HYDRO SEARCH, INC.
A Tetra Tech Company

September 12, 1994
(302483158)

Mr. David Linnear
U. S. Environmental Protection Agency
Region V
77 W. Jackson Boulevard
Chicago, IL 60604

RE: Better Brite RI/FS, DePere, Wisconsin

Dear Mr. Linnear:

Over the past few days we have been gathering pertinent information relating to the size and dimensions of the excavations completed at the Better Brite Chrome Shop and Zinc Shop sites and any soil sample analytical results from soil samples collected outside of the excavated areas. As part of this effort, we reviewed the pollution reports prepared by Mr. Walter Nied, the on-site coordinator for the project, for the time period of July 2, 1992 through August 2, 1993. The review of the pollution reports indicated that there may be additional data available which we do not have copies of. The following is a list of items which we hope you will be able to provide us with or for which you may know who we may contact to obtain the information.

Please send copies of the Pollution Report for the following time periods:

- 6/4 to 6/17/93
- 2/20 to 2/28/93
- 11/13 to 11/24/93

The following items were reported in various pollution reports. We would like to have more information on the location of some of the excavation activities that took place, the location and depths of soil samples, and copies of the analytical reports for the soil samples listed below:

1. The pollution report dated 5/25/93 for the time period 5/14/93 to 5/21/93 states the following under item #4 of the Actions Taken Section: "4) Contaminated surficial soils at the BBC (Better Brite Chrome) facility were scraped approximately 1 foot in an attempt to eliminate the contamination. The scraped areas were sampled for laboratory analysis to evaluate the effectiveness of the scraping."

   If possible, please provide a map showing the locations of the areas where the shallow soil excavation took place or give a brief description of this area. Also, we would like copies of the analytical reports for the soil samples collected from the scraped areas.

175 N. Corporate Drive, Suite 100, Brookfield, Wisconsin 53045 Telephone (414) 792-1282 Facsimile (414) 792-1310

2. The pollution report dated 3/18/93 for the time period 3/12/93 through 3/18/93 states in item #2 of the Actions Taken Section that "Soil was excavated at the BBC facility around the perimeter of the site."

   If possible, please provide a description of the area or a map outlining the area where this excavation activity was completed.

3. The pollution report dated 3/11/93 for the time period 3/5/93 through 3/11/93 states in item #1 of the Actions Taken Section that "surface and 1-foot depth soil samples were collected outside the chrome site excavation area."

   Please provide us with copies of the analytical reports for these samples. Also, if available, provide a description of the sample locations or a map showing the sample locations.

4. In the pollution report dated 3/4/93 for the time period 3/1/93 through 3/4/93, it is stated that "Surface soil samples were collected around the perimeter of the chrome site."

   Please provide us with descriptions of the sample locations or provide a map showing the locations of these sample points. Also, we would like copies of the analytical reports for these soil samples.

5. The pollution report dated 2/19/93 for the time period 2/12/93 through 2/19/93 states in item #3 of the Actions Taken Section that "Soil borings were begun at the BBZ (Better Brite Zinc) facility in order to characterize extent of contamination in areas adjacent to but not encompassed by the ground-water collection system."

   Please provide us with the borehole logs for these soil borings and a description of the borehole locations or a map showing the soil borings. If soil samples from the boreholes were submitted for laboratory analyses, please send us copies of the analytical reports as well.

6. The 2/19/93 pollution report also states in item #7 of the Actions Taken Section that "Additional soil samples were collected from the surface soils of the BBC facility in order to further characterize extent of contamination."

   Please provide us with a description of the sample locations or a map showing the sample locations. We would also like copies of the analytical reports for these soil samples.

7. The pollution report dated 1/22/93 for the time period 1/14/93 through 1/22/93 states in item #4 of the Actions Taken Section that the Phase I boring program at the BBC facility was completed. The 1/14/93 pollution report states that four soil borings were completed at the BBC facility and that samples were collected to a depth of 20 feet at 2-foot intervals. The report also states that the soil samples were to be analyzed for total and TCLP chromium. The 1/7/93 pollution report states that additional soil borings were collected at the BBC facility.

   Please provide us with copies of the borehole logs and analytical results for soil samples collected from these boreholes. We would also like a description of the borehole locations or a map showing the borehole locations.

Finally, we would like any information available regarding the size and dimensions of the excavations completed at both sites. We have rough sketches of the excavations at the Chrome Shop and Zinc Shop sites showing the locations of soil samples which were collected from the bottom of each excavation. Based on these sketches, it appears that the excavation at the Zinc Shop encompassed the area beneath the former location of the Zinc Shop building. The sketch of the Chrome Shop excavation indicates that the soil beneath the former location of the Chrome Shop building was not excavated. The excavation at the Chrome Shop appears to be an L-shaped pit located along the west and south sides of the former location of the Chrome Shop building.

If you have any more information on the size and dimensions of the Chrome Shop and Zinc Shop excavations, please send us copies of the data.

If you require additional information, please do not hesitate to call.

Sincerely,

HYDRO-SEARCH, INC.

Judy L. Fassbender
Senior Hydrogeologist

Mark A. Manthey
Hydrogeologist

JLF/MAM:gf
cc: Kate Freiberg, WDNR Project Manager

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REVISION 2

TASK 2

SAMPLING AND ANALYSIS PLAN

REMEDIAL INVESTIGATION/

FEASIBILITY STUDY

BETTER BRITE PLATING, INC.

DE PERE, WISCONSIN

February 28, 1994

Prepared for:

Wisconsin Department of Natural Resources
101 S. Webster Street
P. O. Box 7921
Madison, Wisconsin 54707-7921

Prepared By:

Simon Hydro-Search
Brookfield Lakes Corporate Center XII
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Brookfield, Wisconsin 53045

Project No. 301483158

simon Environmental

REVISION 2

TASK 2

SAMPLING AND ANALYSIS PLAN
REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
BETTER BRITE PLATING, INC.
DE PERE, WISCONSIN

February 28, 1994

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APPENDIX

1.0 INTRODUCTION

This document presents the Remedial Investigation/Feasibility Study (RI/FS) Sampling and Analysis Plan (SAP) for Better Brite Plating, Inc. (Better Brite) site listed on the National Priorities List (NPL) under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended. Simon Hydro-Search was contracted by the Wisconsin Department of Natural Resources (WDNR) to conduct the RI/FS at the Better Brite site located in De Pere, in accordance with the contract signed by Governor Thompson on July 29, 1991 between the WDNR and Simon Hydro-Search. The purpose of the RI/FS is to determine the nature and extent of currently undefined impacts to ground water, evaluate the results of soil sampling completed by U. S. EPA, as well as assess risks posed by impacts at the site to human health and the environment, and perform a feasibility study of remedial alternatives. If deemed necessary, the design and implementation of selected remedies identified would follow in a Remedial Design/Remedial Action (RD/RA) phase.

The purpose of this SAP is to provide guidance for all field work by defining in detail the sampling and data-gathering methods to be used in the performance of the RI. The SAP identifies the rationale and specific level of effort in data collection. Standard Operating Procedures (SOPs) referenced in this plan for sampling procedures are provided in Appendix A.

Supplemental to this SAP are the following documents which detail the specific methods and procedures to be utilized in the execution of the RI/FS:

- Work Plan: The Work Plan documents the decisions and evaluations made during the scoping process and presents the anticipated RI tasks. It also

details the technical approach, personnel requirements, and schedule for each task;

- Quality Assurance Project Plan (QAPjP): The QAPjP establishes detailed procedures to assure the quality of field and laboratory testing data obtained during the RI/FS;

- Health and Safety Plan (HASP): The HASP describes activities and precautions to be taken during the RI/FS to protect those personnel collecting the data as well as the general public and the environment; and

- Data Management Plan (DMP): The DMP provides specific details for how the data collected during the RI/FS will be recorded, stored, and communicated.

These documents encompass the overall plan for conducting the RI/FS at the site. The Plans are also intended to be flexible and subject to revision as field observations and site conditions warrant.

2.0 PROJECT DESCRIPTION

This section presents a summary of the current site conditions at Better Brite as related to the listing of the site on the National Priorities List (NPL) under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Existing conditions have been described in detail in the Task 1 Site Evaluation Report (HSI, 1992) which compiled and evaluated the existing information for the site, as a precursor to the preparation of the Work Plans.

Better Brite operated two plating facilities in De Pere, Wisconsin. The first facility located at 315 S. 6th Street, the Zinc Shop, began operation in the late 1960s as a chrome-plating operation, and in the 1970s, zinc and other metal plating became the primary operation. Plating continued at the Zinc Shop until 1989. The second facility at 519 Lande Street, the Chrome Shop, conducted chrome plating from the mid 1970s to 1986 and is located 2,000 feet south of the Zinc Shop. Due to their close proximity, these Shops were jointly nominated to the NPL as a single site.

Soils with elevated metal concentrations are present both on and off site (beyond property bounds) as a result of discharges from both Shops. Elevated levels of metals, primarily chromium, and VOCs have been documented in ground water at both Shops.

The City of De Pere's Grant Street municipal well is located approximately 250 feet from the Zinc Shop and the potential for contamination to reach the well is a primary concern. Compounds of concern have not been identified in this well to date. This is one of six municipal wells which service De Pere. Investigations at the site have revealed concentrations of metals and VOCs in excess of ground-water quality standards regulated under Chapter NR140, Wisconsin Administrative Code. Following several investigations at the Zinc and Chrome Shops, a hazard assessment was performed by the Wisconsin

Department of Natural Resources (WDNR) under the authority of the U.S. Environmental Protection Agency (U.S. EPA) utilizing the Hazard Ranking System (HRS). The site qualified for NPL nomination under CERCLA. The Zinc and Chrome Shops were subsequently jointly nominated to the NPL in 1989 and listed in 1990 .

The geology at the site (both shops) is comprised of approximately 30 to 40 feet of unconsolidated glacial deposits overlying bedrock. The unconsolidated deposits consist of glacial lake and till deposits, primarily silty clays. The surficial bedrock consists of 150 feet of Ordovician-age Dolomite of the Sinnipee Group. The Ordovician St. Peter Sandstone and Prairie du Chien Group sandstones are directly beneath the dolomite. These Ordovician sandstones together with the underlying Cambrian Sandstones, are typically 600 to 1800 feet thick. Precambrian-age crystalline basement is present at a depth of 800 to 2,000 feet.

The ground-water aquifers beneath the site include the saturated thickness of the unconsolidated deposits, the dolomite, and the sandstone bedrock aquifers. The dolomite bedrock is considered a separate aquifer from the underlying sandstone units; however, it is thought to be hydraulically connected to the sandstones west of the Fox River and it furnishes only small amounts of water in the area.

Ground-water flow in the silty clay beneath the Zinc Shop is predominantly toward the northwest while at the Chrome Shop, flow is toward the west. Flow directions are likely affected locally by the Fox River and city water supply wells. The water table surface occurs at an average depth of approximately 5 to 15 feet. Strong downward vertical gradients averaging between -0.31 to -0.72 ft/ft were calculated at the Zinc Shop. No information on vertical gradients is available for the Chrome Shop.

Ground-water and soil sampling at the Shops have detected metals and volatile organic compounds (VOCs) at various locations, primarily near the facility buildings. The inorganic analytes of principle interest are chromium, lead, cadmium, and cyanide. The ground-water VOC impacts of concern include trichloroethylene, 1,1,1-trichloroethane, and tetrachloroethylene, which have been detected in the aqueous phase only. Currently, the lateral and vertical extent of impacts to soil and groundwater resulting from Better Brite's operations is not known.

The WDNR and U.S. EPA have conducted limited investigations of soil and ground water at the site since the property owner declared bankruptcy. Interim remedial measures have also been implemented by these agencies. These include a ground-water extraction trench which was installed at the Chrome Shop by Better Brite in 1980 or 1981. Also, the excavation and removal of impacted soils from areas of immediate health concern, and the installation of one extraction well (or sump) at each of the Shops was completed in 1990. Additional excavation of impacted soils at both shops, primarily underlying former foundations, was completed in 1993. Ground-water extraction sumps were constructed in the excavation areas at both shops. These sumps replaced the previous extraction well at the Chrome Shop and the original sump at the Zinc Shop. The ground-water extraction systems at both Shops, and a pretreatment plant at the Chrome Shop are currently in operation.

Potential risk to human health posed by the site is associated primarily with exposure to contaminated surface soils and with ground-water impacts possibly reaching the City of De Pere's municipal water well(s). Private domestic water supply wells also exist in the study area, and their location and present use has been verified by WDNR. Recommendations to abandon these wells or increase sampling frequency have been made or are likely to be made. Surface-water impacts, primarily as overland flow due to discharges from the facilities and precipitation, have been documented at the site.

The data collection needs required to complete the Remedial Investigation/Feasibility Study (RI/FS) will focus on ground-water impacts on- and off-site including preferential contaminant migration along the backfill of buried utilities. Surficial soils were sampled in 1993 by U. S. EPA; this data will be evaluated along with limited subsurface data collected during other IRM activities conducted by U. S. EPA in 1993.

3.0 SAMPLING & ANALYSIS PLAN ORGANIZATION

3.1 RI Field Investigation Subtasks

As addressed in Section 2.0 and in the Site Evaluation Report (SER), historical releases were largely centered in the immediate vicinity of the Shop buildings of the Better Brite Site. Existing data suggest that ground-water impacts associated with each Shop occur as plumes primarily limited to the uppermost hydrostatic units and that the City of De Pere Grant Street municipal well has not detected impacted ground water originating from the site. U. S. EPA collected surficial soil samples in 1993, but the extent of surface soil contamination has not been evaluated at the Shops but was originally thought to be large due to the nature of the contaminants and their ability to migrate with site run-off. The SER also identified known and/or suspected source areas under and adjacent to each former Shop facility which are contributing to ground-water impacts. Soil at these source areas was excavated and landfilled by U. S. EPA in 1993 to remove the known sources.

Based on the compilation and summary of existing data contained in the SER and the reports of IRM activity completed by U. S. EPA in 1992 and 1993, the RI field investigation task has been divided into subtasks in a manner generally conforming with potential Operable Units (OUs) for site remediation during the RD/RA phase. An OU is defined as a discrete action that comprises an incremental step toward comprehensively addressing site problems. The RI field investigation subtasks for the site have been compiled on the basis of specific media (e.g. ground water, soil, etc.), location (e.g. Zinc Shop, Chrome Shop), and/or whether remedial activities to mitigate specific ground-water and soil impacts have potential to be conducted independently as OUs. The RI data collection work elements for these subtasks can be conducted relatively independently and offer the potential to accelerate implementation of a RA in a manner consistent with the NCP.

Where these circumstances exist, an Interim Remedial Measure (IRM) may be accelerated under a focused FS.

Based on the above, existing data contained in the SER and reports of U. S. EPA IRM activity, the following RI field investigation subtasks have been identified:

- Subtask-1: Documented and potential ground-water impacts on- and off-site. Impacted ground water has the potential to affect both public and private water supply systems at the site and may be addressed through an IRM.

- Subtask-2: Documented or suspected impacts to surficial soils on- and off-site, as available from U. S. EPA 1993 sampling results, primarily resulting from surface water runoff and fugitive dust from the site. Surficial soils represent a migration pathway for human exposures at the site and may be addressed through an IRM.

- Subtask-3: Documented or suspected contamination within private residences as a result of contamination originating at the sites (e.g. within sumps). These impacts are not likely to be addressed through an IRM until sources causing interior contamination can be mitigated.

Each of these subtasks apply to both the Zinc and Chrome Shops. The SAP subtasks which apply to the Zinc and Chrome Shops in the following sections are identified by the suffix "Z" or "C", respectively.

3.2 SAP Format

The SAP is organized by each of the above subtasks to address the specific data collection activities necessary to complete the source, physical, contaminant and/or risk assessment characterizations for the site. The following sections encompass the SAP for each subtask and include a summary description of the subtask and existing information, the specific objectives to be achieved by sampling and a summary table of the data quality objectives. The technical approach and rationale behind the sampling plan are also described which includes definition of the scope of investigation. Each subtask also contains one or more figures illustrating the subtask and/or specific sampling locations.

The specific analytical methods to be utilized are tabulated and followed by a summary table of the overall sampling effort. Sampling procedures relevant to each subtask are summarized in Section 15.0 and reference the applicable SOPs contained in Appendix A.

While the SAP is discussed for each subtask individually, it is intended that the results from all data collection activities will be evaluated collectively in preparing Technical Memoranda and the RI Report in describing the nature and distribution of impacts to all media and in determining an appropriate site remedy(ies).

4.0 SUBTASK-1Z: NATURE AND EXTENT OF GROUND-WATER IMPACTS

4.1 Subtask Description

Subtask-1Z involves contamination and migration pathway characterization activities necessary to define the nature and extent of ground-water impacts on- and off-site, confirm the direction of ground-water flow and determine hydraulic characteristics of the unconsolidated deposits and of the upper dolomitic bedrock. Activities necessary to conduct this characterization include constructing additional wells or well nests across the site and on surrounding properties, repairing or abandoning several existing site wells, compiling ground-water elevation data, developing and sampling monitor wells, analyzing ground-water samples for constituents of concern, and collecting and analyzing hydraulic conductivity data for the wells. The wells will be used to evaluate the hydraulic properties of the unconsolidated deposits and dolomitic bedrock, the hydraulic gradients between the unconsolidated deposits and the dolomite and the ground-water flow directions in the bedrock and unconsolidated deposits. This information will then be used to evaluate the nature and extent of impacts in ground water.

Three well nests, consisting of one water table well approximately 20 feet deep and one piezometer approximately 30 feet deep, were installed at the Zinc Shop in 1987 by STS, Inc. The wells were sampled in 1987, 1988 and 1989. The results of the analyses indicated that chromium concentrations exceeded the NR140 (Public Health) Enforcement Standard (ES) in all six of the wells at each sampling with a maximum value of 310 mg/l having been detected. Information on hexavalent chromium content in ground water is not available for the Zinc Shop.

Zinc concentrations have exceeded the NR 140 ES or Preventative Action Limit (PAL) at each of the six wells. Zinc levels were highest in the samples collected in 1988 with values

ranging from 0.029 to 0.158 mg/l. Information on lead in the ground water is sparse but lead concentrations have been detected at levels of up to 0.017 mg/l. Data does not indicate that cadmium concentrations have exceeded PALs to date. Cyanide was detected at levels which exceeded the PAL at all wells and the ES at W-2A. ES's for four VOCs were exceeded in one or more of the wells at the Zinc Shop. ES's were exceeded for carbon tetrachloride, 1,1-dichloroethylene, tetrachloroethylene and trichloroethane.

The direction of regional ground-water flow in the vicinity of the site is generally to the northeast towards the Fox River and Green Bay. However, ground-water flow immediately beneath and adjacent to the site appears to be more complex and influenced by site-specific topography and soil characteristics. Based on water levels measured by STS in 1987 at the original six wells on-site, the flow direction at the water table slopes to the northwest, coincident with surface topography, toward a shallow ravine. The potentiometric surface slope, as measured in the piezometers set above the bedrock surface, is perpendicular to that at the water table, trending toward the northeast (i.e., parallel to the regional ground-water flow).

4.2 Sampling Objectives

The objectives of the sampling and analysis plan for Subtask-1Z include the following:

1. Determine the nature and extent of ground-water impacts originating at the Zinc Shop;

2. Determine if the backfill along the sewer lines is acting as a conduit for migration of contaminants off-site;

3. Determine the vertical gradients in ground water between the silty clay and the dolomite bedrock;

4. Quantify the extent and magnitude of impacts to soil, including metals and/or VOCs through visual inspection for metals and field screening for VOCs;

5. Determine the extent of the silty sandy layer documented in previous investigations at a depth of approximately 15 feet bgs which could potentially represent a significant preferential migration pathway;

6. Evaluate the presence of subsoil fractures and their effect on visible chromium distribution, if present;

7. Characterize subsurface conditions to enable the evaluation of remedial alternatives, if appropriate.

Impacts to ground-water are known at the site based on previous investigations. The nature of the impacts of primary concern (e.g., chromium speciation) have not yet been determined nor has the horizontal or vertical extent of impacts.

4.3 Data Quality Objectives

DQOs for Subtask-1Z will encompass analytical laboratory quality objectives as follows:

Sampling Objective	Parameter	Data Quality Objective
Determine the extent and magnitude of ground-water impacts	TAL Metals and Cyanide TCL VOCs Hexavalent Chromium Total Organic Carbon	Establish presence/absence and vertical/horizontal boundaries of impacts

Sampling Objective	Parameter	Data Quality Objective
Determine the magnitude of ground-water impacts being recovered		Provide data for risk assessment. (DQO Level IV and V)
Determine the potential presence of subsurface soil impacts	Photoionizable VOCs Metals	PID field screening Visual inspection Establish presence/absence and vertical/horizontal boundaries of impacts (DQO Level I)
Determine the Physical Properties of the Soil	Material Properties Testing	(DQO Level III)

4.4 Technical Approach

4.4.1 Installation of Monitor Wells and Piezometers

This task involves installation of 14 wells, consisting of 7 water table wells and 7 piezometers. Three of the piezometers will be completed in dolomitic bedrock and four will be completed in unconsolidated materials, to provide subsurface characterization and hydraulic information for the site vicinity. Figure 4-1 shows the proposed locations for these piezometers and water table wells. Table 4-1 summarizes the rationale for the well locations. The 14 ground-water monitor wells will be installed at eight locations on and adjacent to the site bringing the total number of fully operational monitor wells associated with the Zinc Shop to 16. Three additional wells are currently at the site; however, their integrity is questionable and they will be used only for estimating water elevations.

Three locations will have three well nests consisting of one water table well (approximately 15 feet bgs) one piezometer completed just above the unconsolidated bedrock interface (approximately 30 feet bgs) and a second piezometer set into bedrock (approximately

60 feet bgs). One three-well nest will be located between the Zinc shop property and the municipal well. The water table well (MW-4) and shallow piezometer (MW-4A) for this nest were installed by U. S. EPA in 1993. MW-4 and MW-4A are not included in the 14 wells proposed for installation during the RI. Only the bedrock piezometer (MW-4B) was included in the 14. One of the remaining three-well nests (MW-6 nest) will be located to the south of the Zinc Shop near Butler Street. This will function as the background well location since all flow calculated to date had a northerly component. The remaining three-well nest (MW-5 nest) will be located northeast of the Zinc Shop property to provide adequate triangulation for calculating flow direction and gradients.

Two nests of two wells, each consisting of one water table well (approximately 15 feet bgs) and one piezometer completed above the bedrock (approximately 30 feet bgs) will be installed north and northeast of the Zinc Shop property. One two-well nest (MW-7 nest) will be completed along Sixth Street to the north of the Zinc Shop to evaluate the impacts in ground water in the suspected downgradient direction. The second two-well nest (MW-8 nest) will be located near the municipal well and will be used for determining the extent and magnitude of ground-water impacts and the configuration of the water table and potentiometric surface near the municipal well.

Three locations were selected for installation of water table wells only. One will be located near the intersection of Sixth and Grant Streets to the north of the site, one to the east of the site near the catchment basin for the storm sewer which carries runoff from the site, and the third south of the building to the southeast of the site. These locations were selected to provide additional information on water table configuration and nature and extent of impacts as well as to evaluate potential effects of the underground utilities, especially storm and sanitary sewer lines which parallel the site, and basement sumps on the ground water. The utilities are likely backfilled with sand and/or gravel and because of the significantly higher hydraulic conductivity in the backfill, impacts in ground water are likely to follow the

sewer lines as the preferential migration pathway. The sump at the large building (formerly North American Vanlines) to the southeast of the site acts to extract ground water from the area. This preferential movement will likely affect the local water table configuration.

All the water table wells and shallow piezometers will be advanced using hollow-stem augering techniques. Continuous split-spoon soil samples will be collected during the drilling for the shallow piezometers or water table well in locations where no shallow piezometers are proposed. Soil samples will be visually inspected for chromium bearing materials and screened with a PID to evaluate the potential presence of VOCs. Representative samples from each boring will be examined for the presence of chromium bearing materials and screened for VOC content. Chromium compounds are visible in soils and can be differentiated in the field using a hand lens. These compounds are found predominantly on the fracture planes in clay. Crystalline dichromate is a platey mineral which is bright orange in color. Trivalent chrome precipitates are black or dark green and chromium staining on calcium carbonate turns the crystals bright yellow, making even the micro-crystals of silt size or finer, visible.

Representative soil samples from each varying stratigraphic unit (up to three per well nest location) will be submitted for material properties testing. The deep piezometers will be completed using rotary drilling methods.

The water table wells will be constructed of 2-inch diameter Schedule 40 PVC well casing and 10-foot screens which intercept the water table. The piezometers will be constructed of Schedule 80 PVC with 5-foot screens. Upon completion, the wells will be developed as required by WDNR NR 141, surveyed for elevation and location by a registered surveyor, and tested to estimate hydraulic conductivity (slug or baildown tests). A specific point will also be surveyed to measure water level elevation in the sump to allow for comparison of water level data from the wells.

4.4.2 Ground-Water Sampling

Two rounds of ground-water samples will be collected from each of the new monitor wells and the two new existing monitor wells installed by U. S. EPA in 1993 to profile the potential presence and vertical distribution of impacts, if present. The first round of samples will be collected not more than 30 days following well installation and development, using dedicated PVC bailers to minimize cross-contamination potential. The samples will be collected after purging the well as recommended by WDNR. The second sampling round will be collected approximately 30 days (at a minimum) after the first round.

Ground-water samples will also be collected at the extraction sump for comparison with the results obtained from samples collected from the new and existing monitor wells. Two rounds of ground-water samples will be collected from the sump coincident with the monitor well sampling events. The sump sampling procedure will be as follows:

- The sump will be purged until dry, if possible;
- Fluid levels in the sump will be allowed to recover enough to allow collection of the required sample volume; and
- Sampling will be performed using either a dedicated or disposable PVC bailer or using the existing pump if the condition of the existing equipment is appropriate for sampling and will not compromise the sample quality.

These data will be used to evaluate the effectiveness of the sump in removing impacted ground water as well as to confirm the impact distribution in the ground water.

All ground-water samples will be analyzed for TAL metals and cyanide, TCL VOCs, hexavalent chromium and total organic carbon. The analytical results of these samples will be used to determine the nature and extent of ground-water impacts.

4.4.3 Fluid Level Measurements

Fluid level measurements collected from the new monitor wells installed during this subtask characterization, from the pre-existing monitor wells installed during all earlier investigations, and from the ground-water extraction sump (when fully recovered) will be compiled, analyzed and interpreted in order to characterize migration pathways and ground-water flow direction under the site. The preparation of water table and potentiometric surface maps for the area will be included in the analysis and interpretation of this data. However, if the ground-water migration pathways and flow directions are not sufficiently characterized, the sampling and analysis plan may be revised for installation of additional monitor wells/piezometers prior to ground-water contamination characterization. WDNR approval will be obtained prior to initiating any significant changes to the plans.

4.4.4 Field Investigation Procedures

Field investigation procedures applicable to the activities described above are summarized in Section 15.0 of this SAP. Detailed procedures are contained in Appendix A.

4.5 Analytical Requirements

Media	Parameters	Method
Ground Water	TAL Metals, CN	CLP-RAS
	TCL VOCs	CLP-RAS
	Hexavalent Chromium	CRL-SOP
	TOC	CLP-SAS
Soils	VOCs	HNu PID model PI-101
	Material Property Testing	(field screening)
		Non-CLP-ASTM

4.6 Summary

In summary, seven water table wells and seven piezometers will be installed as part of this characterization. Ground-water samples will be collected from 16 monitor wells and the ground-water extraction sump as part of the contaminant characterization. Table 4-2 summarizes the site investigation activities necessary to characterize Subtask-1Z. The results of these activities will be reported in the Remedial Investigation Report.

5.0 SUBTASK-2Z DOCUMENTED OR SUSPECTED IMPACTS TO SURFICIAL SOILS

5.1 Subtask Description

Subtask-2Z involves characterization of documented or suspected impacts to surficial soils on- and off-site primarily resulting from surface water run-off and fugitive dust from the site. No direct air monitoring or surface water characterization is proposed at this time. Activities necessary to conduct this characterization include using analytical results from samples collected by U. S. EPA in 1993 to determine the nature, magnitude and extent of impacts to surficial soils to evaluate the risk to public health presented by the soils.

Impacts to surficial soils at the site have been previously evaluated through laboratory analysis of soil samples. Prior to 1993, surface sampling had been conducted primarily to confirm the presence of contamination at the Zinc Shop, and also in the yards and gardens of adjacent homes to determine whether contaminants were present above acceptable levels. Sampling prior to 1993 included samples collected during three sampling events. In May of 1983, soil samples were collected from an area with absent or stressed vegetation between the sidewalk and the 6th Street curb at the Zinc Shop. The samples contained zinc at 1.5 mg/kg, and cadmium and cyanide at levels in excess of background concentrations.

In July, 1988, five soil samples from the top 6 inches of soil were collected at or near the Zinc Shop. One sample was collected from the gravel driveway, 14 yards from the northeast corner of the building. A second was collected near the middle of the south side of the building, and the third sample and fourth sample, a duplicate, were collected from the east side of the building near a recent spill. The fifth sample was collected at

the southwest corner of the Smet property (401 S. Sixth Street) as a potential background sample. Analysis of the samples confirmed that the zinc, chromium, lead, cyanide and barium were present at levels above background in the samples from the Zinc Shop property. Three pesticides, DDD, DDE, and DDT were detected in the soil sample from the east side of the building. Three semi-volatiles; benzyl alcohol, 2-methyl-phenol, and benzoic acid were detected in the samples from the driveway. However, the concentrations of pesticides and semi-volatiles detected were low, and are not thought to be the result of activities at Better Brite.

In September of 1985, six soil samples were collected from locations where liquids had been observed leaking from the building and areas with stressed or no vegetation. This was primarily along the south property line and along the east side of the building. Elevated levels of zinc, chromium, and lead were prevalent in the samples. Cadmium and cyanide were also detected in most locations above background levels.

Also, in February of 1980, storm water runoff noted at the site as ponded water was sampled and found to contain between 8.1 and 56 mg/kg zinc, between <0.1 and 0.6 mg/kg chromium and between 0.1 and 0.6 mg/kg cyanide. No other sampling of storm water runoff has been completed at the site.

In 1993, U. S. EPA conducted surficial soil sampling on the Zinc Shop and surrounding properties. Discharge of liquid waste is known to have originated along the sill plate on the south side of the building, along the west side of the building and at the loading dock area at the north side of the building. The potential for surficial soil impacts in these areas as well as along migration pathways emanating from these areas are high and thus, was a key focus of the surficial soil investigation.

The area included in the surficial soil investigation extends north to include the residential property north of the Zinc Shop, east to the railroad tracks, south to Butler Street and west to the west side of Sixth Street. Surface soil samples were submitted to a Close Support Laboratory (CSL) for total chromium analysis. These results were used as the basis for possible supplementary sampling to define the extent of impacts and in selection of samples submitted to the CLP laboratory.

Soil samples were collected from the top 0 to 6 inches of surficial materials (excluding surface gravel and vegetation) across the site, and from 2.5 to 3.0 feet in depth in areas not excavated surrounding the old building location. The top 0 to 6 inches and 2.5 to 3.0 feet of soil were sampled to provide an estimate of the potential exposure to contaminants through possible direct contact and possible residential digging activities such as fence installation or rototilling. Approximately 15 reconnaissance samples from 0 to 6 inches and three from 2.5 to 3.0 feet were collected. The 0 to 6 inch samples were submitted for analysis of metals and cyanide. The 2.5 to 3.0 feet samples were submitted for metals, cyanide and VOC analysis. Sample locations are indicated on Figure 5.1. Background samples were also collected from the areas near the site, but from areas outside the zone of impacted surface soil.

5.2 Sampling Objectives

The objectives of the sampling and analysis plan for Subtask-2Z include the following:

1. Evaluate the existence of metal impacted soils adjacent to the Zinc Shop building, especially in areas where releases are known to have occurred, and in surface water run-off channel ways using results of analyses for samples collected in 1993 by U. S. EPA;

2. Determine the quantity, extent and magnitude of impacts to the soil in areas of known releases and in surface-water run-off channel ways using the U. S. EPA 1993 data;

3. Determine background concentrations of metals in surface soils in areas adjacent to the Zinc Shop property from the U. S. EPA 1993 or other data; and

4. Characterize surficial soil conditions to enable evaluation of remedial alternatives, if appropriate.

5.3 Data Quality Objectives

DQOs for Subtask-2Z will not include analytical laboratory quality objectives. Analytical laboratory data to be used for this subtask was generated by U. S. EPA in 1993.

Sampling Objective	Parameter	Data Quality Objective
Determine presence of impacts in surface soils	Total Chromium Lead	Screening (DQO Level III*)
Determine extent and magnitude of impacted surface soil	TAL Metals and Cyanide TCL VOCs**	Establish presence/absence and magnitude and horizontal limits of impacts Provide data for risk assessment. (DQO Level IV and V)

* Close support laboratory
** Samples from 2.5 to 3.0 feet below ground surface only

5.4 Technical Approach

5.4.1 Scope of Investigation

Results of the 1993 U. S. EPA sample collection and analysis activities will be evaluated to determine the extent and magnitude of impacted surface soil. This information will be used in the risk assessment and to determine remedial alternatives, if required.

5.4.2 Sampling Procedures

No field activities are planned for this subtask.

5.5 Analytical Requirements

No field screening or laboratory analyses are included for this subtask. All analytical work was completed in 1993 by the U. S. EPA.

5.6 Summary

Analytical results from surficial soil sampling completed by the U. S. EPA in 1993 will be compiled and evaluated. No additional soil sampling is planned. The results of this activity will be reported in the Remedial Investigation Report.

6.0 SUBTASK-3Z: BASELINE RISK ASSESSMENT CHARACTERIZATIONS

6.1 Subtask Description

Subtask-3Z involves baseline risk assessment characterizations to evaluate whether there is risk to human health and/or the environment through exposures at concentrations of concern. These activities include the following:

- General characterization of the population within 1,200 feet of the site and development of a land use map;
- Identification of sensitive receptors, such as schools, hospitals and nursing homes within 1,200 feet of the site;
- Sampling of the municipal water supply well potentially downgradient of the site;
- Evaluating hexavalent chromium, metals and cyanide content of water accumulating in basement floor sumps of five buildings adjacent to the site; and,
- Identifying, generally, flora and fauna in and around the site, species in the human food chain, and critical habitats.

Existing data from multiple sources will be utilized for completion of the above activities. The results of this effort will be reported in the Remedial Investigation Report with recommendations, if appropriate, for further investigation or sampling.

6.2 Sampling Objectives

As indicated above, existing data, primarily the results of the surface soil sampling completed by the U. S. EPA in 1993, as well as the results of the municipal well sampling and basement sump sampling will be used to address the activities encompassed by this subtask.

6.3 Data Quality Objectives

DQOs for Subtask-3Z will encompass analytical laboratory quality objectives as follows:

Sampling Objective	Parameter	Data Quality Objective
Determine the nature and magnitude of compounds in the basement sumps of five residences adjacent to the site which potentially originated at the site	TAL Metals and Cyanide TCL VOCs Hexavalent Chromium	Establish presence/ absence and horizontal boundaries of impacts Provide data for risk assessment (DQO Level V)
Determine the nature and magnitude of compounds in ground water, if present, at the municipal well adjacent to the site	TAL Metals and Cyanide (low levels) TCL VOCs (low levels) Hexavalent Chromium	Establish presence/ absence and horizontal boundaries of impacts Provide data for risk assessment (DQO Level V)

The specific technical approach of the investigation for Subtask-3Z is discussed below.

6.4 Technical Approach

6.4.1 Human Population Characterization

Municipal Well Sampling

Characterization of the area's human population will be evaluated based on existing information. The activities encompassed in this characterization will include sampling of nearby downgradient City of De Pere's Grant Street Municipal water supply well, and identification of sensitive receptors in the area.

The existence of private water supply wells in the vicinity of the Zinc Shop was addressed by WDNR in the fall of 1991. This effort included the review of WDNR Well Constructor's Reports and field verification of abandonment of private wells of interest. WDNR and the City of De Pere conducted a door-to-door survey of 91 residences and business in the vicinity of both the Chrome and Zinc Shops in September of 1991. Although two private wells, currently in use, and five unused wells were identified in the vicinity of the Better Brite site, all wells in use were near the Chrome Shop. No private wells near the Zinc Shop were identified for potential sample collection. The Grant Street municipal well will be sampled on two events which will coincide with monitoring well sampling in Subtask-1Z. The results of this assessment will be used in evaluating the potential for human exposure. The sampling procedure for the municipal well will follow WDNR guidelines for municipal well sampling.

Land Use

The population of the area in the vicinity (1,200 ft. radius) of the Zinc Shop potentially exposed to impacted media will be described. This effort will consist of reviewing a recent

aerial photograph of the area to delineate residential homes, commercial and industrial properties. A current land use map for the study area will be prepared presenting this information.

Sensitive human populations will be identified using existing information on the location of hospitals, schools and nursing homes within a 1,200 ft. radius of the site property. This information will be highlighted on the land use map.

In-Home Sampling

Contaminants have the potential to enter residential homes adjacent to the site via ground water seeping into basements. Sampling of selected basement sumps in one event will be used to estimate risks posed by these chemicals to local residents. A total of five homes will be sampled as shown on Figure 6-1. The sumps will be sampled by purging three sump volumes or purging the sump dry, whichever is less, and allowing sufficient recovery to collect the required sample volume. The sample will be collected either from the pump, if possible and it is determined that sample integrity will not be compromised, or using a disposable bailer or transfer container.

6.4.2 Ecological Characterization

The ecological characterization will include general identification of flora and fauna in and around the site. WDNR records will be consulted regarding the potential existence of critical habitats and endangered or threatened species known in the area. The Natural Resources Trustee will be contacted to determine if other ecological data are available that may be relevant to the investigation. Existing data sources will be compiled and evaluated relative to the presence of sensitive ecological resources in the area.

6.4.3 Field Investigation Procedures

The Grant Street municipal well and water accumulated in basement floor sumps of residences adjacent to the site will be sampled and samples will be submitted for analysis of the parameters listed in Section 6.5

6.5 Analytical Requirements

Media	Parameters	Method
Ground Water		
Municipal Well	TAL Metals and Cyanide (low levels)	CLP-SAS
	TCL VOCs (low levels)	CLP-SAS
	Hexavalent Chromium	CRL-SOP
Basement Floor Sump	TAL Metals and Cyanide	CLP-RAS
	TCL VOCs	CLP-RAS
	Hexavalent Chromium	CRL-SOP

6.6 Summary

A summary of site investigation activities for Subtask 3Z is shown on Table 6-1. The results of Subtask-3Z activity will be reported for risk characterization in the Remedial Investigation Report, and may contain recommendations for further sampling, as appropriate.

7.0 SUBTASK-1C: NATURE AND EXTENT OF GROUND-WATER IMPACTS

7.1 Subtask Description

Subtask-1C involves contamination and migration pathway characterization activities necessary to define the nature and extent of ground-water impacts on- and off-site, confirm the direction of ground-water flow and determine hydraulic characteristics of the unconsolidated deposits and of the upper dolomitic bedrock. Activities necessary to conduct this characterization include constructing additional well nests across the site and on surrounding properties, repairing or abandoning several existing site wells, developing and sampling monitor wells, analyzing ground-water samples for constituents of concern and collecting and analyzing hydraulic conductivity data for the wells. The wells will be used to evaluate the hydraulic properties of the unconsolidated deposits and dolomitic bedrock, the hydraulic gradients between the unconsolidated deposits and the dolomite and the ground-water flow directions in the bedrock and unconsolidated deposits. This information will then be used to evaluate the nature and extent of impacts on ground water. A separate part of the Subtask-3C will involve the sampling of off-site private water supply wells near the site which have been identified by the WDNR.

Ten wells, consisting of nine water table wells and one piezometer ranging from 5.5 to 27 feet deep were installed at the Chrome Shop in 1979 by STS, Inc. Seven additional wells consisting of four water table wells, ranging from 19 to 37 feet deep, and three piezometers, ranging from 56 to 63 feet deep, were installed in 1987 by STS, Inc. (Figure 7-1). The 1979 wells were sampled in 1979 and 1980, and the seven wells installed in 1987 were sampled in 1987, 1988 and 1989. The results of the analyses indicated that chromium concentration exceeded the NR140 Enforcement Standard (ES) with highest levels in the wells to the west - southwest of the Chrome Shop building. A maximum value of 600 mg/l total chromium was detected. Information on hexavalent chromium content in ground water available for

the Chrome Shop indicates values of 600 mg/l as well. Elevated cadmium and lead concentrations were also detected in several wells.

The direction of regional ground-water flow in the vicinity of the site is generally to the northeast towards the Fox River and Green Bay. However, ground-water flow immediately beneath and adjacent to the site appears to be more complex and influenced by site-specific topography and soil characteristics. Based on water levels measured by STS at the seven wells installed in 1987, the flow direction at the water table slopes to the west, coincident with surface topography. The potentiometric surface slope has not been determined due to the lack of data for the site.

An evaluation of the integrity of the monitor wells was completed by WDNR in 1991. Only four wells at the site, 101, 101A, 102, and 104A, were thought to be adequate for use in the RI. In 1994, the wells were re-evaluated by Simon Hydro-Search. Well 101A had sustained damage during IRM activities completed by U. S. EPA in 1993 and is no longer useable for sampling due to kinked well casing at about 6 feet below ground surface. It is still useful for obtaining water elevation measurements. Some adjustment to the well casing and protector tops will be required along with repairs to surface seals for wells 101 and 104A because soils surrounding the monitor wells were excavated during the IRM activities.

7.2 Sampling Objectives

The objectives of the sampling and analysis plan for Subtask-1C include the following:

1. Determine the nature and extent of ground-water impacts originating at the Chrome Shop;

2. Determine if the backfill along the sewer lines is acting as a conduit for migration of contaminants off-site;

3. Determine the vertical gradients in ground water between the silty clay and the dolomite bedrock;

4. Quantify the extent and magnitude of impacts to soil, including metals and/or VOCs through visual inspection for metals and field screening for VOCs;

5. Evaluate the presence of subsoil fractures and their effect on visible chromium distribution, if present; and

6. Characterize subsurface conditions to enable the evaluation of remedial alternatives, if appropriate.

Impacts to ground-water are known at the site based on previous investigations. The nature of the impacts of primary concern (hexavalent chromium) have not yet been determined nor has the horizontal or vertical extent of impacts.

7.3 Data Quality Objectives

DQOs for Subtask-1C will encompass analytical laboratory quality objectives as follows:

Sampling Objective	Parameter	Data Quality Objective
Determine the extent and magnitude of ground-water impacts	TAL Metals and Cyanide TCL VOCs Hexavalent Chromium Total Organic Carbon	Establish presence/absence and vertical/horizontal boundaries of impacts
Determine the magnitude of ground-water impacts being recovered		Provide data for risk assessment. (DQO Level IV and V)

Sampling Objective	Parameter	Data Quality Objective
Determine the potential presence of subsurface soil impacts	Photoionizable VOCs Metals	PID field screening Visual inspection Establish presence/absence and vertical/horizontal boundaries of impacts (DQO Level I)
Determine the physical properties of the soil	Material Properties Testing	Provide data for determining contaminant migration potential (DQO Level III)

7.4 Technical Approach

7.4.1 Installation of Monitor Wells and Piezometers

This task involves installation of 18 wells, consisting of 9 water table wells and 9 piezometers with 4 piezometers completed in dolomitic bedrock and 5 in unconsolidated materials, to provide subsurface characterization and hydraulic information for the site. Figure 7-1 shows the proposed locations for the new piezometers and water table wells. Table 7-1 summarizes the rationale for the well locations. Initially, the 18 ground-water monitor wells proposed in this subtask will be installed at 9 locations on and adjacent to the site bringing the total number of functional monitor wells associated with the Chrome Shop to 21. Three of the 13 existing wells will be used to obtain near source composition information and water level elevation data. Nine of the other wells at the site remaining from previous investigation will also be used for obtaining water level measurements.

Four locations will have three well nests consisting of one water table well (approximately 15 feet bgs) one piezometer completed just above the unconsolidated bedrock interface (approximately 30 feet bgs) and a second piezometer set into bedrock (approximately 60 feet bgs). The three 3-well nests will be located so that they surround the former Chrome Shop area with one well located on the north (MW-106 nest), the east (MW-107 nest), the south (MW-108 nest), and the west (MW-109 nest) sides of the former Chrome Shop.

One nest of two wells, consisting of one water table well (approximately 15 feet bgs) and one piezometer completed above the bedrock (approximately 30 feet bgs) will be installed to the west of the Chrome Shop property. This 2-well nest (MW-110 nest) will be completed on the west side of the surface water drainage way to evaluate the extent of contaminants which may have originally traveled in the surface water drainage way.

Four locations were selected for installation of a water table well only (MW-111, MW-112, MW-113, and MW-114). These locations were selected to provide additional information on water table configuration and/or nature and extent of impacts based on limited information on ground-water flow directions and areas potentially impacted by contaminated surface runoff.

All the water table wells and shallow piezometers will be advanced using the hollow-stem auger method of drilling. Split-spoon samples will be continuously collected during drilling of the shallow piezometers or water table wells where no shallow piezometer is proposed. The deep piezometers will be completed using rotary drilling techniques. Standard Operating Procedures will be followed and are described in SAP Appendix A.

Soil samples collected during drilling will be visually inspected for chromium bearing materials and screened with a PID to evaluate the potential presence of VOCs. Representative samples from each boring will be examined for the presence of chromium

bearing materials and screened for VOC content. Chromium compounds are visible in soils and can be differentiated in the field using a hand lens. These compounds are found predominantly on the fracture planes in clay. Crystalline dichromate is a platey mineral which is bright orange in color. Trivalent chrome precipitates are black or dark green and chromium staining on calcium carbonate turns the crystals bright yellow, making even the micro-crystals of silt size or finer, visible. Representative soil samples from each varying stratigraphic unit (up to three per well nest location) will be submitted for material property testing as listed in Section 7.5.

The water table wells will be constructed of 2-inch diameter Schedule 40 PVC well casing and a 10-foot screen which intercepts the water table. To characterize geology and hydrogeology, all of the piezometers will have 5-foot screens, and the bedrock piezometers will be constructed using Schedule 80 PVC. Upon completion, the wells will be developed as required by WDNR NR 141, surveyed for elevation and location by a registered land surveyor, and hydraulically tested using slug or baildown tests. A specific point will also be surveyed to measure water level elevation in the sump to allow for comparison of water level data from the wells.

7.4.2 Fluid Level Measurements

Fluid level measurements collected from the new wells and piezometers installed during this subtask characterization from the ground-water extraction collection systems (if fully recovered), and from the pre-existing wells installed during earlier investigations will be compiled, analyzed and interpreted in order to characterize migration pathways and ground-water flow direction at the site. Included in the analysis and interpretation of this data will be the preparation of three ground-water flow maps for the area, a water table map, a potentiometric surface map using the wells screened immediately above the bedrock, and a second potentiometric surface map using the wells completed in the bedrock. If, after

preliminary analysis of the data and completion of the ground-water flow maps, the ground-water migration pathways and flow directions are not sufficiently characterized, the work plan may be revised for installation of additional monitor wells/piezometers prior to the ground-water contaminant characterization.

7.4.3 Ground-Water Sampling

Two rounds of ground-water samples will be collected from the new wells and three of the existing wells to profile the distribution of impacts. The samples will be collected using dedicated PVC bailers after purging the well as recommended by WDNR. The second sampling round will be collected approximately 30 days (minimum) after the first round.

Ground-water samples will also be collected at the extraction sump and the collection trench for comparison with the results obtained from samples collected from the new and existing monitor wells. Two rounds of ground-water samples will be collected from the sump and trench coincident with the monitor well sampling events. The sump and trench sampling procedures will be as follows:

- The sump or trench will be purged until dry, if possible;
- Fluid levels in the sump or trench will be allowed to recover enough to allow collection of the required sample volume; and
- Sampling will be performed using either a dedicated or disposable PVC bailer or using the existing pump if the condition of the existing equipment is appropriate for sampling and will not compromise the sample quality.

These data will be used to evaluate the effectiveness of the sump and trench in removing impacted ground water as well as to confirm the impact distribution in the ground water.

All ground-water samples will be analyzed for TAL metals and cyanide, TCL VOCs, hexavalent chromium and total organic carbon. The analytical results of these samples will be used to determine the nature and extent of ground-water impacts.

7.4.4 Field Investigation Procedures

Field investigation procedures applicable to the activities described above are summarized in Section 15.0 of this SAP. Detailed procedures are contained in Appendix A.

7.5 Analytical Requirements

Media	Parameters	Method
Ground Water	TAL Metals and Cyanide	CLP-RAS
	TCL VOCs	CLP-RAS
	Hexavalent Chromium	CRL-SOP
	Total Organic Carbon	CLP-SAS
Soil	VOCs	HNu PID Model PI-101 (field screening)
	Material Property Testing	Non-CLP-ASTM

7.6 Summary

Nine water table wells and nine piezometers will be installed as part of this characterization. Ground-water samples will be collected from each new well, three existing wells, and the ground-water extraction sump and collection trench as part of the contaminant characterization. Table 7-2 summarizes the site investigation activities necessary to characterize Subtask-1C. The results of these activities will be reported in the Remedial Investigation Report.

8.0 SUBTASK-2C DOCUMENTED OR SUSPECTED IMPACTS TO SURFICIAL SOILS

8.1 Subtask Description

Subtask-2C involves characterization of documented or suspected impacts to surficial soils on- and off-site primarily resulting from surface water run-off and fugitive dust from the site. No direct air monitoring or surface water characterization is proposed at this time. Activities necessary to conduct this characterization include using analytical results from samples collected by U. S. EPA in 1993 to determine the nature, magnitude and extent of impacts to surficial soils, and evaluate the risk to public health presented by the soils and runoff.

Impacts to surficial soils at the site have been previously evaluated through the laboratory analysis of soil samples. Prior to 1992, surface sampling had been conducted primarily to confirm the presence of contamination at the Chrome Shop, and also in the yards and gardens of adjacent homes to determine whether contaminants were present above acceptable levels. Sampling prior to 1992 included samples collected during at least four sampling events. Prior to April of 1980, surficial soil contamination had been documented to the south and west of the Chrome Shop and in the Konrath's garden soils. The maximum soil concentration of total chromium encountered in investigations prior to 1980 was 1,400 mg/kg directly west of the facilities building. The average total chromium concentration in the contaminated area was approximately 190 mg/kg (dry soil basis).

In April, 1986, three surface soil samples were collected near the site boundary on the south and southwest side of the Chrome Shop. Chromium concentrations ranged from 250 mg/kg to 510 mg/kg in the soil. In June of 1986, five additional surface soil samples

were collected. Three were collected off-site and two on-site. High hexavalent chromium was detected in the soils from on-site. One of the samples, collected in the area adjacent to the cyclone unit which was part of the buildings ventilation system, contained 14,100 mg/kg hexavalent chromium. A fourth sampling event occurred in 1988. Four surface soil samples were collected on and adjacent to the Chrome Shop property. The concentrations of chromium in these samples ranged from 433 mg/kg to 2,250 mg/kg. One sample collected near the southeast property corner contained lead at a concentration of 7,900 mg/kg. In 1992 and 1993, the U. S. EPA conducted surficial soil sampling at the Chrome Shop and surrounding properties.

Discharge of liquid wastes are known to have originated at the loading dock on the west side of the main building, and are suspected along the east and south sides of the building and at the storage building to the north of the main building. The former drum and pail storage areas to the east of the main building, as well as the roll-off box storage area, the holding pond, and the former shed locations were also areas for investigation. The potential for surficial soil impacts in these areas as well as along migration pathways emanating from these areas are high and thus, this was a key focus of the surficial soil investigation.

The area included in the surficial soil investigation extended well beyond the site boundaries to enable the collection of background samples. The area extends north to include the residential property on the south side of Lande Street, east and south to the railroad tracks, and west to the properties along the east side of Sixth Street. For screening purposes, surface soil samples were submitted to a Close Support Laboratory (CSL) for total chromium analysis. These results were used as the basis for possible supplementary sampling to define the extent of impacts and in selection of samples which were subsequently be submitted to the CLP laboratory.

In November of 1992, soil samples were collected from the top 0 to 6 inches of surficial materials (excluding surface gravel and vegetation) and from 2.5 to 3.0 feet. The top 0 to 6 inches of soil was sampled to provide an estimate of the potential exposure to contaminants through possible dust and direct contact and the 2.5 to 3.0-foot depths were sampled to estimate possible exposures due to activities such as digging or planting. Thirty-nine reconnaissance samples (including samples from both depths) were collected for preliminary screening at the CSL. Sample locations for specific potential release areas were selected to provide a representative sample. Samples were analyzed for total chromium and several for lead for screening purposes. Fifteen sample locations (from 0 to 6 inches and/or 2.5 to 3.0 feet) with the highest total chromium levels or total lead were submitted for CLP laboratory analysis of TAL metals and cyanide. Samples from 2.5 to 3.0 feet were also analyzed for TCL VOCs. Sample collection locations are indicated on Figure 8-1.

Primary areas of focused sampling included the drainage swale located along the railroad tracks to the southeast of the main Chrome Shop building, the former sheds, and other storage areas, the former holding pond area, french drain treatment area, and the backyards of residents living downgradient of the site. Background samples were also collected from the areas near the site, but from areas likely to be outside the zone of impacted surface soil.

8.2 Sampling Objectives

The objectives of the sampling and analysis plan for Subtask-2C include the following:

1. Evaluate the existence of metal impacted soils, especially in areas where releases are known to have occurred and in surface water run-off channel ways, using results of analyses for samples collected in 1992 and 1993 by U. S. EPA;

2. Determine the quantity, extent, and magnitude of impacts to the soil in areas of known releases and in surface-water run-off channel ways using the U. S. EPA 1992 and 1993 data;

3. Determine background concentrations of metals in surface soils in areas adjacent to the Chrome Shop property from the 1992 and 1993 U. S. EPA or other data; and

4. Characterize surficial soil conditions to enable evaluation of remedial alternatives, if appropriate.

8.3 Data Quality Objectives

DQOs for Subtask-2C will not include analytical laboratory quality objectives. Analytical laboratory data to be used for this subtask was generated by U. S. EPA in 1992 and 1993 as follows:

Sampling Objective	Parameter	Data Quality Objective
Determine presence of impacts in soils	Total Chromium Lead	Screening (DQO Level III)*
Determine extent and magnitude of impacted surface soil	TAL Metals and Cyanide TCL VOCs	Establish presence/absence and magnitude and horizontal limits of impacts Provide data for risk assessment. (DQO Level IV and V)

* Close Support Laboratory

8.4 Technical Approach

8.4.1 Scope of Investigation

Results of the 1992 and 1993 U. S. EPA sample collection and analysis activities will be evaluated to determine the extent and magnitude of impacted surface soil. This information will be used in the risk assessment and to determine remedial alternatives, if required.

8.4.2 Sampling Procedures

No field investigation activities are planned for this subtask.

8.5 Analytical Requirements

No analytical requirements are included in this subtask. All analytical work was completed by U. S. EPA in 1992 and 1993.

8.6 Summary

Analytical results from surficial soil sampling completed by U. S. EPA in 1992 and 1993 will be compiled and evaluated. No additional soil sampling is planned. The results of this activity will be reported in the Remedial Investigation Report.

9.0 SUBTASK-3C: BASELINE RISK ASSESSMENT CHARACTERIZATIONS

9.1 Subtask Description

Subtask-3C involves baseline risk assessment characterizations to evaluate whether there is risk to human health and or the environment through exposures at concentrations of concern. These activities include the following:

- General characterization of the population within 1,200 feet of the site and development of a land use map;
- Identification of sensitive receptors, such as schools, hospitals and nursing homes within a 1,200 foot radius of the site;
- Sampling of the one known private water supply well downgradient of the site;
- Evaluating the hexavalent chromium, metals, and cyanide content of water in basement floor sumps at five adjacent buildings; and
- Identifying generally, flora and fauna in and around the site, species in the human food chain, and identification of critical habitats.

Existing data from multiple sources will be utilized for completion of the Subtask-3C activities. The results of this effort will be reported in the Remedial Investigation Report with recommendations, if appropriate, for further investigation or sampling.

9.2 Sampling Objectives

As indicated above, existing data as well as results of surface soil sampling (Subtask-2C), completed by U. S. EPA in 1992 and 1993, and the results of private well and basement sump sampling analysis will be used to address the activities encompassed by this subtask.

9.3 Data Quality Objectives

DQOs for Subtask-3C will encompass analytical laboratory quality objectives as follows:

Sampling Objective	Parameter	Data Quality Objective
Determine the nature and magnitude of compounds in the basement sumps of five residences adjacent to the site which potentially originate at the site	TAL Metals and Cyanide TCL VOCs Hexavalent Chromium	Establish presence/absence and horizontal boundaries of impacts
		Provide data for risk assessment (DQO Level IV and V)
Determine the nature, extent, and magnitude of compounds in the one private well identified in the residences downgradient from the site	TAL Metals and Cyanide (low levels) TCL VOCs (low levels) Hexavalent Chromium	Establish presence/absence and horizontal boundaries of impacts
		Provide data for risk assessment (DQO Level V)

The specific technical approach of the investigation for Subtask-3C is discussed below.

9.4 Technical Approach

9.4.1 Human Population Characterization

Private Well Sampling

Characterization of the area's human population will be evaluated based on existing information. The activities encompassed in this characterization will include sampling of one nearby downgradient private water supply well and identification of sensitive receptors in the area.

The existence of private water supply wells in the vicinity of the site was addressed by WDNR in the fall of 1991. This effort included a review of WDNR Well Constructor's Reports and field verification of abandonment of private wells of interest. WDNR and the City of De Pere conducted a door-to-door survey of 91 residences and business in the vicinity of the Shops in September of 1991. Two private wells, currently in use, and five unused wells were identified in the vicinity of the Chrome Shop site. One of the wells currently in use was sampled by WDNR and continued periodic sampling is anticipated. For this investigation, the nearest of the operable wells found will be sampled. The results of this sampling will be used in evaluating contaminant extent and the potential for human exposure.

Land Use

The population of the area in the vicinity (1,200 ft. radius) of the Chrome Shop potentially exposed to impacted media will be described. This effort will consist of reviewing a recent aerial photograph of the area to delineate residential homes, commercial and industrial

properties. A current land use map for the study area will be prepared presenting this information.

Sensitive human populations will be identified using existing information on the location of hospitals, schools and nursing homes within a 1,200 ft. radius of the site property. This information will be highlighted on the land use map.

In-Home Sampling

Contaminants have the potential to enter residential homes adjacent to the site via ground water seeping into basements. Sampling of selected basement floor sumps in one event will be used to estimate risks posed by these chemicals to local residents. A total of five homes will be sampled as shown on Figure 9-1. The sumps will be sampled by purging three sump volumes or purging the sump dry, whichever is less, and allowing sufficient recovery to collect the required sample volume. If possible, the sample will be collected from the pump, if it is determined that sample integrity will not be compromised, or using a disposable bailer or transfer container.

9.4.2 Ecological Characterization

The ecological characterization will include general identification of flora and fauna in and around the site. WDNR records will be consulted regarding the potential existence of critical habitats and endangered or threatened species known in the area. The Natural Resources Trustee will be contacted to determine if other ecological data are available that may be relevant to the investigation. Existing data sources will be compiled and evaluated relative to the presence of sensitive ecological resources in the area.

9.4.3 Field Investigation Procedures

One private water supply well as well as water accumulated in five basement floor sumps of residences adjacent to the site will be sampled and samples will be submitted for analysis of the parameter listed in Section 9.5.

9.5 Analytical Requirements

Media	Parameters	Method
Residential Well	TAL Metals and Cyanide (low levels)	CLP-SAS
	TCL VOCs (low levels)	CLP-SAS
	Hexavalent Chromium	CRL-SOP
Basement Floor Sump	TAL Metals and Cyanide	CLP-RAS
	TCL VOCs	CLP-RAS
	Hexavalent Chromium	CRL-SOP

9.6 Summary

A summary of site investigation activities for Subtask-3C is shown on Table 9-1. The results of this activity will be reported for risk characterization in the Remedial Investigation Report, and may contain recommendations for further sampling, as appropriate.

10.0 PERMITTING AND LICENSING REQUIREMENTS

This section identifies the RI activities anticipated to require permits and/or licenses.

10.1 Subsurface Exploration

Permits required for subsurface exploration include contacting Digger's Hotline for utility clearances prior to soil disturbance activities. As appropriate, the City of De Pere will also be contacted regarding the existence of subsurface infrastructures, such as storm sewers, water lines, etc.

10.2 Disposal of RI Generated Wastes

Performance of the RI will generate potentially impacted soils and liquids. The disposition of these wastes is described below. Approval of the management methods described for disposal of these RI generated wastes through WDNR will be accomplished by WDNR approval of this SAP.

10.2.1 Drilling Decontamination Fluids

Waste liquids will be produced during cleaning/decontamination of equipment. A decontamination area for drilling equipment will be constructed at each site so that decontamination fluids are diverted to permit collection for temporary storage to allow for settling. Location of the decontamination area for the Zinc Shop is shown on Figure 4-1, and for the Chrome Shop on Figure 7-1. Construction information for the decontamination areas are indicated on Figure 10-1. These discharges are expected to be minimally impacted. A sample of the water will be analyzed for potential direct discharge to the City of DePere sanitary sewer system. If the contamination levels are

not acceptable to the city, the water will be transferred to the Better Brite pre-treatment facility for treatment prior to discharge to the De Pere City Sanitary Sewer.

The pre-treatment facility is a batch-type reduction/precipitation water treatment system designed to remove chromium. The system uses sodium bisulfite at a pH of 3 to reduce hexavalent chromium to trivalent chromium. Precipitation of the chromium is achieved with sodium hydroxide in addition to anionic polymer as a flocculating agent. The sludge is then dewatered using a plate-and-frame filter press. The sludge is disposed of at a licensed disposal facility and the treated water is discharged to the City of De Pere's Sanitary Sewer System.

10.2.2 Monitor Well Fluids

Waste liquids derived from monitor wells, including both purged, development, and sampling fluids, will be temporarily containerized, if necessary to allow sediment to settle and then transferred to the Better Brite pre-treatment plant for treatment. Discharges from the pre-treatment plant will be monitored for chromium and, if necessary, for other parameters to assure discharge water meets the City of DePere POTW requirements prior to discharging to the De Pere City Sanitary Sewer.

10.2.3 Extraction System

Discharges from purging of extraction systems prior to sampling at extraction sumps and trenches will be collected and treated at the pretreatment facility. The sanitary sewer currently receives discharges from these extraction systems following pretreatment. No additional permits for this discharge are anticipated.

10.2.4 Soils

Impacted soil will be generated through drill cuttings in the performance of soil borings for monitor well installation. Drill cuttings will be temporarily stored in drums on-site on pallets within the fenced areas at the Chrome Shop for later disposal or incorporation into the final remediation for the site. The drums will be labelled to identify their source location and segregated on the basis of whether impacts are indicated by visual inspection, or PID field screening. Cuttings which may be hazardous must be moved by a licensed hauler and properly manifested. Treatment or disposal options for impacted drill cuttings will be determined at a later time based on the amount of soil and the level of contaminant in the soils. Non-impacted soils will be dispersed on the Better Brite property.

10.3 Off-Site Access

Permits for access to conduct subsurface exploration on property not owned by Better Brite is required prior to initiation of off-site work. This permission will be gained by WDNR through landowner signature on an Access Permission form, discussed in the Data Management Plan. The form will acknowledge landowner permission to conduct specific activities and clearance from subsurface hazards known to the landowners which may not be identifiable through Digger's Hotline (e.g. septic systems, electric cables, etc.).

11.0 SAMPLING PROCEDURES

Sampling procedures and protocols necessary to conduct the RI activities described for each of the subtasks are summarized on Table 11-1. The specific details of each of the sampling procedures referenced are contained in Appendix A. This appendix contains Standard Operating Procedures (SOPs) which will be uniformly adhered to for sample collection and handling activities.

A summary table of sample matrices, analytical parameters, and frequencies of sample collection are shown on Table 11-2.

11.1 Sample Identification and Documentation

Each sample container will be tagged with the following information as required by CLP:

- Sample identification code,
- Date/time of collection,
- Preservative, and
- Any special information, including potential level of contamination.

The sample identification code is an alpha-numeric code used to specify the material type, location, and sampling interval (i.e., depth), where appropriate, for each sample. Listed below are the standard codes to identify the type of material to be sampled. To an extent, these codes also identify the sampling location.

- SB - Soil borehole
- MW - Water table monitoring well (soils and ground water)
- P - Piezometer Monitoring well (soils and ground water)

- PW - Private well water
- SP - Sump

For example, SB110-3 to 5 refers to a soil sample from borehole location 110 over the three to five-foot interval; and MW-203 refers to a ground-water sample from monitoring well location 203. Soil boring logs for boring locations instrumented as monitoring wells will be identified as monitoring wells (MW).

Trip blanks will be prepared prior to field work using laboratory-grade deionized water in laboratory quality sample vials. Trip blanks will be labelled, tagged, and preserved as if they were investigative samples and they will be designated as trip blanks on U. S. EPA paperwork.

To further reduce the potential for sample identification errors and duplication of previous site investigation sample locations, each series of subtasks has been assigned numbers for use in identifying sampling locations. The numbers available for each subtask are as follows:

Subtasks Associated with the Better Brite Zinc Shop:

Subtasks	Sample Location Numbers
1Z through 3Z	Z001 through Z900

Subtasks Associated with the Better Brite Chrome Shop:

Subtasks	Sample Location Numbers
1C through 3C	C001 through C900

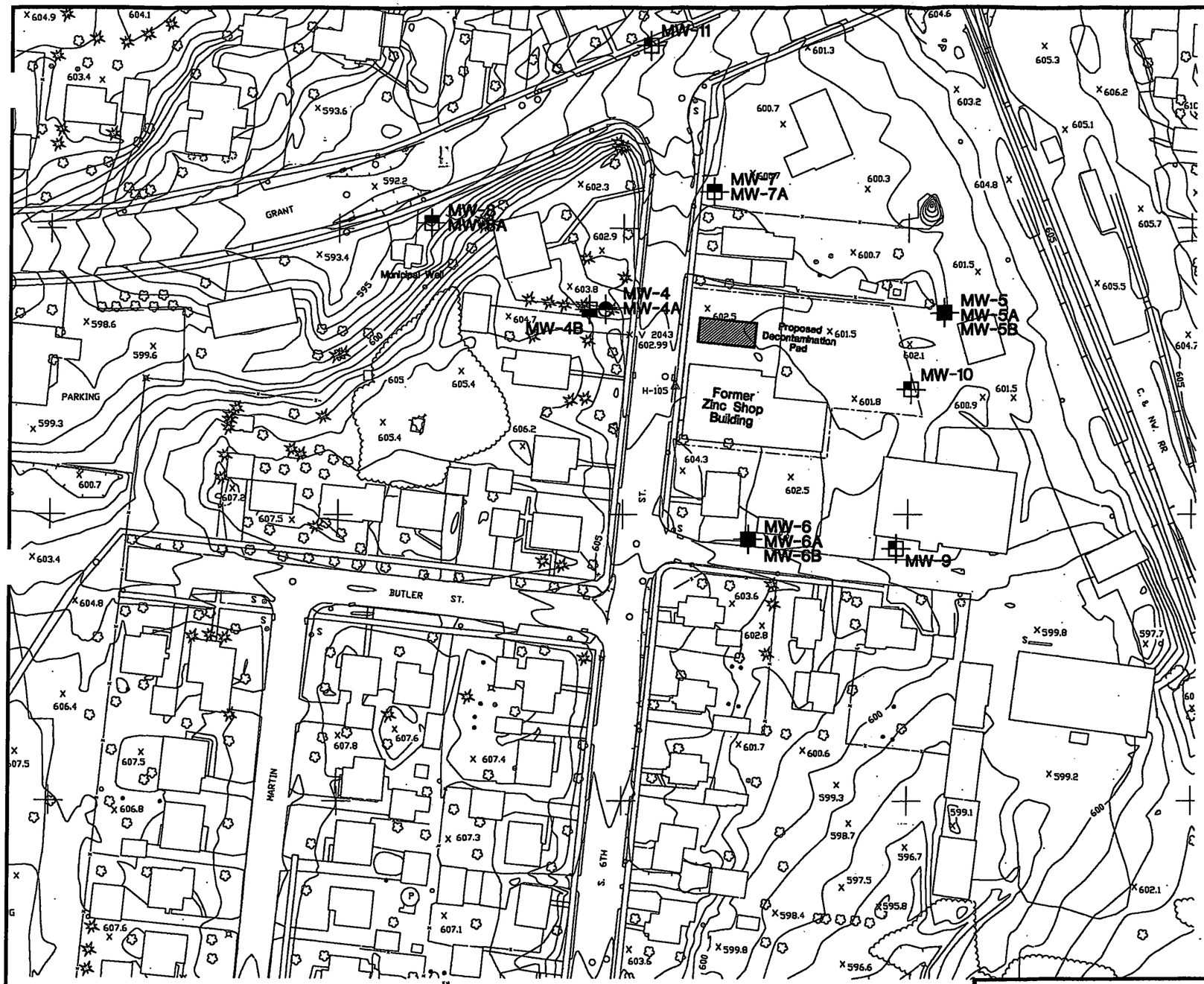
Sample location numbers Z901 through Z999 and C901 through C999 are reserved for duplicate and field blank QA samples. For example, a duplicate ground-water sample from monitoring well MW-Z001 would be identified as MW-Z901. Other duplicate samples or field blanks will be numbered in succession. Samples collected for matrix spike duplicates analysis will be identified with the code MSD (e.g., MWZ001-MSD).

12.0 REFERENCES

HSI, 1992, Site Evaluation Report, Remedial Investigation/Feasibility Study, Better Brite Chrome and Zinc Shops Site, De Pere, Wisconsin, Simon Hydro-Search, Brookfield, Wisconsin.

Wisconsin Department of Natural Resources (WDNR), 1991, Personal Communications with Terry Koehn, Superfund Program Pertaining to Previous Investigations at Better Brite, Lake Michigan District, Green Bay, Wisconsin.

FIGURES



EXPLANATION

MW-4	SHALLOW WELL INSTALLED BY USEPA IN 1993 (~15')
MW-4A	INTERMEDIATE WELL INSTALLED BY USEPA IN 1993 (~30')
MW-11	PROPOSED SHALLOW WELL LOCATION AND DESIGNATION (~15')
MW-8A	PROPOSED INTERMEDIATE WELL LOCATION AND DESIGNATION (~30')
MW-6B	PROPOSED BEDROCK WELL LOCATION AND DESIGNATION (~60')

N

SCALE

0 200

Feet

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

SIMON HYDRO-SEARCH
Brookfield Lakes Corporate Center XII
175 N. Corporate Drive, Suite 100
Brookfield, Wisconsin 53045

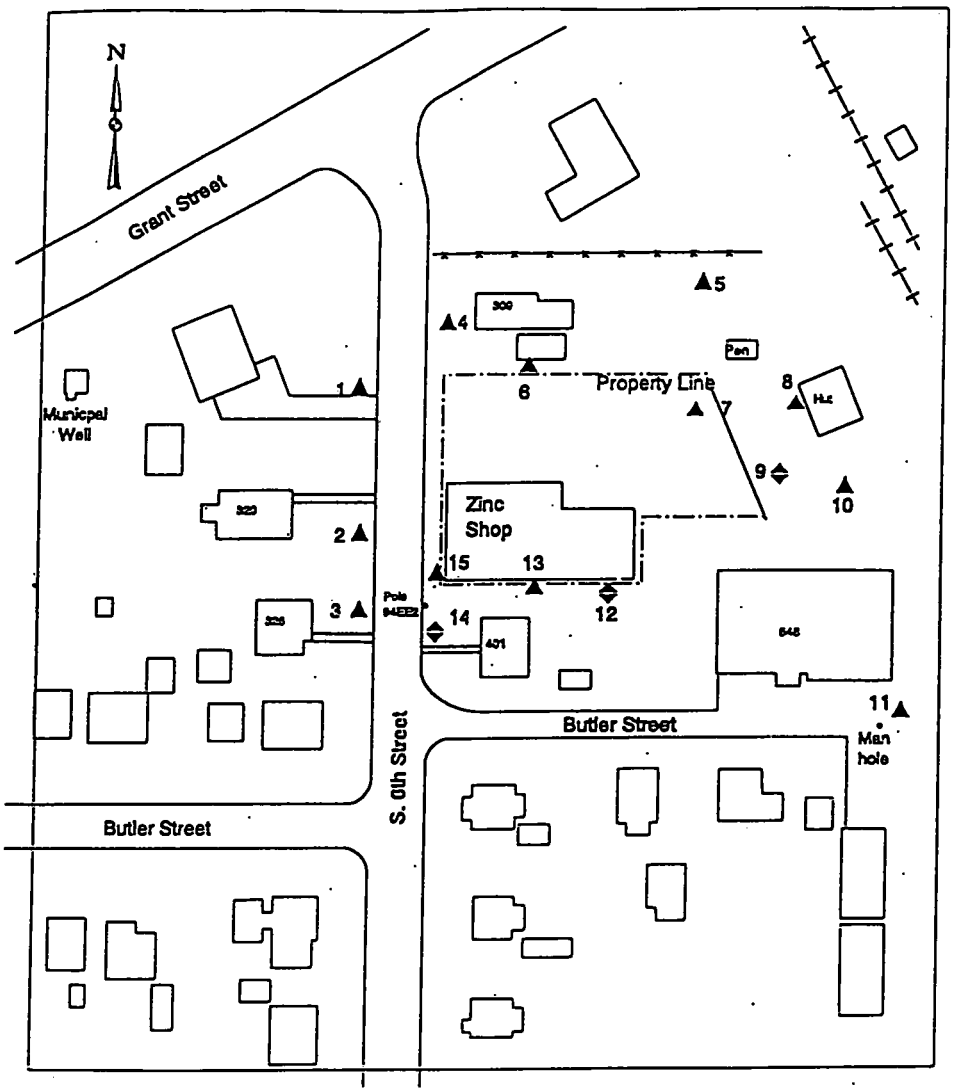
Dsgn. by: RAG	Chk. by: JJF	Apprv. by: MCM
PROJECT: 301483158	DATE: 02/22/94	

BETTER BRITE
DePERE, WISCONSIN

SUBTASK - 1Z : PROPOSED MONITOR WELL LOCATIONS

DRAWING: 3158-zb1 | FIGURE: 4-1

/hsi/148/3158/3158-zb1



SAMPLING LOCATIONS
BETTER BRITE ZINC

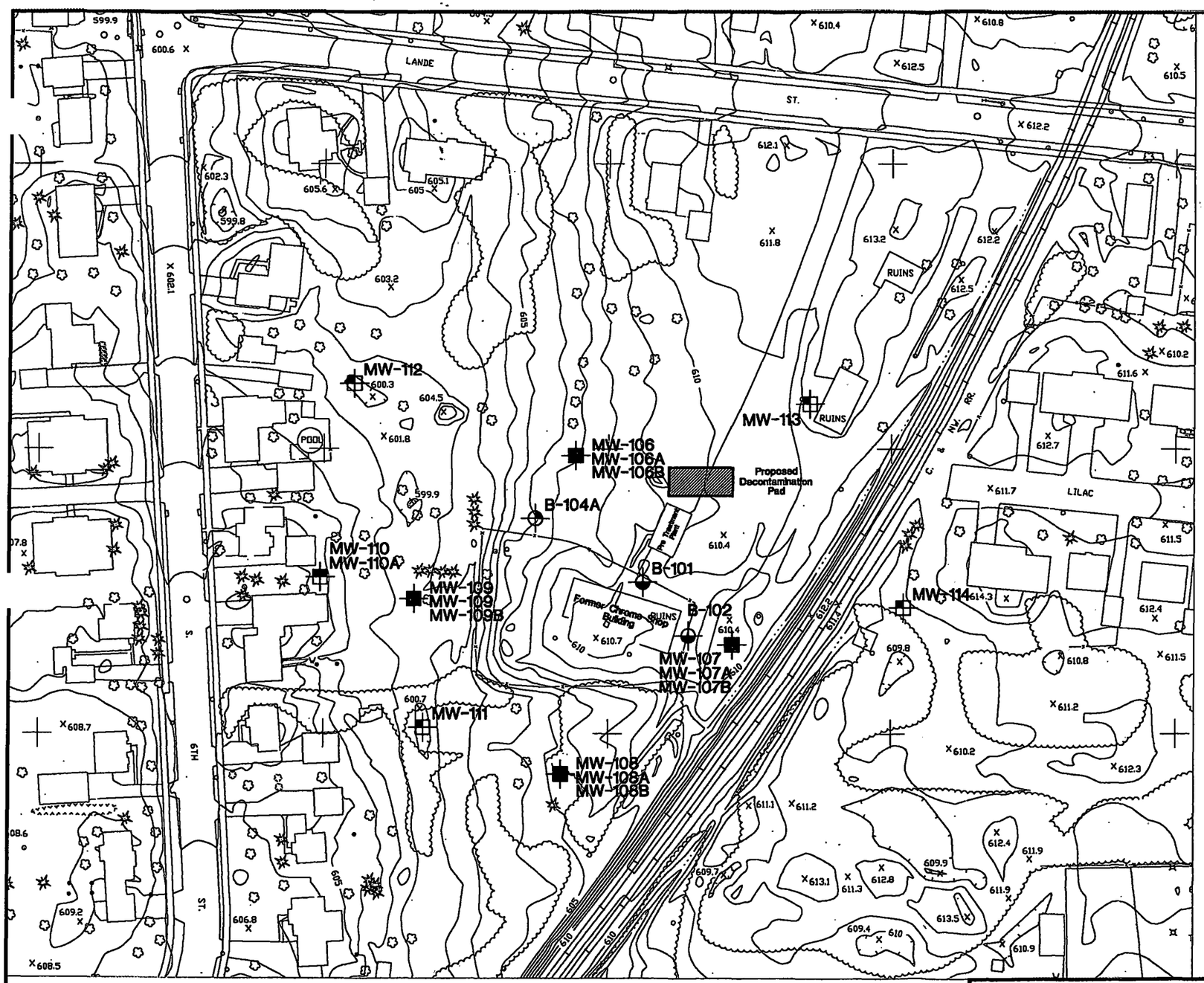
LEGEND

▲ Shallow (0-6"): Metals & CN
◆ Shallow (0-6"): Metals & CN & Deep(2.5-3'): Metals, CN & VOA

Sampled by U.S.EPA, 5/3-4/93
2 Background samples taken off map.

NOT TO SCALE

SIMON HYDRO-SEARCH Brookfield Lakes Corporate Center XII 175 N. Corporate Drive, Suite 100 Brookfield, Wisconsin 53045	BETTER BRITE DePERE, WISCONSIN **SUBTASK - 2Z** **SURFACE SOIL** **SAMPLING LOCATIONS**
Dsgn. by: RAG | Chk. by: | Apprv. by:	
PROJECT: 301483158 | DATE: 02/23/94	DRAWING: | FIGURE: 5-1



EXPLANATION

- MW-11 — PROPOSED SHALLOW WELL LOCATION AND DESIGNATION (~15')
- MW-8A — PROPOSED INTERMEDIATE WELL LOCATION AND DESIGNATION (~30')
- MW-6B — PROPOSED BEDROCK WELL LOCATION AND DESIGNATION (~60')
- B-104A — EXISTING INTERMEDIATE WELL LOCATION AND DESIGNATION (~30')
- B-102 — EXISTING BEDROCK WELL LOCATION AND DESIGNATION (~60')

N

SCALE
0 200
Feet

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

SIMON HYDRO-SEARCH
Brookfield Lakes Corporate Center XII
175 N. Corporate Drive, Suite 100
Brookfield, Wisconsin 53045

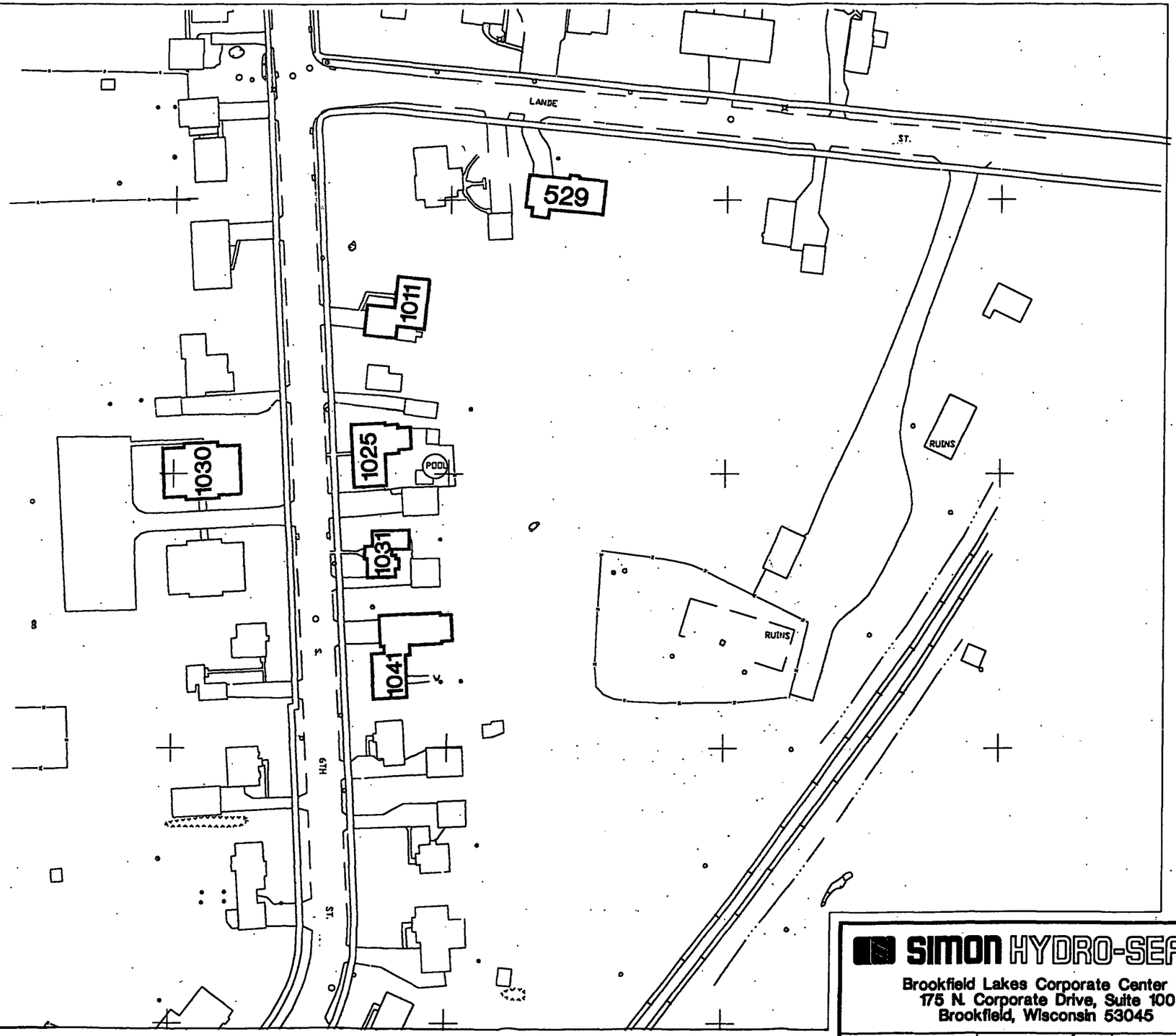
Dsgn. by: RAG	Chk. by: JJ7	Apprv. by:
PROJECT: 301483158	DATE: 02/22/94	

BETTER BRITE
DePERE, WISCONSIN

SUBTASK - 1C : PROPOSED MONITOR WELL LOCATIONS

DRAWING: 3158-cb2 | FIGURE: 7-1

/hsi/148/3158/3158-cb2



EXPLANATION

529 BASEMENT SUMP SAMPLE LOCATION AND STREET ADDRESS

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

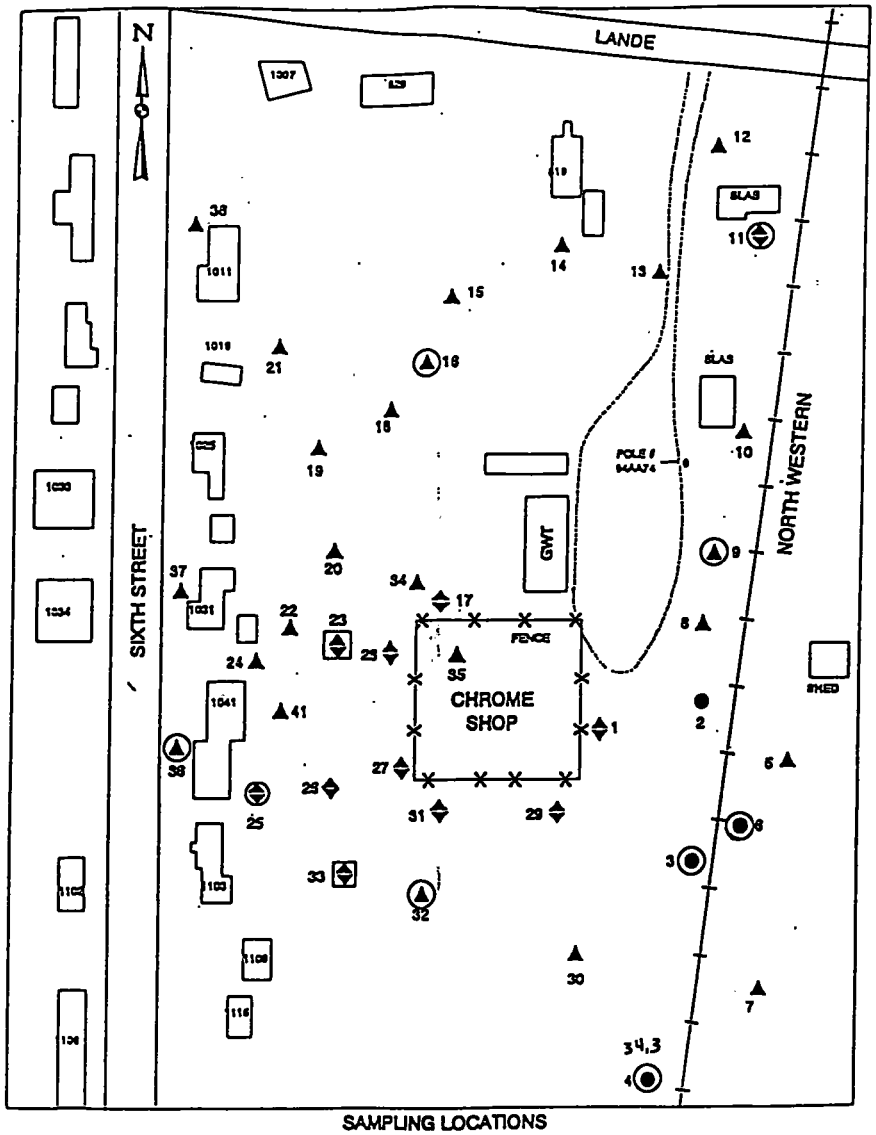
SIMON HYDRO-SEARCH
Brookfield Lakes Corporate Center XII
175 N. Corporate Drive, Suite 100
Brookfield, Wisconsin 53045

Dsgn. by: RAG	Chk. by: VJF	Apprv. by: MAM
PROJECT: 148115003	DATE: 04/03/92	

BETTER BRITE
DePERE, WISCONSIN

SUBTASK-3C:
BASEMENT SUMP
SAMPLE LOCATIONS

DRAWING NO.: 1500-chrome2 | FIGURE: 9-1.



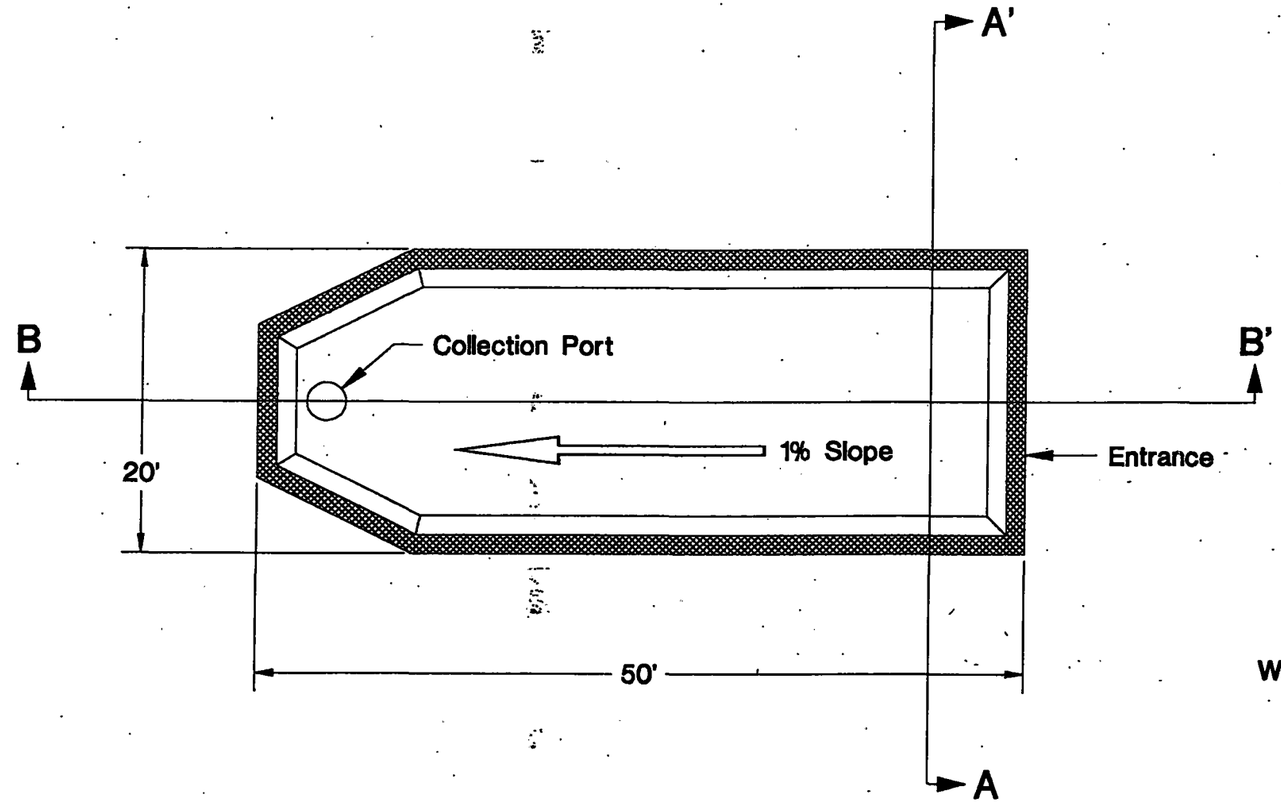
SAMPLING LOCATIONS
BETTER BRITE CHROME SHOP
LEGEND

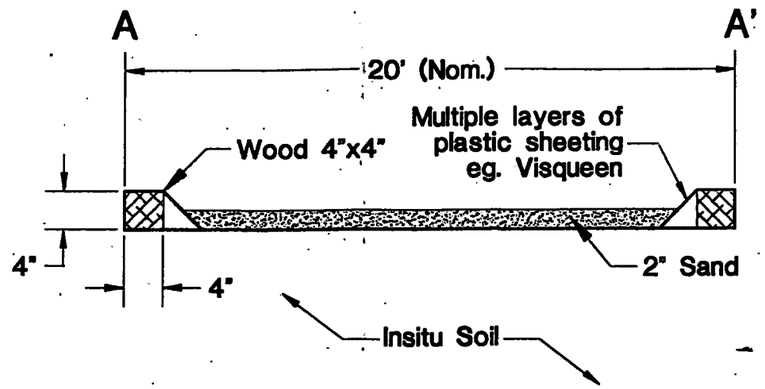
▲ Round 1, Shallow (0-6"): Cr
◆ Round 1, Shallow (0-6") & Deep (2.5-3'): Cr
● Round 1, Shallow (0-6"): Cr & Pb
○ Round 2, Shallow (0-6"): Metals & CN
□ Round 2, Shallow (0-6"): Metals & CN; Deep (2.5-3'): Metals, CN, VOA

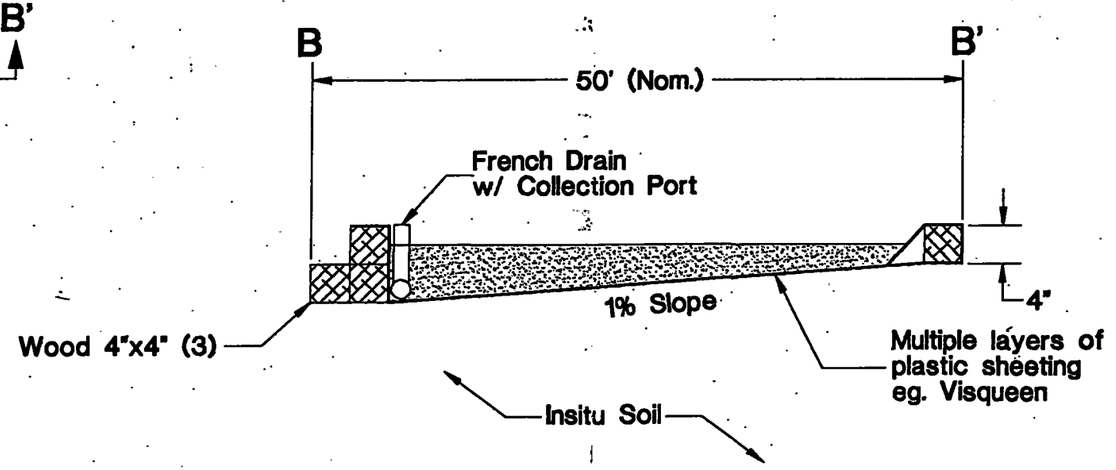
GWT=Groundwater Treatment Building: 2 Background samples taken off of map;
Round 1 collected 11/92; Round 2 collected 5/4/93

NOT TO SCALE

SIMON HYDRO-SEARCH Brookfield Lakes Corporate Center XII 175 N. Corporate Drive, Suite 100 Brookfield, Wisconsin 53045		BETTER BRITE DePERE, WISCONSIN SUBTASK - 2C SURFACE SOIL SAMPLING LOCATIONS
Dsgn. by: RAG	Chk. by: JJF	Apprv. by: MAM
PROJECT: 301483158	DATE: 02/23/94	DRAWING: FIGURE: 8-1







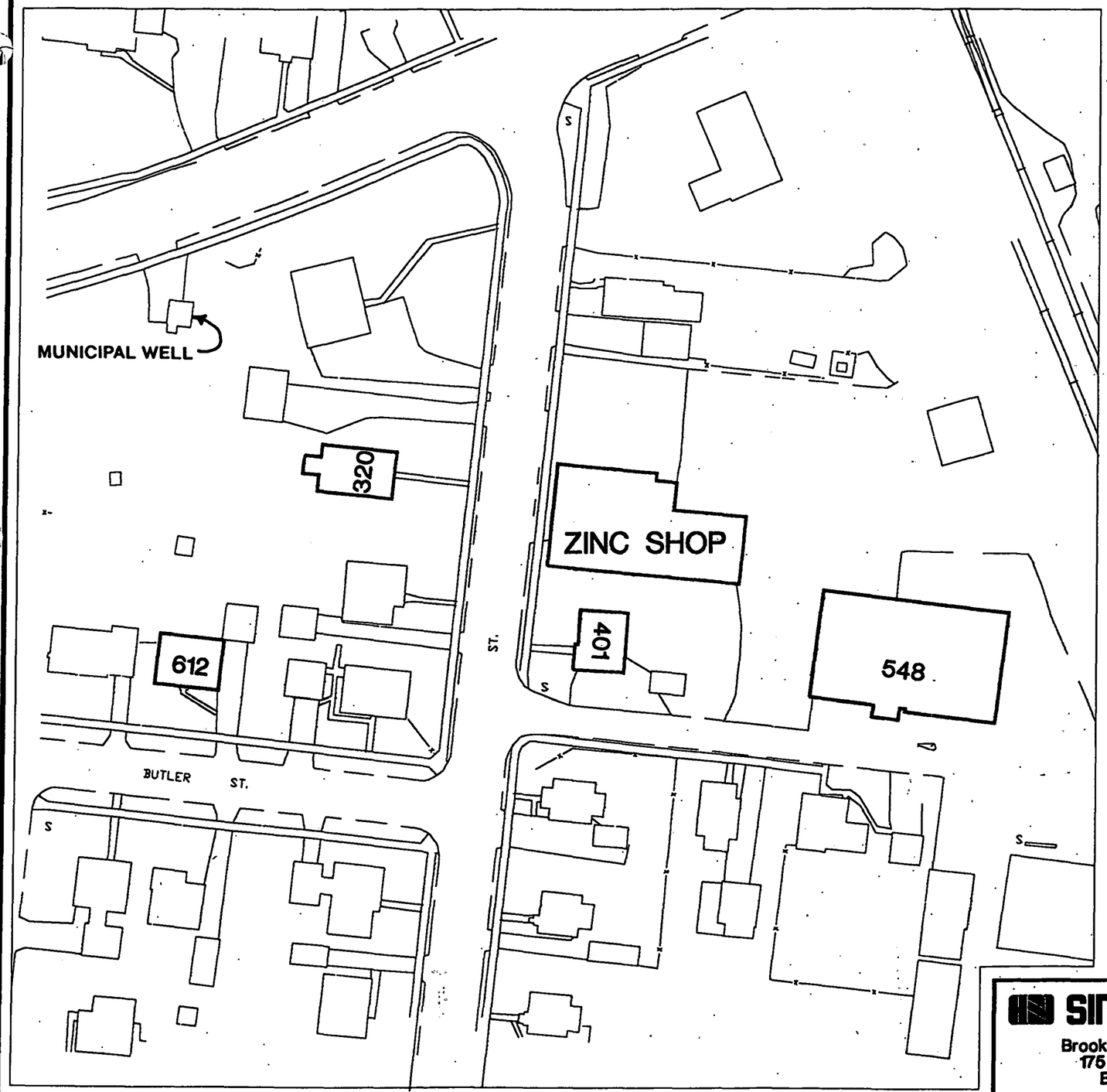
SIMON HYDRO-SEARCH
Brookfield Lakes Corporate Center XII
175 N. Corporate Drive, Suite 100
Brookfield, Wisconsin 53045

Dsgn. by: RAG	Chk. by: JFF	Apprv. by: JMM
PROJECT: 148115003	DATE: 10/12/92	

BETTER BRITE
DePERE, WISCONSIN

DECONTAMINATION PAD CONSTRUCTION DETAILS

DRAWING NO.: 1500-21 | FIGURE: 10-1



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

EXPLANATION

612 — BASEMENT SUMP SAMPLING LOCATION AND STREET ADDRESS

N

SCALE

0 250

FEET

SIMON HYDRO-SEARCH
Brookfield Lakes Corporate Center XII
175 N. Corporate Drive, Suite 100
Brookfield, Wisconsin 53045

Dsgn. by: RAG	Chk. by: MT	Apprv. by: mam
PROJECT: 148115003	DATE: 04/03/92	

BETTER BRITE
DePERE, WISCONSIN

SUBTASK-3Z:
BASEMENT SUMP SAMPLING LOCATIONS

DRAWING NO.: 1500-12 | FIGURE: 6-1

TABLES

Table 4-1 Zinc Shop Monitor Well Location Rationale

Well	Approximate Depth (Ft.)	Rationale
MW-4*	15	To determine water-table elevation. To determine ground-water quality northwest of the source area.
MW-4A*	30	To determine vertical gradients northwest of the source area. To determine ground-water quality northwest of the source area. To assess vertical extent of contamination.
MW-4B	60	To determine vertical gradients northwest of the source area. To determine ground-water quality in the bedrock northwest of the source area between the site and the municipal well. To assess vertical extent of contamination.
MW-5	15	To determine water-table elevation. To determine ground-water quality northeast of the source area.
MW-5A	30	To determine vertical gradients northeast of the source area. To determine ground-water quality northeast of the source area. To assess vertical extent of contamination.
MW-5B	60	To determine vertical gradients northeast of the source area. To determine ground-water quality northeast of the site. To assess vertical extent of contamination.
MW-6	15	To determine water-table elevation. To determine ground-water quality to the south of the site.
MW-6A	30	To determine vertical gradients to the south of the site. To determine ground-water quality to the south of the site. To assess vertical extent of contamination.
MW-6B	60	To determine vertical gradients to the south of the site. To determine ground-water quality in the bedrock south of the source area. To assess vertical extent of contamination.
MW-7	15	To determine water-table elevation. To determine ground-water quality to the north of the site, topographically downgradient.
MW-7A	30	To determine vertical gradients north of the site. To assess vertical extent of the contamination. To determine ground-water quality to the north of the site.
MW-8	15	To determine water-table elevation. To determine ground-water quality northwest of the site near the municipal well.
MW-8A	30	To determine vertical gradients northwest of the site near the municipal well. To assess vertical extent of contamination. To determine ground-water quality to the northwest of the site.
MW-9	15	To determine water-table elevation To determine ground-water quality to the southeast of the site. To assess the effects of the basement sump in the building to the southeast of the site.
MW-10	15	To determine water-table elevation. To determine ground-water quality to the east of the site, related to the storm sewer line and catchment basin.
MW-11	15	To determine water-table elevation. To determine ground-water quality to the north of the site near the sewer lines.

* These wells were installed by U. S. EPA in 1993 and are included on this table for completeness. The remaining 14 wells will be installed during the RI.

Table 4-2. Summary of Data Collection Activities: SUBTASK-1Z

Description: Subtask-1Z: Document the nature and extent of ground-water impacts related to the Zinc Shop.

Media/Activity	No. of Locations	Depth (ft.)	Number of Samples		Analytical Parameters
			per location	total	
Soil					
Monitor Well Installations	7 4 3	15 30 60	7 7 0	49 28 0	Visual inspection for metals PID screening for VOCs
	8	0 - 60	1 - 3	8 - 24	Material Properties[1]
Ground Water					
Monitor Wells	16	15 - 60	2[2]	32	TAL Metals, Cyanide, TCL VOCs, Hexavalent Chromium Total Organic Carbon
Extraction Sump	1	15	2[2]	2	

1 Material properties include grain size distribution.

2 Monitor well ground-water sampling will occur as two separate sampling events.

Table 6-1. Summary of Data Collection Activities: SUBTASK-3Z

Description: Evaluate potential risk assesment with contaminants originating at the Zinc Shop.

Media/Activity	No. of Locations	Number of Samples		Analytical Parameters
		per location	total	
Ground Water				
Grant Street Municipal Well	1	2[1]	2	TAL Metals and Cyanide (low levels), TCL VOCs (low levels), Hexavalent Chromium
Basement Sump Water	4	1	4	TAL Metals and Cyanide, TCL VOCs, Hexavalent Chromium

1 Municipal well ground-water sampling will occur as two separate events.

Table 7-1 Chrome Shop Monitor Well Location Rationale

Well	Approximate Depth (Ft.)	Rationale
MW-106	15	To determine water-table elevation. To determine ground-water quality north of the source area near the former runoff collection pit.
MW-106A	30	To determine vertical gradients. To access vertical extent of contamination. To determine ground-water quality north of the source area near the former runoff collection pit.
MW-106B	60	To determine vertical gradients. To assess vertical extent of contamination. To determine ground-water quality in the bedrock north of the source area near the former runoff collection pit.
MW-107	15	To determine water-table elevation. To determine ground-water quality east of the source area near the former roll-off box storage area.
MW-107A	30	To determine vertical gradients. To assess vertical extent of contamination. To determine ground-water quality east of the source area near the former roll-off box storage area.
MW-107B	60	To determine vertical gradients. To assess vertical extent of contamination. To determine ground-water quality in the bedrock east of the source area near the former roll-off box storage area.
MW-108	15	To determine water-table elevation. To determine ground-water quality south of the source area.
MW-108A	30	To determine vertical gradients. To assess vertical extent of contamination. To determine ground-water quality south of the source area.
MW-108B	60	To determine vertical gradients. To assess vertical extent of contamination. To determine ground-water quality in the bedrock south of the source area.
MW-109	15	To determine water-table elevation. To determine ground-water quality west of the source area, west of the french drain and the retention berm.
MW109A	30	To determine vertical gradients. To access vertical extent of contamination. To determine ground-water quality west of the source area west of the french drain and the retention berm.
MW-109B	60	To determine vertical gradients. To access vertical extent of contamination. To determine ground-water quality in the bedrock west of the source area west of the french drain and the retention berm.
MW-110	15	To determine water-table elevation. To determine ground-water quality to the west of the source area west of the storm sewer line.
MW-110A	30	To determine vertical gradients. To access vertical extent of contamination. To determine ground-water quality to the west of the source area west of the storm sewer line.
MW-111	15	To determine water-table elevation. To determine ground-water quality to the southwest of the source area at the south end of the surface water drainage way. Along the storm sewer.
MW-112	15	To determine water-table elevation. To determine ground-water quality to the northwest of the source area at the north end of the surface water drainage way. Along the storm sewer.
MW-113	15	To determine water-table elevation. To determine ground-water quality to the northeast of the known source area. To evaluate the area of a former grain elevator foundation as a potential source area.
MW-114	15	To determine water-table elevation. To determine ground-water quality to the east of the source area (background).

Table 7-2. Summary of Data Collection Activities: SUBTASK-1C

Description: Nature and Extent of Ground-Water Impacts related to the Chrome Shop.

Media/Activity	No. of Locations	Depth (ft.)	Number of Samples		Analytical Parameters
			per location	total	
Soil					
Monitor Well Installations	9 5 4	15 30 60	7 7 0	63 35 0	Visual Inspection for Metals PID screening for VOCs
	9	0 - 60	1 - 3	9 - 27	Material Properties[1]
Ground Water					
Monitor Wells	21	15 - 60	2[2]	42	TAL Metals and Cyanide TCL VOCs
Extraction Sump	1	15	2[2]	2	Hexavalent Chromium Total Organic Carbon
Collection Trench	1	8 - 11	2[2]	2	

1 Material property analyses include grain size distribution.

2 Monitor well ground-water samples will be collected during two separate sampling events.

Table 9-1. Summary of Data Collection Activities: SUBTASK-3C

Description: Subtask-3C: Evaluate potential risk assessment with contaminants originating at the Chrome Shop.

Media/Activity	No. of Locations	Number of Samples		Analytical Parameters
		per location	total	
Ground Water				
Private Water Supply Wells	1	1	1	TAL Metals and Cyanide (low levels) TCL VOCs (low levels) Hexavalent Chromium
Basement Sump Water	6	1	6	TAL Metals and Cyanide TCL VOCs Hexavalent Chromium

SAP Table 11-1. Standard Procedures Matrix

		Subtasks Z and C		
		1	2	3
40400	Sample Identification	X		X
40500	Chain-of-Custody	X		X
40600	Sample Container Preparation, Preservation, and Maximum Holding Times	X		X
40700	Sample Location Control	X		X
50000	Equipment Calibration, Operation, Maintenance (General Comments)	X		X
50100	ENMET CGS-10M Portable Gas Detector	X		
50200	HNu PI-101	X		
50300	VWR Mini-pH Meter	X		X
50400	Specific Conductance Meter (YSI Model #33)	X		X
70100	Hollow-stem Auger Drilling	X		
70200	Fluid Rotary Drilling	X		
70500	Well and Piezometer Construction and Installation	X		
70700	Well Development	X		
80400	Subsurface Soil Sampling	X		
85000	Equipment Decontamination	X		X
91000	Ground-Water Sampling	X		X
92000	Sampling of Residential Wells			X
94000	Aquifer Testing	X		
120100	Soil Sample Description	X		

Table SAP11-2. Table of Samples and Matrices

Matrix	Test Parameter	# of Samples		[1]Field Dup.		[1]Field Blank		[2]Trip Blank		[3]MS/MSD	Total Sample
		Zinc	Chrome	Zinc	Chrome	Zinc	Chrome	Zinc	Chrome		
MONITOR WELL INSTALLATIONS											
Soil	Non-CLP Material Property Testing includes grain size analyses, % moisture, laboratory permeability, Atterberg limits	8 - 24	9 - 27	0	0	0	0	0	0	0	17 - 51
MONITOR WELLS											
Water	Round 1: RAS CLP TAL Metals and Cyanide[5] RAS CLP TCL VOA CRL SOP Hexavalent Chromium SAS CLP Total Organic Carbon	16	21	2	3	2	3	2	3	3	52
	Round 2: RAS CLP TAL Metals and Cyanide[5] RAS CLP TCL VOA CRL SOP Hexavalent Chromium SAS CLP Total Organic Carbon	16	21	2	3	2	3	2	3	3	52
EXTRACTION SYSTEMS[4]											
Water	RAS CLP TAL Metals and Cyanide[5] RAS CLP TCL VOA CRL SOP Hexavalent Chromium SAS CLP Total Organic Carbon	2	4	0*	0*	0*	0*	0*	0*	0*	6
PRIVATE WATER SUPPLY WELLS											
Water	SAS CLP TAL Metals and Cyanide (low levels) SAS CLP TCL VOA (low levels) CRL SOP Hexavalent Chromium	0	1	0	1**	0	1**	0	1**	1**	4
MUNICIPAL WATER SUPPLY WELLS[4]											
Water	SAS CLP TAL Metals and Cyanide (low levels) SAS CLP TCL VOA (low levels) CRL SOP Hexavalent Chromium	2	0	1	0	1	0	1	0	1	5
BASEMENT SUMP											
Water	RAS CLP TAL Metals and Cyanide RAS CLP TCL VOA CRL SOP Hexavalent Chromium	4	6	1	1	0	0	1	1	1	14

Table SAP15-2. Table of Samples and Matrices (Cont'd.)

NOTES: CLP - Contract Laboratory Program
DUP - Duplicate
MS/MSD - Matrix Spike/Matrix Spike Duplicate
RAS - Routine Analytical Service
SAS - Special Analytical Service
TAL - Target Analyte List
TCL - Target Compound List
VOA - Volatile Organic Analysis

1 - One field duplicate and one field blank will be collected for every ten or fewer samples.
2 - One trip blank prepared with laboratory grade water will be included with each shipment of aqueous VOA samples. The number which appears in this column, therefore is an estimate.
3 - One MS/MSD sample will be collected for every 20 or fewer investigative samples. MS/MSD samples are not included in the "Total Sample" column.
4 - Two rounds of extraction well and municipal well samples will be collected. The total number of samples to be collected during the RI is listed. Half of the indicated number of samples will be collected for each round.
5 - Ground-water samples collected from monitor wells which are to be tested for metals will be filtered.
* - Extraction system water samples will be collected and submitted with the monitor well water samples. QA/QC samples for these are included with the monitor well QA/QC sample quantities.
** - One sample from the municipal water supply well will be collected and submitted with the private water supply well sample. QA/QC samples for the municipal well sample is included with the private well QA/QC sample quantities. A second sample is is also scheduled to be collected at the municipal well and will require separate QA/QC sample analysis.

Note: All analyses to be performed by CLP and/or CRL except for material property testing which will be completed by a material property testing laboratory.

1-27-94

WISCONSIN
DEPT. OF NATURAL RESOURCES

George E. Meyer
Secretary

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

101 South Webster Street
Box 7921
Madison, Wisconsin 53707
TELEPHONE 608-266-2115
TELEFAX 608-264-6277
TDD 608-267-6897

January 25, 1994

Mr. Dennis J. Behr
Simon Hydro-Search
175 N. Corporate Drive, Suite 100
Brookfield, WI 53045

Subject: Better Brite Remedial Investigation/Feasibilty Study

Dear Mr. Behr:

Enclosed is the signed and approved change order number three to the Better Brite Remedial Investigation/Feasibilty Study contract.

You are authorized to proceed with the amended scope of work.

Sincerely,

David R. Behn

David R. Behn
Purchasing Agent

enclosure

cc: James McLimans - SW/3
Terry Koehn - LMD

Project No. 93SW344
Agreement No: 3372

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
Madison, Wisconsin

THIRD AMENDMENT TO
THE AGREEMENT ENTITLED "PHASE I DATA REVIEW AND WORK PLAN PREPARATION REMEDIAL INVESTIGATION/FEASIBILITY STUDY BETTER BRITE NPL SITE"

BETWEEN
THE STATE OF WISCONSIN, BY ITS DEPARTMENT OF NATURAL RESOURCES AND SIMON HYDRO-SEARCH, INC.
DATED JULY 29, 1991

PURSUANT TO PARAGRAPH 12 OF THE AGREEMENT, THE PARTIES HEREBY AMEND PARAGRAPHS 28, 34 AND 56 OF THE AGREEMENT TO READ AS FOLLOWS:

28. PROJECT MANAGEMENT. The Department's project manager for this project is Terry Koehn located in the Department's Lake Michigan District Headquarters Office in Green Bay. The Consultant has identified Judy Fassbender as its project manager. If either the Consultant or the Department changes its project manager for this project, notification of this change shall be sent to the other party within ten days of such a change with the name of the new project manager included.

56. COMPENSATION. As consideration for providing the services under this agreement, the Department shall pay the Consultant the Consultant's cost plus a fixed fee.

The cost ceiling for such services shall be Six Hundred Sixty Eight Thousand Eight Hundred Thirty Nine Dollars ($668,839). This cost ceiling includes One Hundred Eighteen Thousand Eight Hundred Fifty One Dollars ($118,851) for Phase I Activities and Five Hundred forty Nine Thousand Nine Hundred Eighty Eight Dollars (549,988) for Phase II Activities.

The fixed fee for such services shall be Ninety Eight Thousand Three Hundred Twenty Two Dollars ($98,322). This fixed fee includes Fifteen Thousand Eight Hundred Twenty Four Dollars ($15,824) for Phase I Activities and Eighty Two Thousand Four Hundred Ninety Eight Dollars ($82,498) for Phase Two Activities.

In addition, a contingency fund of Sixty Thousand Dollars ($60,000), is included in this contract. This contingency fund may be used at the sole discretion of the Department.

PURSUANT TO PARAGRAPH 12, THE PARTIES HEREBY ADD THE FOLLOWING LANGUAGE TO PARAGRAPH 34 OF THE AGREEMENT:

Subject to the terms and conditions set forth in this Agreement, the Department engages the Consultant for the furnishing of services in the area of preparation of a Superfund Remedial Investigation/Feasibility Study as specifically described in Exhibit "B" entitled: "Phase II Activities, Better Brite Plating Inc., De Pere, Wisconsin" dated July 8, 1993, a copy of which is attached to and made a part of this Agreement, and for such other tasks as may be mutually agreed upon in writing between the Consultant and the Department.

PURSUANT TO PARAGRAPH 12, THE PARTIES HEREBY ADD PARAGRAPH 57 TO THE AGREEMENT. THIS NEW PARAGRAPH READS AS FOLLOWS:

57. EPA INDEMNIFICATION. EPA Indemnification Language attached and incorporated herein as Attachment 1, exclusively governs EPA indemnification of the Contractor. This in no way implies indemnification of the Contractor by the Department.

SIMON HYDRO-SEARCH, INC.

By _____

Michael R. Noel

Title Senior Vice President

Date December 3, 1993

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

By _____
GEORGE E. MEYER, Secretary

Date 12/19/93

Approved:

_____
TOMMY G. THOMPSON, Governor

Date 1/17/94

INDEMNIFICATION OF STATE CONTRACTOR UNDER EPA COOPERATIVE AGREEMENT V995102-01

On May 27, 1992, the U.S. Environmental Protection Agency (EPA) agreed to enter into an indemnification agreement with Simon Hydro-Search (the Contractor) for the work plan portion of the Remedial Investigation/Feasibility Study (RI/FS) at the Better Brite site (the Site), for which the Contractor and the Wisconsin Department of Natural Resources (WDNR) signed a contract (the Contract) on July 29, 1991. The WDNR and the Contractor are now amending this Contract to include the remainder of the RI/FS work. EPA will enter into an indemnification agreement with the Contractor for all work in the Contract, as amended, as authorized by Section 119 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), and the Superfund Response Action Contractor final Indemnification Guidelines, 58 F.R. 5972 (January 25, 1993) (the Final Guidelines). This offer to indemnify against certain liabilities to third parties will be effected through the Indemnification Agreement set forth below, which will be incorporated into the Contract awarded by the State under this EPA Cooperative Agreement (CA).

A. Scope of Indemnification Coverage

1. Covered liabilities. EPA indemnification shall apply to the Contractor's liability to any third party for damages caused by a release of a hazardous substance, pollutant or contaminant from the Site, provided such liability is based solely on the Contractor's negligent performance of response action activities at the Site. The expenses of litigation and settlement of such third party claims are included in the liability covered by this Indemnification Agreement.

2. Liability exclusions. EPA indemnification will not cover the costs of any claims adjudicated or resolved by agreement if the adjudication or agreement occurred before EPA received the notice required by paragraph (D)(1) of this Clause. The expenses of litigation or settlement) which were incurred before EPA received the notice required by paragraph (D) (1) of this Clause will not be indemnified. EPA will not indemnify the Contractor for any liability for which the Contractor is eligible for compensation under any insurance policy (including self insurance) or otherwise. EPA indemnification will not cover liabilities (including the expenses of litigation or settlement) that were caused by the conduct of the Contractor (including any conduct of its directors, managers, staff, agents, representatives or employees) which constituted gross negligence or

intentional misconduct. The Contractor shall not be indemnified for liability arising under strict tort liability, or any basis of liability other than negligence. If the Contractor is found to be both strictly liable and negligent, indemnification shall be available under this Agreement only for the amount (if any) specified in the judgment as being attributable exclusively to the Contractor's negligence.

B. Indemnification term.

EPA indemnification shall apply to third-party claims for any covered liability, which claims are reported to EPA no later than ten years after expiration of the Contract term. The Contractor must provide notices of such claims in the manner and within the time limits specified in paragraph (D) of this Clause.

C. Indemnification limit and deductible.

1. Indemnification deductible. Indemnification shall be available only to the extent the Contractor's liability exceeds an indemnification deductible of $ 50,000 per occurrence. The deductible applies to each occurrence (i.e., a release, including continuous or repeated releases, of any hazardous substance or pollutant or contaminant) resulting from the Contractor's negligent performance of response action activities at the Site. Any liability within the deductible amount shall not be covered by this Indemnification Agreement, nor shall any liability within the deductible be an allowable cost under this or any other contract with the United States.

2. Indemnification limit. Except as otherwise specifically provided in this Clause, EPA will not indemnify the Contractor for liability exceeding the indemnification limit of $ 5 Million. This EPA indemnification limit applies to the aggregate of all claims reported to EPA during the term of this Indemnification Agreement.

(a) Effect of insurance coverage. If the Contractor acquires or has acquired pollution liability insurance to cover risks which are also covered under this Indemnification Agreement and the Contractor has charged the costs of such insurance directly or indirectly to the Government, the EPA will indemnify the Contractor only for that portion of any liability which exceeds the sum of the full pollution liability coverage of such insurance and the amount of the indemnification deductible specified in paragraph (1) above, but which does not exceed the indemnification limit. If during the contract term, the Contractor reduces the pollution liability insurance coverage required under this Contract, without the EPA's approval, the liability of EPA under this Indemnification Agreement shall not

be increased by reason of the reduction in the Contractor's insurance coverage. The provisions of this paragraph (C) (2) (a) shall apply to any subcontractor indemnification agreements approved under this Clause.

(b) Effect of subcontractor indemnification. Except as otherwise provided in this Clause, the EPA's maximum liability under this Indemnification Agreement and all subcontractor indemnification agreements approved in accordance with paragraph (H) of this Clause shall not exceed an amount equal to the indemnifcation limit set forth in paragraph (c) (2) minus the sum of pollution liability insurance coverage described in paragraph (c) (2) (a).

(c) Co-payments. If the indemnification limit is greater than $50,000,000.00 (fifty million dollars), the Contractor shall be required to pay 50% of that portion of any covered loss which exceeds $50,000,000.00 (fifty million dollars).

D. Claims Notification and Processing

1. For purposes of this Clause, "claim" means a written demand for compensation for damages, naming the Contractor or any subcontractor, and alleging a release of any hazardous substance, pollutant or contaminant caused by the Contractor's or subcontractor's response action activities. The Contractor must submit a written notice to EPA of any claim which may qualify for days after first receiving notice of such claim. A similar notice shall be provided by the Contractor to its insurance carrier(s) within 20 (twenty) working days upon first receiving notice of the claim, or a shorter period if required by the terms of the insurance policy, and shall be made even if the Contractor believes that its insurance is not applicable to the claim or action.

2. The notice required by paragraph (1) above must include a copy of the complaint or other document asserting a claim, and all available information on the time, place, and circumstances involved and the names and addresses of the persons injured and of available witnesses. The Contractor shall furnish, in the manner and form required by EPA, evidence or proof related to any claim that may involve indemnification payments.

3. The Contractor shall promptly furnish to the State Contracting Officer copies of all written correspondence from its insurance carrier(s) concerning the carrier's response to the notice of claim, including any notice of denial of coverage.

4. By a date specified by the State Contracting Officer, the Contractor shall furnish to EPA complete photocopies and/or electronic copies of all insurance policies issued to the

Contractor that were in force at the time of the response action, as well as those in force at the time of the notice of claim.

E. Litigation and Settlement.

1. Reservation of rights. EPA reserves the right to direct, control, or assist in the defense of any claim or action covered by this Indemnification Agreement. The Contractor shall not admit liability or settle any claim without the Contracting Officer's written consent. The Contractor shall cooperate fully with the Government in its efforts to settle or defend the claim.

2. Settlement. The EPA reserves the right to direct the Contractor to accept a settlement offer. If the EPA directs in writing that the Contractor accept an offer to settle a claim, the EPA shall not be obligated to indemnify for any loss in excess of the directed settlement amount.

F. Payments.

1. Prerequisites. No payment shall be made under this Indemnification Agreement until the Contractor submits evidence satisfactory to the State Contracting Officer that the indemnification deductible has been satisfied, the coverage available under any purchased insurance or self-insurance has been exhausted, the indemnification limit has not been exceeded, any costs claimed for defending or settling the claim were incurred after EPA received the notice required by paragraph (D) (1) of this Clause, and any required co-payment by the Contractor have been made.

2. Payee. EPA may make indemnification payments to the Contractor or to the third-party claimants to whom the Contractor is liable.

3. Funding limitations. The Contractor acknowledges that the only source of funds available for indemnification under this Clause is the CERCLA Hazardous Substance Superfund. Except to the extent that Congress may make specific appropriations to fund payments is subject to the availability of appropriations from the Superfund at the time liabilities covered by this Indemnification Agreement are represented by final judgments or by settlement agreements approved in writing by EPA.

G. No Waiver of Sovereign Immunity or Admission of Liability.

EPA's agreement to indemnify the Contractor, or EPA's payment of any money under this Indemnification Agreement, shall not be construed as a waiver of sovereign immunity by the United States. Nothing in this Indemnification Agreement, shall be

construed as an admission by the United States that it is a liable party, within the meaning of 107 of CERCLA, for any release that has occurred or may occur in the course of any response action the United States undertakes pursuant to 104 of CERCLA.

H. Subcontractor indemnification.

1. With the prior written approval of the State Contracting Officer and subject to the indemnification deductible and limit specified in paragraph (C) of this Indemnification Agreement, the Contractor may include in any subcontract a clause whereby the Contractor agrees to indemnify the subcontractor. The terms and conditions of this Indemnification Agreement must be included in such subcontract clause, and the clause must specify the indemnification limit provided to the subcontractor. EPA will indemnify the Contractor for any covered loss incurred by a subcontractor pursuant to an approved subcontract indemnification agreement.

2. Any indemnification agreement entered into under this paragraph (H) must be processed and approved in accordance with the requirements for the approval of subcontractor indemnification set forth in the Final Guidelines and in other instructions issued by the EPA.

I. Negation of Relationship

1. Nothing in this Clause shall be construed as an indemnification by U.S. EPA of the State of Wisconsin.

2. Nothing in this Clause shall be construed as an indemnification agreement between the State and the Contractor.

3. Nothing in the Contract shall be construed to create, either expressly or by implication, any contractual relationship between EPA and the Contractor except as specifically provided in this Clause. EPA is not authorized to represent or act on behalf of the State in any manner relating to this Contract and has no responsibility with regard to the mutual obligations of the State and the Contractor as provided herein.

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Lake Michigan District Headquarters
1125 N. Military Avenue
P.O. Box 10448
Green Bay, WI 54307-0448
TELEPHONE # (414)492-5869
TELEFAX # (414)492-5913

George E. Meyer
Secretary

May 27, 1993

File Ref: WIT-560010118
WID-006132088
Brown Co. SFND

COPY

David Linnear
U.S. Environmental Protection Agency
Region 5 HSRW-6J
77 West Jackson Boulevard
Chicago, IL 60604-3590

Re: Modified Scope for Better Brite RI/FS

The following comments are provided in response to your letter received by this office on April 20, 1993, in regard to reducing the scope of the Better Brite RI/FS. It is important to note that we are in agreement with the underlying theme of your letter, to conduct the RI/FS in a cost effective manner. However, it is our opinion that reducing the scope of the project to the degree you are suggesting could result in the preparation of a RI report with numerous data gaps, potentially leading to development of an inadequate FS. This result could make it difficult to determine what final remedial actions need to be taken.

We understand that a great deal of effort and expense have been incurred at the two Better Brite shops and remain supportive of that work. It was very refreshing, although somewhat frustrating in regard to the RI/FS, to have had the recent activities related to source removal and expansion of groundwater collection, performed in such an accelerated manner. We do not, however, think that these activities have completely addressed the contamination problems at the two sites. The effectiveness of the efforts, in terms of both groundwater collection and removal of all significant soil contamination, remains, to varying degrees, unknown.

We also understand that EPA has to consider budget constraints in allocating funds for the performance of RI/FS projects. However, for this project, which in effect consists of performing RI/FS quality investigation for <u>two</u> sites, the remaining budget of less

than $300,000 per site is not sufficient to complete a thorough investigation. We have stated that the current funding level is inadequate for the past two years and have made prior requests for additional funding. Regardless, we are willing to work with you to limit the scope and cost of the RI/FS.

The following comments, specific to the subject letter, are presented on a paragraph by paragraph basis.

Page 1, Para 2 - We are not specifically in disagreement with the statement that the total cost presented in the consultant's proposal was high. However, as stated at the meeting, this proposal was provided using their standard billable rates for the purpose of discussion and further negotiation. A final proposal would have been prepared, on a cost plus fixed fee basis, after agreement on the scope of the project and associated negotiations. This approach was appropriate considering that adjustments to the scope were anticipated. If the scope of the project was left as presented in their proposal, it is doubtful that any negotiations would have been successful in reducing the cost of the project to our current budget.

Page 1, Para 3 - We are in agreement that the primary pathway of concern, at this time, is the groundwater pathway and the amount of effort proposed to evaluate it shows this fact. On the other hand, if only groundwater is investigated during the RI/FS what specific data will be used to address other contaminant pathways at the sites?

Page 2, Para 2 - We are in agreement with the proposal to reduce the cost associated with the community relations task. Additionally, keeping this task as "optional" provides the flexibility of using the consultants capabilities if needed. Having the consultant available to produce maps for factsheets, etc. and to attend public meetings if needed would be helpful.

Page 2, Para 3 - It is the WDNR's opinion that abandonment of nonfunctional monitoring wells is an action that should be performed as soon as possible. It is not important who abandons the monitoring wells, or under which budget, as long as it is done properly, documented and preferably done this field season. It does seem apparent that this work could be accomplished most cost effectively by doing it in conjunction with the installation of monitoring wells associated the RI/FS, minimizing contracting and mobilization costs. A letter has been provided to EPA regarding the methodology for well abandonment and recommendations regarding which wells will require abandonment. Recent activities at the sites may require an on-site review of well conditions prior to the final decision regarding which wells to abandon. It is expected that most of them are now unsuitable.

Page 2, Para 4 - There will always be some administrative cost related to mobilization and some subcontractors will be required regardless of any reduction in scope. To successfully complete the bidding process for obtaining a drilling contractor will require a significant amount of time and effort on the part of the consultant. Efforts to obtain any access agreements that remain outstanding must also be considered. We are planning to keep this cost as low as possible through negotiations, prior to entering into a contract for the second phase of the RI/FS.

Page 2, Paras 5 & 6 - These paragraphs do not present the concept of EPA completing the surface soil sampling as a proposal and in fact these tasks have been performed. Thus, we request that the results of this effort are presented in a format suitable for inclusion into the RI report. We understand that screening sampling was not performed at the Zinc Shop, but that the confirmatory sampling was completed at both sites. Overall, we are not opposed to having you perform this work as long as it is understood that time will be required of the consultant to evaluate the data generated, during preparation of the RI report.

Page 2, Para 7 & 8 - As we've discussed with you many times, we have made an effort to keep the number of wells limited. However, considering our current understanding of the hydrogeology at both sites, a fairly high number of wells per site are needed. This statement is based on the concept that the goal of an RI is to obtain a good idea of hydrogeologic conditions and the degree and extent of contamination at the sites. To address shallow groundwater flow, flow near bedrock and flow within bedrock, 5 or so wells at each site are not adequate to meet these goals. Considering an approach of obtaining a more limited understanding of site conditions, a modification of the drilling plans has been completed by the WDNR and HSI to reduce the number of wells. This approach appears to have the potential for data gaps and more uncertainty is determining a final remedy from the FS. It also increases the probability that additional wells will be required at a later date to fill data gaps. Overall, it is our opinion that this sort of phased approach could end up being more expensive in the long run.

Utilizing staff gauge measurements from the small wetland near the Chrome shop could provide useful information in understanding the hydrogeology in the area. However, we agree that it could be dropped from the RI scope at this time, with the understanding that the potential connection between groundwater and surface water will be investigated as part of the RD process.

Page 2, paras 9 & 10 - Obtaining the hydrogeologic information from "pump" tests on the groundwater sumps is thought to be important for the determination of a final remedy at the Better Brite Shops. Determining the zone of influence for the recently

constructed sumps would provide a much better idea of their effectiveness than any number of slug tests on monitoring wells. However, it would be acceptable for Emergency Removal's contractor to perform this task, assuming their budget allows it. This may be a more expensive approach due to multiple mobilizations of drilling contractors. As a less desirable alternative, the pump tests could be completed during the RD stage of the project. This approach will cause greater uncertainty in the selection of a remedy for the site in the FS stage.

Page 2, paras 11 & 12 - Aspects of this task are needed to address the risk potential to residents in the area. This task includes the only samples directed toward area homes. It remains our opinion that as part of the RI, samples from residential sumps (3 to 5 per site), the municipal well (1) and private wells (1) should be collected. It has been a number of years (1987?) since samples of water from the municipal or private well were analyzed for the complete TCL and TAL. Keep in mind that collection of these samples is not a major cost and that they are related to evaluating the groundwater pathway. Additionally, a review of land use in the area requires completion.

Page 3, para 2 - We agree that reducing the number of samples collected will reduce the costs associated with sample analysis/validation. It is also agreed that the contractor should use the data management system they already have in use.

Page 3, para 3 - We are in agreement with using a qualitative baseline risk assessment for the purposes of the RI. It is likely that cleanup of the site will become ARAR driven, therefore, this aspect could be discussed as well as the potential risks in present and future use scenarios. If the results of this effort and subsequent work by WDOH warrant it, a quantitative risk assessment could be completed at a later date. Developing a qualitative baseline risk assessment should reduce costs associated with this task.

Page 3, para 4 - Considering the reduction in scope of the project, the desire to reduce costs and its more focused approach, we no longer agree with the need for tech memos. In reality there is only a single field task (groundwater evaluation), along with the evaluation of data collected by EPA, remaining in the scope of the project. Therefore, it appears that conducting the field work and proceeding directly toward completion of the RI report is appropriate. This will hopefully reduce the overall costs associated with producing a final RI report. However, rather than having moderate costs associated with two tasks, there will be a cost related to the RI report that is greater than either task individually. The RI report will primarily focus on the groundwater pathway, but will additionally include review of the soils data collected. The report should also point out data gaps for future evaluation.

Unless you complete soil borings with collection and analysis of soil samples there will be little information regarding evaluation of any remaining soil contamination in the RI report. Thus, unless you elect to perform this task, we propose that a limited number of soil borings near the sumps be included in the RI scope. These would provide information regarding the effectiveness of your source removal efforts and help identify additional areas that should be addressed as part of the final remedy.

Following preparation of a RI report a FS report will be prepared. This report will again primarily focus on the groundwater pathway.

Please find attached a copy of a modified proposal from HSI with a preliminary cost estimate. Although this estimate still exceeds the remaining funds in the CA you will note a considerable reduction in the scope of the project and associated cost. It is our opinion that to reduce the scope of the project below this level of effort would not be appropriate. Significantly reducing the scope beyond this point may not provide sufficient information to evaluate the site and select a final remedy.

Please let me know if this approach is acceptable to you so we can proceed with negotiations toward preforming the RI. Additionally, we should discuss the inclusion of a number of soil boring into the scope as mentioned above.

Sincerely,

Terry Koehn
State Project Manager

enc.

cc: G. Edelstein SW/3
J. Lemcke SW/3
K. Bro WDOH
M. Noel HSI
D. Rossberg LMD
Day File LMD
w/o enc.

5-19-93

SIMON HYDRO-SEARCH

175 N. Corporate Drive
Suite 100
Brookfield, WI 53045

Telephone (414)792-1282
Facsimile (414)792-1310

May 18, 1993
(148115003)

Mr. Terry Koehn
Wisconsin Department of Natural Resources
1125 N. Military Avenue
P.O. Box 10448
Green Bay, WI 54307-0448

RE: Cost Estimate for Phase II Activities, Better Brite Plating, Inc., De Pere, Wisconsin

Dear Terry:

The following pages provide a summary for the revised scope of anticipated tasks and associated costs for the second phase of Remedial Investigation (RI) activities and a Focused Feasibility Study (FFS) for ground water at the Better Brite Plating Facility in De Pere, Wisconsin. The scope of this next phase will consist of additions and revisions to Project Plans, field investigative activities, and associated data reduction, evaluation, and reporting and preparation of a FFS to deal with ground-water impacts. The scope herein is considerably smaller than in the Project Plans, and is also reduced from the February 24, 1993 scope and cost estimate.

The task numbering system presented below is from the September, 1990 Statement of Work (SOW), and is shown with the current status of each task:

Task 1: Summary and Validation of Existing Data - Wisconsin Department of Natural Resources (WDNR) Activity (completed)

Task 2: Contractor Procurement - WDNR Activity (completed)

Task 3: Project Planning (in progress as below)

- Subtask 3.1: Evaluation of Existing Information (completed)
- Subtask 3.2: Work Plan Preparation (Phase II activity)
- Subtask 3.3: Applicable, Relevant and Appropriate Requirements (ARARs) Consideration (Completed)
- Subtask 3.4: Preparation of Project Plans (Ongoing)
- Subtask 3.5: Monthly Progress Reports (Ongoing)
- Subtask 3.6: Quarterly Reports (WDNR activity)

Task 4: Community Relations Support (Phase II activity, optional)

175 N. Corporate Drive
Suite 100
Brookfield, WI 53045
Telephone (414)792-1282
Facsimile (414)792-1310

Task 5: Field Investigations (Phase II activity)

- Subtask 5.1: Pre-Investigation Considerations (Phase II activity)
- Subtask 5.2: Hydrogeologic Investigation (Phase II activity)
- Subtask 5.3: Surface Waters Sewers and Water Main Investigations (Phase II activity)
- Subtask 5.4: Soil Investigation (United States Environmental Protection Agency Interim Remedial Meausre [U.S. EPA IRM] activity)
- Subtask 5.5: Air Investigation (no longer planned)
- Subtask 5.6: Building Investigation (in progress; U.S. EPA IRM activity)
- Subtask 5.7: Post-Investigation Evaluation (Phase II activity)
- Subtask 5.8: Technical Memoranda (no longer planned)

Task 6: Sample Analyses/Validation (Phase II activity)

Task 7: Data Evaluation (Phase II activity)

Task 8: Risk Assessment (Phase II activity)

Task 9: Treatability Studies (Phase III activity)

Task 10: RI Report(s) (Phase II activity)

Task 11: Ground-Water Remedial Alternatives Development and Screening (Phase II activity)

Task 12: Detailed Analysis of Ground-Water Alternatives (Phase II activity)

Task 13: FFS Report (Phase II activity)

Task 14: Conceptual Design (Phase III activity)

Additional Task: Existing well abandonments (Phase II activity, optional)

Tasks 1 and 2 of the SOW and much of Task 3 are completed. The initial scoping effort in Subtasks 3.1 and 3.4 were included as part of Phase I. Some revisions to the scope of work are needed, along with preparation of a Work Plan, which will be based on this document, plus a project schedule and relevant figures and tables (Subtask 3.2).

Activities in Tasks 3 through 8 and Tasks 10 through 13 will be performed as part of the second phase of site activities. Tasks 9 and 14 will be addressed in a later phase(s) when a better estimate of requirements can be made. Task requirements are discussed below.

TASK 3: PROJECT PLANNING

The project planning tasks include preliminary activities required to initiate the RI/FS. Activities conducted to date have included completion of Subtask 3.1 through preparation of the SER (Simon Hydro-Search, 1992) and initial scoping of the RI (Subtask 3.4) through preparation of the Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPjP), Data Management Plan, Health and Safety Plan (HASP), and Baseline Risk Assessment Plan (BRAP). Together, these along with the Work Plan (Subtask 3.2) are called the Project Plans.

Subtasks 3.1, 3.3, and 3.6 are not discussed herein.

Subtasks 3.2 and 3.4

Subtask 3.2, Work Plan Preparation, will be completed as part of this phase of RI activity. The work plan will be based on this document, with a schedule and figures and tables depicting the location of task activities to be completed. Subtask 3.4, Preparation of Project Plans, has been substantially completed; however, prior to initiation of field investigations the SAP will require minor revisions based on United States Environmental Protection Agency (U.S. EPA) activities currently in progress and U.S. EPA and WDNR comments. Assumptions regarding changes in scope are noted in task and subtask descriptions herein, where applicable. The attached cost estimate includes the anticipated costs for Work Plan preparation and SAP revisions.

Subtask 3.5 Monthly Progress Reports

This subtask has been performed during the first phase and will be continued throughout all phases of the RI. Monthly Progress Reports during RI activities will be prepared and submitted to WDNR and will summarize the technical progress of the RI/FS. The report format will differ slightly from previous monthly reports due to the field-oriented activities. Monthly reports will include the following information:

- Summaries of project activities completed during the reporting period;
- Summaries of validated sampling data and results of tests during the reporting period, if specifically requested;
- Summaries of changes in scope of work during the reporting period;
- Summaries of difficulties encountered during the report period, and actions taken to rectify problems;

- Target date and actual date of completion for each element of activity and any deviation from the RI/FS work plans;
- Changes in key personnel during the reporting period; and
- Projected work for the next reporting period.

These progress reports will be submitted to WDNR by the tenth business day of each month following commencement of work in the RI/FS Work Plan. Based on the estimated field time and subsequent data reduction and analysis time, the cost estimate is budgeted to include nine monthly progress reports.

TASK 4: COMMUNITY RELATIONS SUPPORT

Community relations is mainly a WDNR responsibility; however, due to the location of the ongoing field activities and the proximity to the surrounding residences and businesses, and as some of the field work will be performed on surrounding properties and the city streets, considerable public interest is anticipated in the ongoing efforts. For this reason it is anticipated that considerable support may be required for this task. This support may take the form of graphics for plates or slide/overhead presentations at meetings, or may include Simon Hydro-Search personnel attending community meetings and giving a presentation of work to be done, work in progress and/or work completed along with the final goals of the project. This task is included as an optional cost.

TASK 5: FIELD INVESTIGATIONS

The major effort in the second phase of work will be field investigations. The investigations to be performed are presented in the SAP and will be amended as described herein in the revisions to these plans (see Task 3 activities discussed above) based on agency comments and U.S. EPA IRM activities.

Task numbering for field activities and related data acquisition activities will follow the convention in the Project Plans, using subtasks called Operable Units (OUs). These OUs have the potential to be targeted separately for remediation during the Remedial Design/Remedial Action in Phase III. OU-1C and OU-1Z are no longer included based on agency comments and therefore are not presented in the cost estimate. The activities to be performed as part of the field investigation are listed below, along with the subtask(s) which will utilize each activity:

RI Activity	Subtasks / OUs
Existing Monitor Well Abandonment[1,2]	Subtask 5-A
Mobilization (Pre-Investigation Considerations)[2]	Subtask 5-B, all OUs
Surficial Soil Sampling[2] (no longer planned)	OU-2Z, OU-2C
Staff Garage Installation (no longer planned)	OU-3C
Soil Borings and Subsurface Soil Sampling[1,2]	OU-3Z, OU-3C
Monitor Well Installation[1,2] Development[1,2] and Hydraulic Testing[2]	OU-3Z, OU-3C
Monitor Well Sampling[2]	OU-3Z, OU-3C
Municipal Well Sampling[2]	OU-5Z
Private Well Sampling[2]	OU-5C
Private Sump Sampling[2]	OU-5Z, OU-5C
Extraction Sump Sampling[2]	OU-4Z, OU-4C
Extraction Sump Hydraulic Testing[2] (no longer planned)	OU-4Z, OU-4C
Aerial Photo Review and Ecological Characterization	OU-5Z, OU-5C
Surveying[2]	OU-3Z, OU-3C

[1]Requires WDNR form preparation and submittal.
[2]Requires internal form preparation, data reduction, data management, and tracking.

The subtasks/OUs to be performed in this phase of work are described below, and correspond to the subtasks/OUs shown in the SAP and on the attached cost summary tables. Field activities utilized in more than one subtask are described in the first subtask listed. Subsequently, subtasks refer to the initial description. Each of the RI field activities will also be discussed in the Work Plan.

Subtask 5-A: Abandonment of Existing Wells

In addition to the activities currently described in the SAP, the existing site wells will require abandonment. The wells remaining on-site do not have viable annular seals, nor do they have viable surface seals. Without a seal, these wells would act as a conduit to deeper migration of impacted ground water, and therefore they should be removed. The wells proposed as part of the Project Plans will be located to provide adequate coverage of the sites; therefore no replacement wells are proposed at this time. The wells will be abandoned in accordance with NR141 requirements. This task is included on the cost estimate as optional.

Subtask 5-B: Mobilization (Pre-Investigations Considerations)

Once the Work Plan has been prepared and the Project Plans have been revised as needed, several activities will need to be performed prior to initiating field activities. The "premobilization" activities are described below. These activities are shown as a separate subtask in the attached cost estimate.

Subcontracting. Four subcontractors will be retained for specialized tasks to aid in performing the field investigation program. A drilling contractor (WTD, Inc.) will be retained to advance boreholes for the collection of subsurface soil samples, and for the installation of on-site and off-site monitor wells to evaluate contaminants in ground water. A soils scientist (Thresher & Son) will be retained for evaluation of metals in soil. A surveying firm licensed in the State of Wisconsin will be retained to provide horizontal and vertical control for all monitor wells and other sampling points. A material property testing laboratory (Midwest Engineering Services) will be retained to perform grain size analyses and laboratory permeability testing. Laboratory work will be performed by various laboratories in the Contract Laboratory Program (CLP). The laboratories will perform all analyses using U.S. EPA specified methods and procedures. The level of laboratory QA documentation is discussed in the QAPjP.

Access Permission. Upon approval of the Project Plans, Simon Hydro-Search and WDNR will secure access permission to off-site drilling locations, where possible.

Permits. The SAP identifies procedures which will be required for handling of RI generated wastes. This activity includes making arrangements for the disposal of RI-derived waste. Drill cuttings and purge water generated during borehole drilling, monitor well installation, and sampling activities will be stored and disposed of as described in the SAP, and generally consists of temporary storage in 55-gallon drums where field or analytical evidence exists indicating the material is potentially contaminated. Each drum will be labeled, logged and stored in a secure area on-site until it is determined if the material requires treatment and/or disposal. Based on field

screening and analytical results, the waste will be disposed of according to methods approved by WDNR.

Support Facilities. Facilities to support the RI include decontamination stations for drilling equipment and locations for handling RI generated wastes. Decontamination support will require access to water and electricity which will be provided by WDNR. If possible, existing decontamination facilities prepared by U.S. EPA will be utilized; otherwise appropriate decontamination areas will be constructed prior to initiation of RI activities. Ample land area is available on-site for handling RI generated wastes.

Mobilization. Just prior to the initiation of each major field task, equipment and supplies will be mobilized to the site and site operations facilities will be established. The operations will include an area, such as a trailer, in which equipment and supplies can be stored to prevent unauthorized access. Sampling support items, such as packaging materials and overnight courier materials will also be stored on-site. Also to be accomplished during mobilization is the implementation of the site HASP.

Subtask 5-2C: Surface Soil Impacts - Chrome Shop

This subtask was intended to identify impacted soil source areas at the Chrome Shop and target these areas for remediation. However, based on U.S. EPA efforts to-date, this task is no longer essential, and will not be performed.

Subtask 5-2Z: Surface Soil Impacts - Zinc Shop

This subtask was intended to identify impacted soil source areas at the Zinc Shop and target these areas for remediation. However, based on U.S. EPA efforts to date, this task is no longer essential, and will not be performed.

Subtask 5-3C: Ground-Water Impacts - Chrome Shop

Ground-water impacts at the chrome shop will be investigated by installing 18 soil borings at nine locations and completing these borings as monitor wells. Soil samples will be collected for material property testing to evaluate the hydrogeologic and soil conditions, the potential migration pathways and contaminant attenuation factors. No laboratory analyses will be performed on soil samples. These boreholes will be completed at various depths as monitor wells as described in the SAP. The monitor wells will be developed and hydraulically tested, and two rounds of ground-water samples will be collected. The cost estimate assumes nine water-table wells, five intermediate depth piezometers, and four bedrock piezometers will be installed, which is 38% less than the original number. No staff gauges will be installed as proposed in the October 14, 1992 Project Plans.

Activities to be performed for this subtask are described below:

Soil Borings and Soil Sampling. Soil boreholes in the unconsolidated will be installed using hollow stem augering, and those completed in bedrock will be installed using rotary drilling techniques. Soil samples will be collected continuously in the unconsolidated materials from one borehole in each well or well nest location. These soil samples will be visually inspected for the presence of chromium-bearing material and screened for VOCs using a PID. Up to three soil samples from each unconsolidated stratigraphic unit will be submitted for material property testing including grain size analysis, and potentially laboratory permeability, and Atterburg limits.

Monitor Well Installation, Development, and Hydraulic Testing. All boreholes will be completed as monitor wells. New monitor wells will be constructed of two-inch diameter PVC per the SAP. Wells to be completed to bedrock may be double-cased to minimize the potential for vertical cross-contamination. All drilling operations will be supervised by a Simon Hydro-Search hydrogeologist. Following installation, each well will be developed to remove residual effects of drilling to ensure a representative sample can be collected. The wells will be installed and developed in accordance with NR141. Development water will be transported to a central location on site and temporarily containerized to allow sediments to settle out prior to disposal. Disposal options will be approved by U.S. EPA and WDNR.

Baildown tests will be conducted in each monitor well to estimate the horizontal hydraulic conductivity of each completion zone. These tests will consist of quickly removing a solid slug or a volume of water from the well and recording the rise in water level over time. The test data will be analyzed using an analytical computer model (SLUGIX, Interplex Ltd., Golden, Colorado or equivalent) based upon the Bouwer & Rice (1976) method of analyzing slug test data.

Monitor Well Sampling. Two rounds of ground-water samples will be collected from new monitor wells. The second sampling event will occur a minimum of 30 days after the first. Sampling will be accomplished with dedicated PVC bailers following well purging as described in the SAP SOPs. Samples will be collected for field and laboratory analyses. Quality Assurance samples will include duplicates and field blanks and laboratory QC samples. Sample tracking will be performed using appropriate chain of custody and sample container identification as described in the SAP SOPs. Purge water will be transported to a central location on site and temporarily containerized to allow for sediments to settle out prior to disposal. Disposal options will be approved by U.S. EPA and WDNR.

As part of the ground-water sampling activities, water-level measurements will be obtained from the on-site monitor wells. These measurements will be obtained with an electrical water level probe capable of a measurable accuracy of 0.01 feet. The

measurements will be taken from the surveyed reference point on the top of the inner well riser casing. The resulting information will be used in the subsequent production of water table and potentiometric maps for ground-water flow interpretation.

Staff Gauge Installation. No staff gauges will be installed.

Surveying. Work performed under this activity will include conducting field surveys of all sampling points. The survey will establish vertical control for all monitor wells to an accuracy of ±0.01 feet and horizontal control to within an accuracy of ±1.0 feet. Surveying will be conducted by a licensed surveyor.

Subtask 5-3Z: Ground-Water Impacts - Zinc Shop

Ground-water impacts at the zinc shop will be investigated by installing 14 soil borings at seven locations and completing these borings as monitor wells. Soil samples will be collected to evaluate the hydrogeologic and soil conditions and the potential migration pathways and contaminant attenuation factors. These boreholes will be completed at various depths as monitor wells as described in the SAP. The monitor wells will be developed and hydraulically tested, and two rounds of ground-water samples will be collected. The cost estimate assumes seven water-table wells, four intermediate piezometers, and three bedrock piezometers, which is 36% less than the number proposed in the October 14, 1992 Project Plans.

This subtask scope and the attached cost estimate incorporates the following change from the October 14, 1992 Project Plans:

- Hexavalent chromium analysis for soils will not be performed unless a method acceptable to U.S. EPA is found. For risk evaluation purposes, total chromium will be assumed to be equal to hexavalent chromium.

Activities to be performed for this subtask are described below:

Soil Borings and Soil Sampling. (See Subtask 5-3C).

Monitor Well Installation, Development, and Hydraulic Testing. (See Subtask 5-3C).

Monitor Well Sampling. (See Subtask 5-3C).

Surveying. (See Subtask 5-3C).

Subtask 5-4C: Hydraulic Control - Chrome Shop

This task has been deleted.

Subtask 5-4Z: Hydraulic Control - Zinc Shop

This task has been deleted.

Subtask 5-5C: Baseline Risk Assessment - Chrome Shop

The baseline risk assessment data collection activities at the Chrome Shop will include sampling one private well and five private basement sumps, aerial photography review, and an ecological characterization.

Activities to be performed for this subtask are described below:

Private Well Sampling. A field survey has been conducted to verify the location of operable private water supply wells near the site. The private water supply well survey was conducted by WDNR. The nearest of the operable private wells found will be sampled.

The work plan and estimate assumes that a pump will be available on the well to be sampled. The private well will be sampled between the well head and the pressure (storage) tank. If this is not possible, the sample will be collected from the faucet nearest to the pressure tank. If sampling occurs downstream from the pressure tank, the faucet will be opened for the purging of water until the well pump turns on. All water softening or other in-house treatment systems will be bypassed, if possible, when collecting the sample. Field measurements of pH, electrical conductivity, and temperature will be obtained and recorded in the field notebook.

Aerial Photograph Review. Recent aerial photographs of the site will be reviewed to delineate residential homes, commercial and industrial properties. A current land use map will be prepared presenting this information.

Private Sump Sampling. Selected private basement sumps will be sampled to estimate risks posed by the potential of impacted ground-water seeping into basements. Sumps will be purged of three sump volumes or until dry, whichever is less, and then sampled using either the sump pump or disposable bailer or transfer container.

Ecological Characterization. The ecological characterization may include general identification of flora and fauna in and around the site, and a search of WDNR records to determine if other ecological data are available that may be relevant to the investigation. Existing WPDES monitoring data may also be summarized for the pretreatment system.

Subtask 5-5Z: Baseline Risk Assessment - Zinc Shop

The baseline risk assessment data collection activities at the Zinc Shop will include sampling one municipal well and five private basement sumps, aerial photography review, and an ecological characterization.

Activities to be performed for this subtask are described below:

Municipal Well Sampling. DePere's Grant Street Municipal Well will be sampled once along with one round of monitor well sampling, and potentially sensitive receptors in the area will be identified as part of this activity.

Private Sump Sampling. (See Subtask 5-5C)

Subtask 5.8: Technical Memoranda

This task has been deleted, and these reporting requirements are now incorporated in the RI report.

TASK 6: SAMPLE ANALYSES/VALIDATION

Activities in this task include validation, tracking, and storage of field and laboratory sampling data. Field samples will be analyzed and validated per the methodology outlined in the SAP and QAPjP. Laboratory samples submitted to the CLP laboratories will be validated by the CLP laboratory.

A data management system will be utilized to track and store data collected during the RI to ensure that the quality and quantity of data adequately support the FFS. GRITS, the newest database management system developed by the U.S. EPA, is no longer proposed to perform this function.

TASK 7: DATA AND RISK EVALUATION

This task will consist of reducing and analyzing the data collected during all the field activities as well as data provided by U.S. EPA as part of IRMs. The results of these analyses will be presented in an organized and logical manner to aid in interpretation of investigative results. These data will be presented in the form of tables, figures, and other summary presentations as appropriate such that the relationships between site investigation results for each medium are apparent. These summaries will be utilized as appropriate in the Technical Memoranda and the RI report. Also included as part of this task is determination of whether additional data not provided by the RI is needed for evaluation of remedial alternatives. These data needs will be addressed as part of Task 9.

TASK 8: RISK ASSESSMENT

No quantitative risk assessment will be performed.

TASK 9: TREATABILITY STUDIES

This task involves identification of those data requirements which are not already available through the RI and which are specific to the Ground-Water Remedial Alternatives identified for detailed analysis in Task 11. These additional data needs may involve collection of additional site characterization data, supplemental RIs, or treatability studies to better evaluate technology performance at the site. Treatability studies, if needed, will be performed in compliance with relevant U.S. EPA and WDNR guidance. Activities necessary to accomplish this task are:

- Determination of Data Requirements,
- Bench/Pilot Testing Studies, and
- Treatability Testing.

This task will be performed as part of a later phase of work, if warranted.

TASK 10: RI REPORT(S)

Draft RI Report

A draft report covering the RIs will be completed after all RI field work is completed and analyses are received. The format for the RI Report will generally follow the October, 1988 RI/FS guidance document. The report will characterize the site and summarize the data collected and conclusions drawn from the preceding tasks. The report will be submitted in

draft form to both WDNR and the U.S. EPA for review and comment. The RI report will be considered final when site characterization activities are complete for supporting remedial alternatives screening activities and a letter of approval is issued by the WDNR Project Coordinator. A meeting may be scheduled with WDNR to discuss comments on the draft RI report.

TASK 11: GROUND-WATER REMEDIAL ALTERNATIVES DEVELOPMENT AND SCREENING

Based on the results of the RI activities, a range of distinct Ground-Water Remedial Alternatives will be developed to remediate or control contaminated ground water remaining at the site, as deemed necessary in the RI to provide adequate protection of human health and the environment. Based on the scope of RI activities to be performed, ground water is assumed to be the only media remaining of concern. If additional media (soil, surface water or sediments) are found to be impacted at potentially significant levels during the course of RI activities, the RI and subsequent tasks will need to be re-scoped to more thoroughly define the extent of impacts and potential remedial alternatives. The potential alternatives will encompass, as appropriate, treatments used to reduce the toxicity, mobility, or volume of wastes with varying requirements for long-term management of residuals or untreated waste, one or more alternatives involving containment with little or no treatment; and a no-action alternative. Alternatives that involve minimal efforts to reduce potential exposures (.e., site fencing, deed restrictions) will be presented as "limited action" alternatives.

The following steps will be conducted to determine the appropriate range of alternatives for this site:

Based on existing information, site-specific remedial action objectives for ground water will be developed to protect human health and the environment. The objectives will specify the contaminant(s) of concern, the exposure route(s) and receptor(s), and an acceptable contaminant level or range of levels for each exposure route. Preliminary remediation goals will be established based on readily available information or chemical-specific ARARs. As more information is collected during the RI, the remedial action objectives will be refined as appropriate. General responses actions for ground water will be developed defining containment, treatment, pumping, or other actions, singly or in combination to satisfy remedial action objectives. Volumes of ground water to which general response actions may apply will be estimated.

Based on the general response actions, hazardous waste treatment technologies will be identified and screened to ensure that only those technologies applicable to the contaminants present, their physical matrix, and other site characteristics will be considered. This screening will be based primarily on a technology's ability to effectively address the

contaminants at the site, but will also take into account a technology's implementability and cost. Representative process options will be selected, as appropriate, to carry forward into alternative development. The need for treatability testing (Task 9) for potentially useable technologies will be identified.

The potential technologies and process options will be combined into alternatives defined with respect aid size and configuration; time for remediation; rates of flow or treatment; spatial requirements; distances for disposal; and required permits, imposed limitations, and other factors necessary to evaluate the alternatives. If many options are developed, alternatives will be with respect to their effectiveness, implementability, and cost to limit the number of alternatives for detailed analysis, and to select the most promising process options.

Initial screening is intended to include alternatives which satisfy the response objectives, effectively minimize or mitigate actual or potential harm to public health, welfare, or the environment, are in compliance with ARARs, which do not pose significant adverse environmental effects, which are readily implementable, and which will not have excessive costs.

TASK 12: DETAILED ANALYSIS OF GROUND-WATER ALTERNATIVES

The alternative remedies that pass through the initial screening in Task 11 will be further developed and analyzed, and a preferred remedy will be selected. The development of alternatives will follow the guidance provided in the WDNR SOW.

Detailed analysis of these alternatives will consist of an individual analysis of each alternative against the nine evaluation criteria set forth in the NCP and a comparative analysis of all options against the evaluation criteria with respect to one another.

The evaluation criteria are:

- Overall Protection of Human Health and the Environment,
- Compliance with ARARs,
- Long-Term Effectiveness and Permanence,
- Reduction of Toxicity, Mobility, or Volume Through Treatment,
- Short-Term Effectiveness,
- Implementability,

- Cost,
- Support Agency Acceptance, and
- Community Acceptance.

Based on the detailed evaluation, a preferred remedy will be selected and described within a chapter of the FS report. The preferred remedy will:

- be protective of human health and the environment,
- attain all ARARs or health-based levels that have been identified for the site,
- be cost-effective, and
- utilize treatment technologies and permanent solutions to the maximum extent practicable.

The preferred remedy will reflect the preferences for:

- treatment significantly reducing the toxicity, mobility, or volume of hazardous constituents, and
- minimization of long-term management of residuals.

TASK 13: FFS REPORT(S)

A draft FFS report presenting the results of Tasks 11 and 12 will be prepared and submitted to both the WDNR and the U.S. EPA for review and approval. Support data, information, and calculations will be included in appendices to the report. A final report will be prepared, if necessary, to address WDNR and U.S. EPA comments.

Task 14, as described in the SOW, will be performed as a third phase if needed, and is therefore not described further herein.

Meetings

For cost estimating purposes, five meetings are assumed. One meeting will be held to finalize the project plans and work plans. A project kick-off meeting will be held prior to field work. One meeting will be held prior to submittal of the RI report and two meetings will be held as part of the FFS process. The cost estimate assumes all meetings will be held at Simon Hydro-Search offices.

The costs associated with each task are presented on the attached table. Task 5, Field Investigations, is subdivided as discussed herein and in the SAP.

I trust this information meets your needs. If you have any questions, please do not hesitate to call.

Sincerely,

SIMON HYDRO-SEARCH

Jennifer J. Johanson
Hydrogeologist

Judy L. Fassbender
Hydrogeologist

JJJ/JLF:cb

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
Better Brite - DePere, WI

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TASK NUMBER ——————> / TASK DESCRIPTION ——————>		3.2/3.4 Scoping/ PP Revisions	3.5 Monthly Progress Reports	4 (option A) Community Relations	4 (option B) Community Relations	5-A (option) Well Abandonment
PERSONNEL/LABOR						
Principal	Hrs.	6				
$163/Hr.	$	978				
Director	Hrs.	25	12	2	25	
$157/Hr.	$	3,925	1,884	314	3,925	
Senior Engineer/Scientist II	Hrs.					
$107/Hr.	$					
Projects Administrator	Hrs.	20				
$74/Hr.	$	1,480				
Project Engineer/Scientist II	Hrs.	120	72	10	30	15
$68/Hr.	$	8,160	4,896	680	2,040	1,020
Project Engineer/Scientist I	Hrs.			10	30	65
$53/Hr.	$			530	1,590	3,445
Technician	Hrs.					3
$41/Hr.	$					123
CAD Designer	Hrs.	40		15		
$40/Hr.	$	1,600		600		
Administrative Assistant	Hrs.	10				
$40/Hr.	$	400				
Word Processor	Hrs.	50	18	5	15	5
$40/Hr.	$	2,000	720	200	600	200
Clerk/Receptionist	Hrs.	10	6	5	5	
$40/Hr.	$	400	240	200	200	
SUBTOTAL PERSONNEL/LABOR	Hrs.	281	108	47	105	88
	$	18,943	7,740	2,524	8,355	4,788

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TASK NUMBER ——————> / TASK DESCRIPTION ——————>	3.2/3.4 Scoping/ PP Revisions	3.5 Monthly Progress Reports	4 (option) Community Relations	4 (option) Community Relations	5-A (option) Well Abandonment
OTHER DIRECT CHARGES ($)					
Computers - CAD	800		300		
Computers - Professional Staff					
Computers - Word Processing	500	180	50	150	50
Field Equipment					350
Major Field Equipment					335
Safety					50
Subsistence					
Travel					
Vehicles					350
SUBTOTAL OTHER DIRECT CHARGES	1,300	180	350	150	1,135
OUTSIDE SERVICES ($)					
Drilling					10,520
Survey					
Soil Testing					
Chrome Evaluation-Thresher	3,000				
SUBTOTAL OUTSIDE SERVICES	3,000				10,520
TOTAL WITHOUT FIXED FEE PROFIT	$23,243	$7,920	$2,874	$8,505	$16,443
FIXED FEE PROFIT (15%)	$3,486	$1,188	$431	$1,276	$2,466
TOTAL ESTIMATED COSTS	$26,729	$9,108	$3,305	$9,781	$18,909

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TASK NUMBER ---------->		5-B	5-3C	5-3Z	5-5C	5-5Z
TASK DESCRIPTION ---------->		Mobilization	Ground-Water Impacts Chrome Shop	Ground-Water Impacts Zinc Shop	BRA Character. Chrome Shop	BRA Character. Zinc Shop
PERSONNEL/LABOR						
Principal	Hrs.					
$163/Hr.	$					
Director	Hrs.	5	10	7	2	2
$157/Hr.	$	785	1,570	1,099	314	314
Senior Engineer/Scientist II	Hrs.					
$107/Hr.	$					
Projects Administrator	Hrs.	20				
$74/Hr.	$	1,480				
Project Engineer/Scientist II	Hrs.	30	100	65	50	50
$68/Hr.	$	2,040	6,800	4,420	3,400	3,400
Project Engineer/Scientist I	Hrs.	73	605	575	80	80
$53/Hr.	$	3,869	32,065	30,475	4,240	4,240
Technician	Hrs.	40	59	51		
$41/Hr.	$	1,640	2,419	2,091		
CAD Designer	Hrs.		55	41	6	6
$40/Hr.	$		2,200	1,640	240	240
Administrative Assistant	Hrs.					
$40/Hr.	$					
Word Processor	Hrs.	5	47	33		
$40/Hr.	$	200	1,867	1,333		
Clerk/Receptionist	Hrs.	15				
$40/Hr.	$	600				
	Hrs.	188	876	772	138	138
SUBTOTAL PERSONNEL/LABOR	$	10,614	46,921	41,058	8,194	8,194

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TASK NUMBER ——————>	5-B	5-3C	5-3Z	5-5C	5-5Z
TASK DESCRIPTION ——————>	Mobilization	Ground-Water Impacts Chrome Shop	Ground-Water Impacts Zinc Shop	BRA Character. Chrome Shop	BRA Character. Zinc Shop
OTHER DIRECT CHARGES ($)					
Computers - CAD		1,100	820	120	120
Computers - Professional Staff					
Computers - Word Processing	50	467	333		
Field Equipment		1,727	1,601	30	30
Major Field Equipment		5,520	4,784	536	536
Safety		450	353	20	20
Subsistence	67	2,077	2,005	57	57
Travel					
Vehicles	162	2,700	1,974	192	192
SUBTOTAL OTHER DIRECT CHARGES	279	14,040	11,871	954	954
OUTSIDE SERVICES ($)					
		(8,465)			
Drilling		33,676	26733		
Survey		1,350	900		
Soil Testing		9,000	5,600		
Chrome Evaluation-Thresher					
SUBTOTAL OUTSIDE SERVICES		44,026	33,233		
TOTAL WITHOUT FIXED FEE PROFIT	$10,893	$104,987	$86,162	$9,148	$9,148
FIXED FEE PROFIT (15%)	$1,634	$15,748	$12,924	$1,372	$1,372
TOTAL ESTIMATED COSTS	$12,527	$120,735	$99,086	$10,521	$10,521

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TASK NUMBER ——————> / TASK DESCRIPTION ——————>		5-PM Project Management	6-QA Sample Analysis/ Validation	7 Data and Risk Evaluation	10 RI Report Preparation
PERSONNEL/LABOR					
Principal	Hrs.				
$163/Hr.	$				
Director	Hrs.	125	35	40	80
$157/Hr.	$	19,625	5,495	6,280	12,560
Senior Engineer/Scientist II	Hrs.				
$107/Hr.	$				
Projects Administrator	Hrs.	110			
$74/Hr.	$	8,140			
Project Engineer/Scientist II	Hrs.	440	100	160	520
$68/Hr.	$	29,920	6,800	10,880	35,360
Project Engineer/Scientist I	Hrs.		100	80	140
$53/Hr.	$		5,300	4,240	7,420
Technician	Hrs.				
$41/Hr.	$				
CAD Designer	Hrs.			16	166
$40/Hr.	$			640	6,640
Administrative Assistant	Hrs.				
$40/Hr.	$				
Word Processor	Hrs.	40	5	25	190
$40/Hr.	$	1,600	200	1,000	7,600
Clerk/Receptionist	Hrs.	80			
$40/Hr.	$	3,200			
SUBTOTAL PERSONNEL/LABOR	Hrs.	795	240	321	1,096
	$	62,485	17,795	23,040	69,580

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TASK NUMBER ——————>	5-PM	6-QA	7	10
TASK DESCRIPTION ——————>	Project Management	Sample Analysis/ Validation	Data and Risk Evaluation	RI Report Preparation
OTHER DIRECT CHARGES ($)				
Computers - CAD			320	3,320
Computers - Professional Staff		1,600	800	
Computers - Word Processing	400	50	250	1,900
Field Equipment				
Major Field Equipment				
Safety				
Subsistence				
Travel		650		
Vehicles				
SUBTOTAL OTHER DIRECT CHARGES	400	2,300	1,370	5,220
OUTSIDE SERVICES ($)				
Drilling				
Survey				
Soil Testing				
Chrome Evaluation-Thresher			7,000	
SUBTOTAL OUTSIDE SERVICES			7,000	
TOTAL WITHOUT FIXED FEE PROFIT	$62,885	$20,095	$31,410	$74,800
FIXED FEE PROFIT (15%)	$9,433	$3,014	$4,712	$11,220
TOTAL ESTIMATED COSTS	$72,318	$23,109	$36,122	$86,020

WISCONSIN DEPARTMENT OF NATURAL RESOURCES 18-May-93
Better Brite - DePere, WI

Summary of Costs - Page 7 of 8

TASK NUMBER ——————>		11, 12, 13 Focused Feasibility Study	Meetings	TOTAL
TASK DESCRIPTION ——————>				
PERSONNEL/LABOR				
Principal	Hrs.	36		42 Hrs.
$163/Hr.	$	5,868		6,846 $
Director	Hrs.	80	60	510 Hrs.
$157/Hr.	$	12,560	9,420	80,070 $
Senior Engineer/Scientist II	Hrs.			Hrs.
$107/Hr.	$			$
Projects Administrator	Hrs.	50		200 Hrs.
$74/Hr.	$	3,700		14,800 $
Project Engineer/Scientist II	Hrs.	275	61	2,098 Hrs.
$68/Hr.	$	18,700	4,148	142,664 $
Project Engineer/Scientist I	Hrs.	250	15	2,103 Hrs.
$53/Hr.	$	13,250	795	111,459 $
Technician	Hrs.			153 Hrs.
$41/Hr.	$			6,273 $
CAD Designer	Hrs.	110	5	460 Hrs.
$40/Hr.	$	4,400	200	18,400 $
Administrative Assistant	Hrs.			10 Hrs.
$40/Hr.	$			400 $
Word Processor	Hrs.	115	10	563 Hrs.
$40/Hr.	$	4,600	400	22,520 $
Clerk/Receptionist	Hrs.	40	5	166 Hrs.
$40/Hr.	$	1,600	200	6,640 $
SUBTOTAL PERSONNEL/LABOR	Hrs.	956	156	6,305 Hrs.
	$	64,678	15,163	410,072 $

WISCONSIN DEPARTMENT OF NATURAL RESOURCES 18-May-93
Better Brite - DePere, WI

Summary of Costs - Page 8 of 8

TASK NUMBER ——————>	11, 12, 13 Focused Feasibility Study	Meetings	TOTAL
TASK DESCRIPTION ——————>			
OTHER DIRECT CHARGES ($)			
Computers - CAD	2,200	100	9,200
Computers - Professional Staff			2,400
Computers - Word Processing	1,150	100	5,630
Field Equipment			3,738
Major Field Equipment			11,711
Safety			893
Subsistence			4,262
Travel			650
Vehicles			5,570
SUBTOTAL OTHER DIRECT CHARGES	3,350	200	44,053
OUTSIDE SERVICES ($)			
Drilling			70,929
Survey			2,250
Soil Testing			14,600
Chrome Evaluation-Thresher			10,000
SUBTOTAL OUTSIDE SERVICES			97,779
TOTAL WITHOUT FIXED FEE PROFIT	$68,028	$15,363	$551,904
FIXED FEE PROFIT (15%)	$10,204	$2,304	$82,786
TOTAL ESTIMATED COSTS	$78,232	$17,667	$634,689

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

DATE: May 26, 1993

FILE REF: FID #0501109
Brown Co.
ER/SFND

TO: Terry Koehn - LMD

FROM: Gary Edelstein - SW/3 GAE

SUBJECT: Better Brite HSI RI/FS Scope of 5/18/93; Comments on FS Portion

As you know, I would like to see soil borings and samples in the vadose zone near the original source areas. We should also look at surface water runoff and impacts on the Fox R. via storm sewers. Then the soils and surface water would be included in the alternatives developed and we would have a full FS, not just an FFS for groundwater.

The approach here is to perform a FFS on only the groundwater route. The only alternatives described would be for that route. The only deliverables are a draft and final FFS. A preferred alternative is proposed to be selected.

The normal approach is to submit an alternatives array document at about the 25% stage of the FS and get input from the agencies on ARARs. Also, the normal approach is not to have the FS select a preferred alternative but simply compare the alternatives assembled in the alternatives array using a detailed analysis. Regardless of whatever approach we select for this FFS or FS, we should not have HSI select a preferred alternative. Also, regardless of the approach, we could cut some costs by specifying the number of alternatives they would evaluate in detail now. I would suggest no more than 3 or 4 plus a no action.

We may be able to get by with an approach that excludes the alternatives array. However, HSI's approach may end up being more expensive, since we wouldn't have input until a draft FFS was done, and if there are significant problems (i.e, major ARARs missed, wrong alternatives evaluated) the work to prepare an acceptable final FFS would be significant. Regardless, we should do something other than what's outlined.

Normally, I would want an alternatives array. That is what I recommend in this case. However, I did some brainstorming and here are some alternatives for you to consider.

A possible approach might be to just have a meeting to discuss alternatives and ARARs. Another would be for them to submit a short letter outlining the alternatives they're looking at and then have a meeting to discuss them and provide input on ARARs. We and U.S. EPA could follow up any meeting with a letter outlining ARARs.

Another suggestion is to use the Nauthe experience to our advantage and specify, in general terms, the alternatives we want them to look at after the RI data is in. We could also give them general information on ARARs at that time. They could skip most of Task 11 (technologies screening, assembly of alternatives) and concentrate on filling in the additional conceptual design

information for each of the alternatives so they are fully described. U.S. EPA would have to agree to this approach and state it meets the intent of the NCP (I have some reservations on that, but if they say it does, OK). For example, we could specify the alternatives in these terms:

- Alt. 1 - Composite or soil cap only (assuming the soil route was added back in) and monitor GW.

- Alt. 2 - Alt. 1 with unconsolidated zone collection trenches and GW extraction wells in the bedrock, treatment and discharge to POTW or storm sewer. They would fill in the details of the conceptual design and the treatment processes. We would specify ARARs for discharge standards.

- Alt. 3 - Alternative 2 groundwater collection/treatment elements with in-situ solidification of the unconsolidated soils and a 2-foot soil cap.

One problem with this last approach is it is contingent on both you and I staying assigned to the site. If others are assigned who don't have the same experience, then the approach may break down. Therefore, I don't recommend it.

Even with some of the above changes, I expect the FS budget outlined in the Scope should remain somewhat close to what is shown. We will have difficult ARAR issues again, just like at Mauthe, so we shouldn't cut the FS too much.

Call me if you have any questions. Thanks.

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Secretary

Madison, Wisconsin 53707
SOLID WASTE TELEFAX 608-267-2768
SOLID WASTE GENERAL TELEPHONE 608-266-2111
TDD 608-267-6897

May 26, 1993

IN REPLY REFER TO: FID #0501109
Brown Co.
ER/SFND

TELEFAX FROM THE DESK OF GARY EDELSTEIN
Voice Phone #: (608)267-7563

TO: Terry Koehn - LHD

SUBJECT: Better Brite RI/FS Scope

MESSAGE: Per your request yesterday, I took a look at this. Thanks.

PAGES TO FOLLOW (EXCLUDING COVER SHEET): 2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

HSRW-6J

Mr. Terry Koehn
Wisconsin Department of Natural Resources
1125 N. Military Avenue
P.O. Box 10448
Green Bay, WI 54307-0448

RE: Better Brite RI/FS Status Meeting

Dear Mr. Koehn:

The United States Environmental Protection Agency's (U.S. EPA) March 31, 1993 meeting with the Wisconsin Department of Natural Resources (WDNR) and WDNR's Remedial Investigation / Feasibility Study (RI/FS) contractor (Hydro-Search) proved successful in discussing the progress and focusing the direction of this state lead project. This letter documents the focused direction that U.S. EPA would like to see at the Better Brite Plating Chrome and Zinc Shops Site RI/FS proceed with.

As stated in the meeting, U.S. EPA believes that the costs presented in the cost estimate proposed by Hydro-Search for completion of the Work Plan and RI are high and not supportable. Our belief is based primarily on reduction in the scope of this project due to past and present actions that have taken place at the site. Based on experience with projects of this type, knowledge of the site, and the elimination of activities completed, U.S. EPA would like to see this project further reduced in cost and proposed task activities, maximizing the continuing goal of cost effectiveness.

This position is also based on existing knowledge of the nature of contamination in the soil and groundwater at Better Brite. The U.S. EPA believes further examining the extent of the contaminated groundwater plume, will fulfill the requirement to complete this RI/FS.

Currently, the proposed workplan budget submitted exceeds funding available for this site and some of the tasks listed are expansive. We would suggest the following modifications for WDNR consideration. U.S. EPA is prepared to offer its unconditional support to these proposed modifications and would like to assure WDNR that the incorporation of the following suggestions will not

result in future changes that will affect enforcement, remedial actions, or operation and maintenance.

* Task 4: Community Relations Support - Considerable efforts have been made to keep the City of DePere and local residents abreast of our activities and plans, therefore a reduction in effort of this optional task would be in order.

* Subtask 5-A: Abandonment of Existing Wells - This activity could probably be accomplished under the expertise of U.S. EPA's emergency removal section or during implementation of the remedial action. It is a needed activity, but can be acted on outside of this RI/FS, if WDNR feels funds limitation warrant.

* Subtask 5-B: Mobilization - This subtask is primarily an administrative function. The need for subcontracting duties has been reduced in scope due to previous activities.

* Subtask 5-2C: Surface Soils Impacts - Chrome Shop - This activity is scheduled to be completed by U.S. EPA this spring.

* Subtask 5-2Z: Surface Soil Impacts - Zinc Shop - This activity is scheduled to be completed by U.S. EPA this spring.

* Subtask 5-3C: Groundwater Impacts - Chrome Shop - When consideration is given to the reduction in the number of monitoring wells, samples, surveying and staff gauges; a proportionate reduction in cost should follow.

* Subtask 5-3Z: Groundwater Impacts - Zinc Shop - When consideration is given to the reduction in the number of monitoring wells, samples, surveying and staff gauges; a proportionate reduction in cost should follow.

* Subtask 5-4C: Hydraulic Control - Chrome Shop - This activity could be conducted by the contractor responsible for the installation of the system under the emergency removal section and reported to WDNR for incorporation into the RI/FS.

* Subtask 5-4Z: Hydraulic Control - Zinc Shop - This activity could be conducted by the contractor responsible for the installation of the system under the emergency removal section and reported to WDNR for incorporation into the RI/FS.

* Subtask 5-5C: Baseline Risk Assessment - Chrome Shop - The information available allows us to suggest that we only need to analyze a limited number of pathways. We are identifying sampling of the municipal wells, sump pumps and a cursory review of the ecological assessment.

* Subtask 5-5Z: Baseline Risk Assessment - Zinc Shop - The information available allows us to suggest that we only need to

analyze a limited number of pathways. We are identifying sampling of the municipal wells, sump pumps and a cursory review of the ecological assessment.

* Task 6: Sample Analyses/Validation - This needed administrative component can be reduced to include a system commonly used by Hydro-Search versus a more recent product.

* Task 8: Risk Assessment - This section can be streamlined and still meet the requirements of the National Contingency Plan (NCP). The intention of the Risk Assessment is to determine whether remedial action is needed. U.S. EPA has already determined that action is needed through our Emergency Removal's efforts on soils and groundwater. We believe no further action on soils and continued operation of a groundwater pump and treat system is necessary. To confirm this, we suggest utilizing the Health Assessment document under preparation by the WDHHS or a Qualitative Risk Assessment. Kim Bro of the WDHHS has indicated that Health Assessments have been used for qualitative risk assessments on other Wisconsin projects. We are willing to assist you, if you choose to pursue this option.

* Task 10: RI Report(s) - This section is duplicative. We accomplish much of the same in the Technical Memo Section. We would like to see this section reduced or eliminated to incorporate a way to efficiently use the Tech Memos.

Less than $600,000 in federal funds remain to complete the RI/FS. This proposed cost estimate is approximately $800,000, not including the required FS. With these available funds U.S. EPA hopes required work activities to complete the RI/FS can be accomplished with proposed modifications. U.S. EPA remains committed to retaining this project as a WDNR lead, but at this time the Agency cannot justify allocating additional funds for this project. We believe only information critical for the groundwater plume be obtained with RI funds. Data critical for remedial design can be funded with remedial design monies.

U.S. EPA continually examines sites for prioritization and execution of actions for allocations based on efforts to efficiently utilize funding resources for speedy clean-ups. This approach consistently provides protection of human health and the environment from the threat of hazardous waste release, while at the same time effectively utilize taxpayers dollars.

We are pleased with the meeting and the progress that the WDNR has made with its contractor and the RI/FS given changed conditions at these sites. Please call 312-886-1841, should you have any questions.

Sincerely,

David Linnear,
Remedial Project Manager

MODE = TRANSMISSION START=APR-21 12:54 END=APR-21 12:58

NO.	COM	SPEED	DIALSTATION NAME/ TELEPHONE NO.	PAGES	PRG.NO.	PROGRAM NAME
001	OK	[11]	DNR MAD SW/3	005		

-LMD/SOLID WASTE -

********** - - **********

cc: G. Edelstein SW/3
D. Rossberg LMD
D. Crelore LMD

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 17 1992

REPLY TO THE ATTENTION OF:
HSRW-6J

Greetings:

Thank you for your continued interest in the Better Brite Chrome and Zinc Shop Superfund site. This letter is to update you on the current and future planned activities at the Better Brite site by the United States Environmental Protection Agency (U.S. EPA).

First, I would like to take this opportunity to update you on an unplanned activity that has just occurred, namely the fire at the Better Brite Zinc Shop. As you most probably are aware, the Zinc Shop caught fire Saturday night, September 5, 1992. Although the fire was unfortunate, it was fortunate that the bulk of hazardous material that once was located inside the shop was removed sometime ago. Additionally, as the building was in the process of being cleaned in preparation of it being dismantled (an activity that was to be scheduled for the very near future), it contained little or no residuals from the previous plating operations. Thus, it is thought that the fire did not represent a release of contaminants to the surrounding area, anymore than any other building would have. As you can note below, one of the planned activities was to completely dismantle the Zinc Shop. Now that the Zinc Shop has been razed by the fire, the U.S. EPA will continue to remove the debris prior to proceeding with the treatment of contaminated soils, also described below.

Now, regarding planned activities, as you may know, a Record of Decision (ROD) was signed by the U.S. EPA on June 28, 1991. The ROD is the document that describes the interim measures to be taken to address the contamination at the shops. A final remedy will be chosen after a detailed study called a Remedial Investigation/Feasibility Study (RI/FS) is completed by the Wisconsin Department of Natural Resources (WDNR). The major components of the interim action described in the ROD are:

* Continued operation of the existing system that pumps contaminated groundwater at the site and treats it before discharging it into the municipal wastewater treatment system;

* Construction of berm(s) at the Chrome Shop to avoid the flow of surface water off the site;

* Construction of a trench, as an addition to the existing groundwater/surface water collection system, to help prevent ponding at the Chrome Shop;

* Improvement of the existing fences at the Chrome Shop and installation of fences at the Zinc Shop; and

* Installation of siding on the exterior of the building at the Zinc Shop.

The interim action called for in the ROD was initiated in Fall 1991 and has been ongoing. Some aspects of the interim action, however, will be delayed because of another type of action being taken by U.S. EPA. This additional action is an expansion of the removal activities that has previously occurred at the Site. Funding has become available to enable the U.S. EPA to excavate, treat and stabilize the contaminated soils at both shops and to completely dismantle the Zinc Shop building. (Now that the fire has destroyed the Zinc Shop building, funds will be used to segregate the waste material and properly dispose of it.)

This new action will significantly reduce any threats to public health and the environment that may have been caused by the presence of the contamination in the soils at both of the Shop locations. Groundwater at the site will still be contaminated, but the U.S. EPA and the WDNR anticipate that addressing the contaminated soils will help prevent additional groundwater contamination from occurring and will help accelerate the final groundwater cleanup efforts.

The activities that are ongoing or are about to begin in the near future at both Shops include:

* The addition of a trailer/office, based at the Chrome Shop but used for both locations;

* The presence of a backhoe to take samples of the more contaminated areas for use in treatability studies;

* Sampling of soil to determine areas in need of excavation/treatment/stabilization;

* The cleaning/decontamination of the Zinc building prior to its dismantling and preparatory work for its off-site disposal: (This activity was nearly complete at the time the fire destroyed the building.)

* The removal of the concrete slabs at both shops;

* The excavation, treatment and stabilization of contaminated soils; and

* The improvement of the drainage patterns and surface water/groundwater collection systems at both shops.

The exact method of treatment and disposal of contaminated soils is still being worked on by U.S. EPA, in consultation with the WDNR, and I will update you as the project progresses.

If you have questions now, please feel free to call me at 1-800-621-8431 or 312-886-7252. I am temporarily handling the project for David Linnear, the project manager that you may have met at the public meeting held in May 1991. David is temporarily working in another U.S. EPA Division and is expected back in three to four months. The local WDNR contact is still Terry Koehn. He can be reached at 414-492-5869.

Sincerely,

Daniel J. Cozza
Remedial Project Manager

cc: Terry Koehn, WDNR-Green Bay

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Carroll D. Besadny
Secretary
Lake Michigan District Headquarters
1125 N. Military Avenue
P.O. Box 10448
Green Bay, Wisconsin 54307-0448

August 15, 1991

File Ref: WID-560010118
Brown Co.
SW/SFND

Mr. David Linnear
Remedial Project Manager
U.S. EPA Region V FHS/11
230 South Dearborn Street
Chicago, Il 60604

Re: Fencing and Monitoring Well Installation
Better Brite Superfund Site - Interim Action

Dear Mr. Linnear:

Please note the following comments, regarding the installation of monitoring wells and fencing at the Better Brite site as part of the Interim Action. Your consideration of these comments in developing plans for upcoming work at the site would be appreciated.

Zinc Shop Monitoring Wells

As part of the Interim Action, installation of several monitoring wells was proposed in the ROD to help determine if DePere's municipal well, located approximately 250 feet from the Zinc Shop, is being impacted. The following presents the WDNR's proposals regarding well locations and depths.

Four monitoring wells are proposed, as noted on attached map #1.

1. A water table observation well located west of 6th Street, at the 312 6th Street residence.

2. A piezometer screened directly above the bedrock interface at the same location as #1 noted above.

3. A water table observation well located west of 6th Street at the 320 6th Street residence.

4. A piezometer screened directly above the bedrock interface at the same location as #3 noted above.

A water table observation well located within 40 feet of the municipal well may also be considered However, its actual location would be dependant on specific site conditions, as a relatively steep slope is located just to the east and south of the municipal well.

- Due to the proximity of the municipal well, installing deeper monitoring wells in this area is not acceptable.
- This shallow well would help identify any contaminants potentially reaching the municipal well head/casing.

The well locations noted above would be useful in determining if contaminants are migrating toward the municipal well. The piezometers would be useful for monitoring contaminants moving at depth in the unconsolidated sediments. The locations are situated approximately midway between the Zinc Shop and the municipal well.

Each of the wells suggested above could be used in conjunction with the wells already installed at the Zinc Shop to determine vertical gradients, shallow groundwater flow direction, identify the potentiometric surface and to a limited degree the extent of contamination in the area of the municipal well. The water table observation wells can be expected to be approximately 15 feet deep and the piezometer around 30 feet deep. Screening both or one of the piezometers in the upper portion (top 15 feet) of the dolomitic bedrock may also be considered, provided adequate justification is presented.

Please note the enclosed copy of NR-141, Wis. Admin. Code regarding the legal requirements pertaining to the installation of monitoring wells. At a minimum, cuttings from the shallow wells should be analyzed prior to drilling the deeper wells. Analytical results from the shallow wells would be used to determine if contaminants were present at these locations, thus, also determine well drilling and installation techniques required for the deeper wells. Methods to be used in drilling through contaminated zones must be agreed upon prior to commencement of the actual drilling.

As communicated to you previously, the WDNR does not think that the installation of a single well penetrating the sandstone aquifer should be performed at this time. An understanding of groundwater flow in the area and the extent of contamination should be obtained prior to performing this type of work. The well would represent the first well installation related to the site, since those installed in 1987. The 1987 wells were placed basically to document an observed release, not to define limits of contamination. Drilling a deep well into the drinking water aquifer is not thought to be an appropriate first action considering we are just starting the investigation of the area. Additionally, it is thought that the amount of forewarning potentially obtained from such a deep well would be very limited, considering the pumping rate of the municipal well. Information, to be obtained from the RI/FS, regarding groundwater conditions of the area, would be useful in determining the value of a well screened in the sandstone aquifer. Overall, the risks associated with the installation of a single deep well are thought, at this time, to outweigh the potential benefits of such a well. These

concerns were previously brought to the attention of the EPA in the WDNR's concurrence letter for the Interim Action ROD.

Fencing at Zinc Shop

To the south of the building the fence should be installed approximately 15 feet from the building (Note attached map #2).

- The fence should provide sufficient room to effectively sample or maintain monitoring wells in this area. Sufficient room should also be left to allow the next door residents unrestricted access to their home.
- A relatively easily removable panel should also be installed in the fence, in the area of the monitoring wells to provide access for heavy equipment should it be needed.
- Sample S-09 (noted on the attached map) indicated a 976 ppm value for zinc in the soil. This sample was collected by the WDNR as part of the SSI.

Along the west side of the site, the fence should basically tie into the building at both its north and south ends.

- An access gate should be installed along this side, north of the building.

To the east of the building the fence should be placed approximately 30 feet from the building.

- It should enclose the area of the sump, yet allow room for the neighboring trucking company to access their property from the south.
- A gate should be installed near the sump to facilitate removal of water.
- Sample S-10 from the WDNR SSI indicated values of 2910 ppm for chromium, 1500 ppm for lead, 8720 ppm for zinc and 610 ppm for cyanide.
- Sample S-08 from the WDNR SSI indicated a 409 ppm value for cyanide.

To the north of the building, it may be advantageous for the fencing to follow the property boundary, assuming that this boundary is located greater than 15 feet from the loading dock.

- Access to the monitoring wells located to the west of the loading dock should be maintained.

As an alternative the fence should be installed a minimum of 15 feet from the limits of the loading dock (As noted on attached map #2).

- This would provide unrestricted access from 6th Street around the fenced in area.
- A gate should then be installed as indicated on the attached map.
- A removable panel should also be installed in the fence, in the area of the monitoring wells to provide access for heavy equipment should it be needed.

Fencing at the Chrome Shop

It is expected that the existing fence along the southern end of the property would be acceptable in its current location.

- It may require extension to the east and west to tie in to

any adjustments made to the fencing along the east and west sides of the site.

Adjusting the western fence line further to the west should be considered, dependant on actual field locations for soils samples collected from this area.

- This fence line should at a minimum enclose the berm constructed in association with the french drain system.
- Any new water collection system may also require enclosure.
- Each of the samples indicated on attached map #3 detected elevated levels of chromium.
    - Sample S-11 from the WDNR SSI indicated a value of 746 ppm chromium.
    - Sample S-5 collected by the Emergency group in 1990 indicated a value of 870 ppm chromium.
    - Sample S-5 collected by the Emergency group in 1990 indicated a value of 480 ppm chromium.
- A removable panel (or gate) should be installed along this side to provide access to the enclosed area west of the berm.

Enclosing the pretreatment plant along the northern edge of the site should be considered.

- A gate should be installed along this side to provide access to the plant etc.

Fencing in a greater area to the east of the current fence and pretreatment plant should be considered.

- Sufficient room should be maintained within the fence to facilitate transferring water from the Zinc Shop and drum removal.
- Sufficient room along the railroad tracks should also be provided for the railroad company.
- There are reports in the files regarding dumping of waste along the eastern boundary of the site (near the tracks).
- Sample S-12 from the WDNR SSI indicated values of 112 ppm for cadmium, 2250 ppm for chromium and 7900 ppm for lead. Lead was noted as a contaminant of concern in the Preliminary Health Assessment.

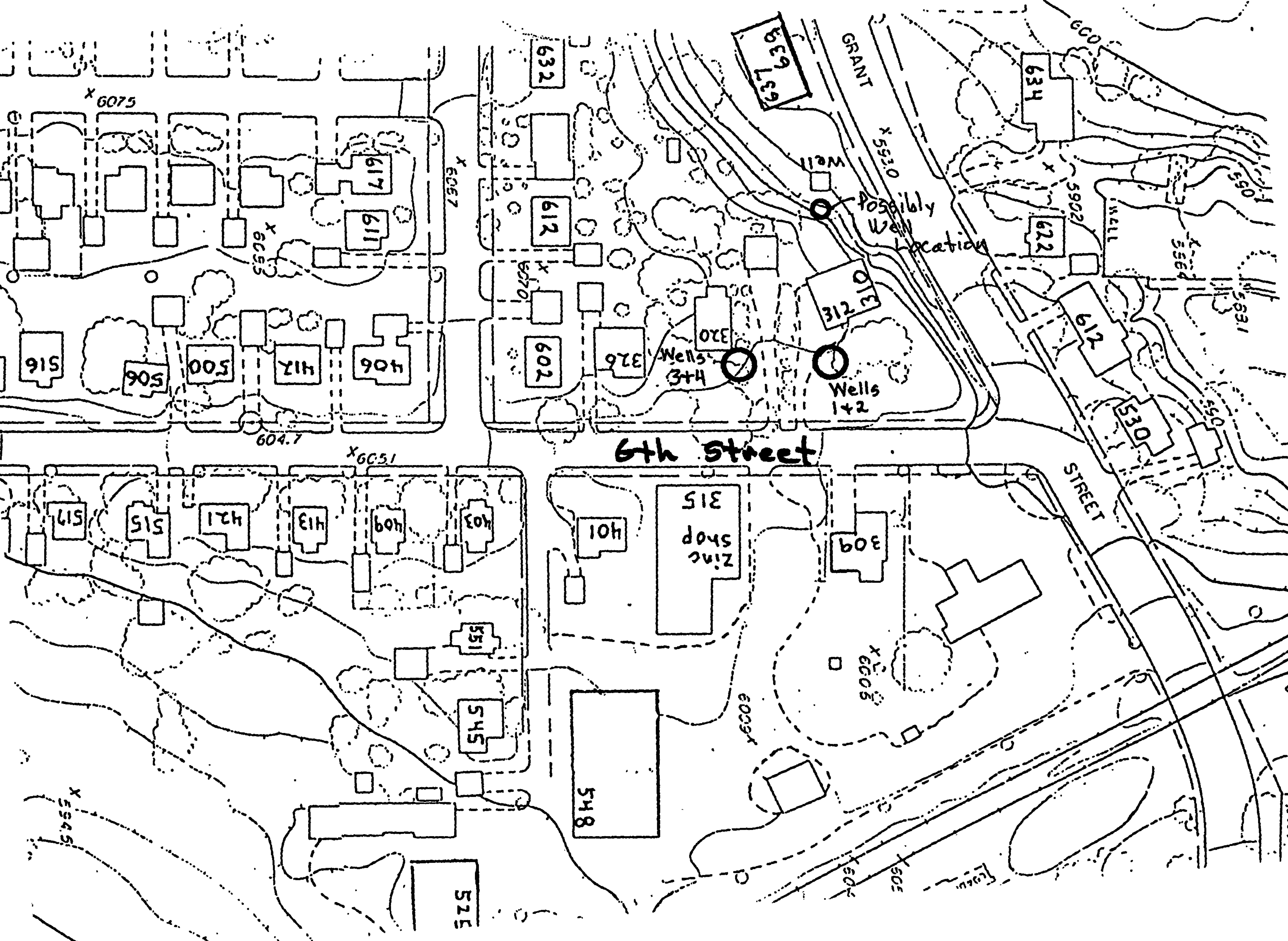
I look forward to reviewing your remedial action plan covering the proposed work at the site. If you have any questions regarding the above please call me at (414) 492-5869.

Sincerely,

Terry Koehn
State Project Manager

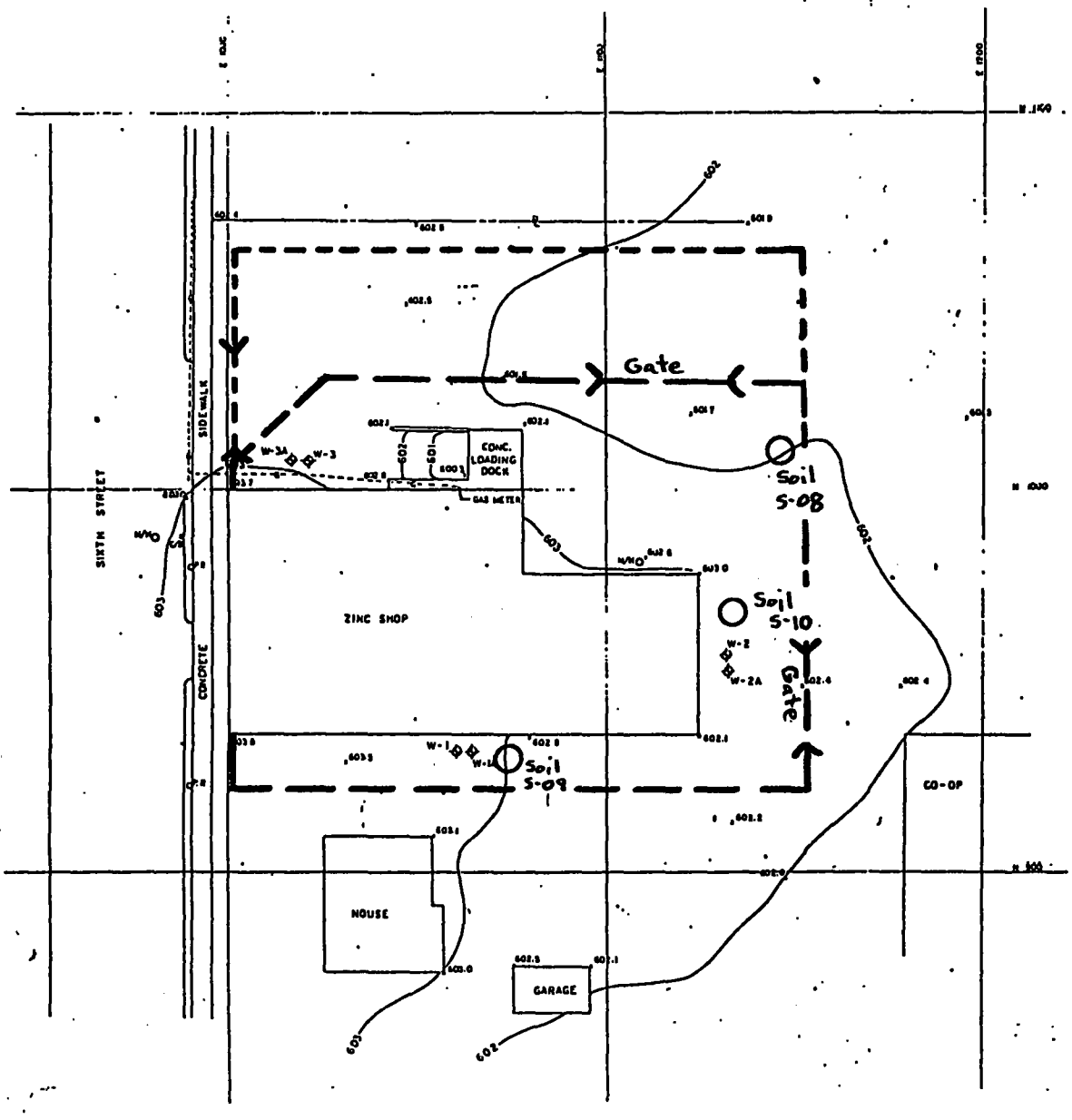
cc: Sue Bangert SW/3
Patricia Hanz LC/5
Doug Rossberg LMD-SW
Rick Stoll LMD-WS
Darsi Foss SW/3
enclosure

Map #1 →N



6th Street
Wells 3+4
Wells 1+2
Possibly Well Location
GRANT
STREET
6075
6051
604.7

Map #2



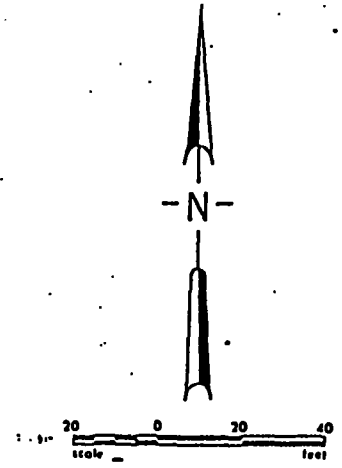


FIGURE 2-1C
SITE MAP

LEGEND

- 602 — GROUND SURFACE CONTOUR
- 602.5 — GROUND SURFACE SPOT ELEVATION
- SOIL BORING WITH MONITORING WELL
- PROPERTY LINE
- POWER POLE
- MANHOLE
- CATCHBASIN
- GAS LINE

STS Consultants Ltd.
Consulting Engineers

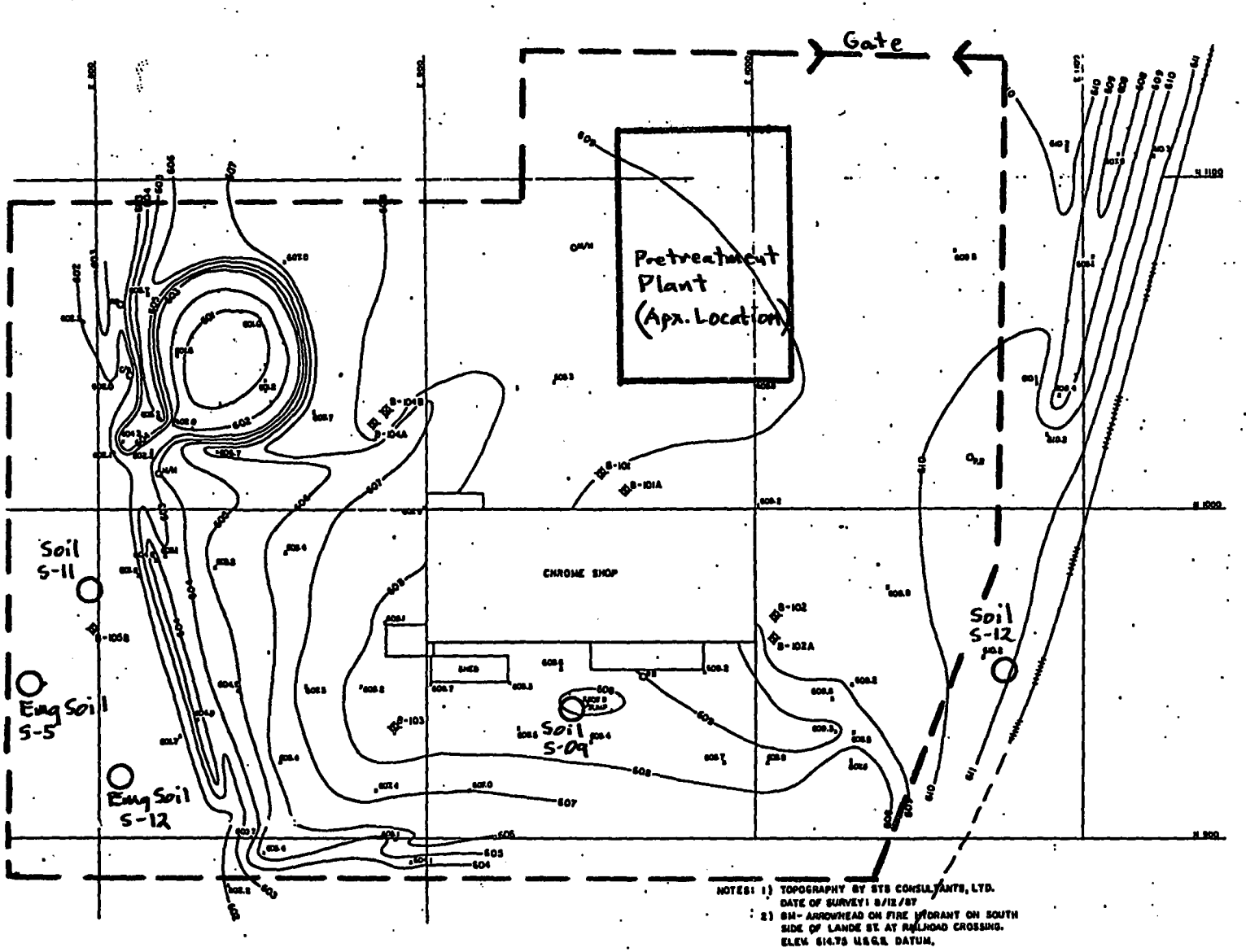
PROJECT/CLIENT

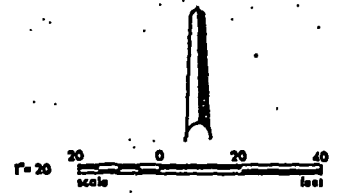
BETTER BRITE PLATING—ZINC SHOP
DEPERE, WISCONSIN

EXISTING SITE CONTOURS

DRAWN BY	K.J.C.	8/31/87	SCALE	FIGURE NO.
CHECKED BY	P.L.E.	9-9-87	STS 0	

Map #3





LEGEND

- GROUND SURFACE CONTOUR
- GROUND SURFACE SPOT ELEVATION
- SOIL BORING
- SOIL BORING WITH MONITORING WELL
- POWER POLE
- MANHOLE
- CATCHBASIN
- RAILROAD TRACKS

NOTES: 1) TOPOGRAPHY BY STS CONSULTANTS, LTD. DATE OF SURVEY: 8/12/87
2) BM- ARROWHEAD ON FIRE HYDRANT ON SOUTH SIDE OF LANDE ST. AT RAILROAD CROSSING. ELEV. 614.75 U.S.G.S. DATUM.

FIGURE 2-2B

STS Consultants Ltd.

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Lake Michigan District Headquarters
1125 North Military Avenue
P.O. Box 10448
Green Bay, Wisconsin 54307-0448

Faxed out 8-19-91 S

Date: 8-19-91

Please Deliver the Following Pages:

TO:

Name: David Linnear

Bureau/Agency: U.S. EPA

Fax Number: 312-886-4071

FROM:

Name: Terry Koehn

Phone Number: 414-492-5869

Fax Number: 414-492-5913

Pages to follow (excluding cover sheet): 7

Any problems phone Connie Schramm at 414-492-5809

Comments/message:

Fence + Wells Memo

F 8-15-91

Hydro-Search, Inc.
Brookfield Lakes Corporate Center XII
175 N. Corporate Drive, Suite 100
Brookfield, Wisconsin 53045
HYDROLOGISTS-GEOLOGISTS-ENGINEERS
Phone (414) 792-1282 FAX (414) 792-1310

August 8, 1991
(148115003)

Mr. Terry Koehn
Wisconsin Department of Natural Resources
1125 North Military Avenue
Green Bay, WI 54307

RE: Better-Brite RI/FS

Dear Terry:

At our project opening meeting of August 7, 1991, we discussed the need for the use of a CLP laboratory to provide analytical support to this project. We understand that the cost for analytical laboratory support will not be included within the funds budgeted for this project if U.S. EPA's Central Regional Laboratory or a CLP laboratory is utilized. In order to expedite receipt of validated analytical results, we were asked to determine Ortek Environmental Laboratory's CLP status.

Attached is a fax received from Ortek indicating the results of Superfund Performance Evaluation samples for FY 1991. I interpret these results to mean that Ortek remains an acceptable subcontractor for this project and would be especially desirable given their close proximity to the site. It would seem premature to make a final determination on laboratory selection until the project work plans are nearing completion. However, it appears that Ortek is a feasible option for analytical support on this project.

Please do not hesitate to contact me if questions arise or if further information is desired on this matter. Best regards!

Sincerely,

HYDRO-SEARCH, INC.

Robert J. Karnauskas, PG., P.HG.
Director of Hydrogeology

RJK:jo
Encl.

ORTEK FAX

ENVIRONMENTAL LABORATORY
2490 West Mason Street P.O. Box 12435 Green Bay, WI 54307-2435
414-498-2222
FAX: 414-498-4067

TO:
NAME: Mr. Karmauskas

COMPANY:

OF PAGES (Including this cover sheet): 5

FROM:
NAME: James Chang

TOPIC:

If you need any
further information
please give me a
call

Thanks

DATE: 8/7/91 FAX #: 414-782-7310

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF:

JUL 02 1991

5SCRL

Dr. James Chang, Director
ORTEK Laboratory
2496 West Mason Street
Green Bay, WI 54307

Dear Dr. Chang:

We are finally returning results to you for your participation in Superfund's Performance Evaluation samples for QB-2 (Organics) FY' 91 and QB-2 (Inorganics) FY' 91.

Your laboratory's performance is acceptable overall. No errors are present for GC/MS identifications or quantifications. Improvements can be made for quantifying pesticides.

The inorganics results (metals) are acceptable with a score of 85%. If we were to re-score the sample disregarding a non-serious error for cobalt in Water 1, a score of 88% would result. Cobalt has a negative bias in both water samples.

We request one favor from you. During the recent renovation (demolition) of our laboratory facilities, we lost your data package for QB-2 (Inorganics). Would you be able to provide us another copy of the QB-2 (Inorganics) data package. We can evaluate it at the same time we evaluate your results for QB-3 (Inorganics).

Sincerely,

David A. Payne,
Chief, Laboratory Scientific Support Section
Central Regional Laboratory

cc: D. Cozza, WMD
G. Schupp, QAS
K. Khanna, WMD

INORGANIC PERFORMANCE EVALUATION SAMPLE

Summary Report for: QB 2 FY 91

Report Date: 4/24/91

Laboratory: ORTEK

Total Number of Samples	n =	3
Total Number of Spikes Outside of Criterion	S =	2
Total Number of Duplicates Outside of Criterion	D =	0
Soil 1 subscore	=	7.79
Water 1 subscore	=	13.23
Water 2 subscore	=	21.12

****
*
* Total Score = 84.96
*
* Acceptable, Response Required
*
****

QB-2 (FY91) (Inorganics)
ORTEK

Matrix: Soil

Element	95 % CI Lower	95 % CI Upper	Result	Qualifiers Level	Qualifiers M	Quant	Spike	Dup	Not Identified	False Positive Type I	False Positive Type II
Al	15900	43601	31200								
Sb	c	c	10.2	u			S				
As	7.1	17	9.6				S				
Ba	63	118	105								
Be	1	1.4	0.92								
Cd	2.2	5.1	3.6								
Ca	6810	9710	8610								
Cr	17	35	26.1								
Co	10	12	8.7								
Cu	36	47	42.8								
Fe	24600	34201	29700								
Pb	805	1080	922								
Mg	2960	4190	3570								
Mn	665	838	775								
Hg	0.72	1.1	0.93								
Ni	11	23	15.7								
K	1000	1420	878								
Se	c	c	0.42								
Ag	2	4.6	3								
Na	d	d	59.6								
Tl	d	d	0.61								
V	32	51	44.1								
Zn	358	494	495		X						

Total Number of Elements	T =	19
	B =	7.79
Number of Elements Not Identified	A =	0
Mis-quantitations + elements not identified	X =	1
Number of Type 1 False Positives	C1 =	0
Number of Type 2 False Positives	C2 =	0
Number of Spikes Outside of Criterion	S =	2
Number of Duplicates Outside of Criterion	D =	0

QB-2(Inorganics) FY91
ORTEK

Matrix: Water 1

Element	95 % CI Lower	95 % CI Upper	Result	Qualifiers Level	Qualifiers M Quant	Qualifiers Spike	Qualifiers Dup	Not Identified	False Positive Type I	False Positive Type II
Al	c	c	13	u						
Sb	292	366	318							
As	41	60	50.2							
Ba	c	c	4	u						
Be	8.8	12	9.6							
Cd	5	10	6.2							
Ca	31800	37200	33100							
Cr	10	18	8.5							
Co	468	505	459		X					
Cu	c	c	7.3							C
Fe	453	576	556							
Pb	40	64	51.6							
Mg	c	c	23	u						
Mn	450	532	511							
Hg	c	c	0.2	u						
Ni	107	134	108							
K	8850	10800	8870							
Se	7.8	13	10.4							
Ag	90	113	106							
Na	c	c	35.2							C
Tl	101	193	172							
V	c	c	5	u						
Zn	3260	3840	3730							

Total Number of Elements	T =	16
	B =	9.23
Number of Elements Not Identified	A =	0
Mis-quantitations + elements not identified	X =	1
Number of Type 1 False Positives	C1 =	0
Number of Type 2 False Positives	C2 =	2
Number of Spikes Outside of Criterion	S =	0
Number of Duplicates Outside of Criterion	D =	0

State of Wisconsin

CORRESPONDENCE/MEMORANDUM

Date: June 7, 1991

File Ref: WID-560010118
Brown Co.
SFND
Corr.

To: Jim McLimans SW/3

From: Terry Koehn LMD

Subject: Better Brite - Phase 1 Proposal

Please find enclosed two (2) copies of the Hydro-Search, Inc. June 4, 1991 proposal for the RIFS Phase 1 work for the Better Brite Sites. I have completed my review of this proposal and find it acceptable. Please proceed with awarding the contract to perform the work.

As you are aware this is a cost plus fixed fee contract. The total amount of this proposal is $119,020. This represents a significant reduction from the cost estimate of the original proposal. The proposal provides for the use of aerial photographs to be provided by EPA for preparation of site maps. It also provides for the use of EPA's recently available model QAPP.

Please let me know if further information is needed.

cc: D. Rossberg LMD
C. VanDerLoop SW/3

Hydro-Search, Inc.
Brookfield Lakes Corporate Center XII
175 N. Corporate Drive, Suite 100
Brookfield, Wisconsin 53045
HYDROLOGISTS-GEOLOGISTS-ENGINEERS
Phone (414) 792-1282 FAX (414) 792-1310

PROPOSAL
PHASE I DATA REVIEW AND WORK PLAN PREPARATION REMEDIAL INVESTIGATION/ FEASIBILITY STUDY BETTER BRITE NPL SITES

June 4, 1991

Prepared For:

Wisconsin Department of Natural Resources
Lake Michigan District Headquarters
1125 N. Military Avenue
Green Bay, Wisconsin 54307

Prepared By:

Hydro-Search, Inc.
Brookfield Lakes Corporate Center XII
175 N. Corporate Drive, Suite 100
Brookfield, Wisconsin 53045

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APPENDICES

1.0 INTRODUCTION

This proposal addresses the Phase I activities for the Remedial Investigation/Feasibility Study (RI/FS) at the Better Brite NPL Sites. The Phase I activities include the review of data and subsequent preparation of the work plan and associated project plans for the RI/FS.

A detailed description of the Phase I activities and anticipated work products is presented in Section 2.0. The schedule and cost to complete Phase I are presented in Sections 3.0 and 4.0, respectively.

2.0 PHASE I: SCOPE OF WORK

Data Review and Work Plan Preparation

This phase encompasses the review of all existing information for the site and the preparation of several documents as follows:

- Site Evaluation Report
- Work Plan
- Project Plans

Each of these documents are discussed in detail below:

2.1 Site Evaluation Report

Existing data for the site provided to HSI by WDNR will be compiled to evaluate the additional activities which need to be included for the RI/FS, and avoid duplication of previous efforts. Existing data would be analyzed to gain a better understanding of the nature and extent of existing impacts, migration pathways, and receptors. This data compilation and review process is intended to form the basis for preparing the project plans for implementing the RI. A Site Evaluation Report is the result of this data compilation and review process.

In order to prepare and adequately scope the Work Plan, existing site and regional data would be reviewed and evaluated. WDNR will be responsible for data collection and only site information provided by WDNR will be reviewed. A summary of the types and sources of information that would be included in the review and the party responsible for its collection is listed below.

Site Specific Information	Provided By
♦ Previous site investigation and documentation reports,	WDNR
♦ Historical site water quality monitoring data,	WDNR
♦ Municipal well water quality and pumping records,	WDNR
♦ Historical water level data,	WDNR
♦ Soil boring and well construction logs,	WDNR
♦ Material property testing data,	WDNR
♦ Design and construction documents and plans pertaining to previous remedial action activities and existing operating systems,	WDNR
♦ Historical aerial photographs,	WDNR
♦ Regulatory documents including HRS and PA reports,	WDNR
♦ U. S. Geological Survey reports and topographic maps,	HSI
♦ Wisconsin Geological and Natural History Surveys,	HSI
♦ Private well logs, and	WDNR
♦ U. S. DOA Soil Conservation Service soil survey reports.	HSI

HSI will work with the WDNR to identify specific data requirements. ✓

A review of the existing geotechnical data would be performed to support the sufficiency of the existing data base. This review will help identify what additional data is needed to satisfy the project objectives. HSI understands that WDNR is in the process of having existing analytical laboratory data validated and has prepared summary tables suitable for inclusion as tables in the SER with limited additional manipulation. ✓

In addition to this literature search, a site visit to the chrome and zinc shop locations will be made to familiarize HSI personnel with the sites. WDNR will also conduct site inspections and provide HSI with the results in the form of technical memorandum. The WDNR site inspection will include the following:

- Existing monitoring wells will be inspected by WDNR to determine if they are functional. Well construction documentation for each well will be reviewed

and compared to current NR141, Wisconsin Administrative Code standards. Wells requiring rehabilitation will be identified for repair or abandonment in accordance with NR141 standards.

- Existence of any visual contamination on or in nearby residential buildings and areas, i.e. flooded or stained basements/yards.

- Location and status of municipal and private water supply wells.

Information and data that are gathered during these initial steps would be used to prepare a Site Evaluation Report that will address the following:

2.1.1 Site History

✓ A relatively brief chronology of the site history as it pertains to site development, operations of the facilities, waste handling activities, and previous investigations would be prepared.

2.1.2 Site Characteristics

A brief summary of the site locations and pertinent area boundary features will be prepared. A description of pertinent regional and site features, physiography, hydrology, geology, and water quality (since 1987) would be developed based on existing reports and other data.

✓ Data provided to HSI by the WDNR, in summary form or technical memorandum, for the period prior to 1987 will be included.

2.1.3 Nature and Extent of the Problem

A summary of known or potential on-site and/or off-site health and environmental effects would be prepared by DOH/ATSDR. This document would be appendicized to the SER.

2.1.4 History of Response Actions

A history of former and existing remedial actions conducted at the Chrome and/or Zinc Shops would be prepared.

2.1.5 ARARs Consideration

Upon receipt of the WDNR/U.S. EPA's list of general Federal and State of Wisconsin Applicable or Relevant and Appropriate Requirements (ARARs), HSI will consider location specific, contaminant specific, and response action specific potential ARARs.

2.1.6 Develop Site Conceptual Model

Information on the waste sources, pathways, and receptors at the site would be used to develop a conceptual site model to evaluate potential risks to human health and the environment. The conceptual site model would include known and suspected sources of impacts, compounds and affected media, known and potential routes of migration, and known or potential human and environmental receptors. If data are unavailable for components of the model, the likely variability in the component would be identified so that the model identifies the possible range of contaminant migration and the potential effects on receptors. The site conceptual model, in addition to assisting in identifying where samples need to be taken, would also assist in identifying appropriate remedial technologies.

2.1.7 Identification of Potential Receptors

Potential receptors, human and environmental, would be identified and used in the development of the site conceptual model, migration pathway assessment, and risk assessment portions of the Work Plan. Included would be the identification, through WDNR records, of private and public water supply wells within a one-half mile radius of the site. House-to-house inspections will be performed by the WDNR in the immediate area of the site. This information will be provided by WDNR to HSI.

2.1.8 Site Mapping

A separate map of each site location will be prepared showing elevations and locations of all pertinent physical features and facilities. The maps will show the location of all ground-water monitor wells, and other pertinent sampling locations. Nearby sampled houses and yards will also be shown on the map. The monitor wells will be labeled in accordance with the current WDNR numbering system. Boundaries of adjacent land will be provided by WDNR and the owner of adjacent properties will be indicated on the maps. Municipal water supply wells within a 1-mile radius of each of the sites will be identified and shown on the maps.

HSI assumes that available existing topographic maps and plan sheets are not suitable to develop the site maps. Therefore, aerials will be flown and site topographic map prepared. Should the U.S. EPA provide current aerial photographs suitable for map preparation, these photographs will be used.

The topographic survey of the site's limits will tie horizontal distances of appropriate physical features and facilities to the property boundary and vertical elevations to National Geodetic Vertical Datum (Mean Sea Level). A topographic map will be produced showing 1-foot contours and a scale of 1 inch = 50 feet. A 100-foot survey grid system will also be included on the map(s). These criteria may be modified to improve clarity and produce a map size that can be effectively used. Copies of the site maps reduced onto 8-1/2" by 11" paper will also be included. Typical features of facilities that will be included in the map are:

1. Locations of buildings, streams, ditches, railroad tracks, fences, and other prominent fixtures on or adjacent to the site.

2. Locations of overhead and underground utilities on the site, in the public right of way, and adjacent properties potentially affected by contamination from the site. Included should be storm sewer, sanitary sewer, water main, gas main,

telephone, cable TV, and electrical lines. This information will be provided by WDNR to HSI.

3. Important features inside the site building (Zinc Shop) or former building (Chrome Shop), including tanks, floor drains/troughs, and any identified sources of contamination.

2.1.9 Develop Site Management Strategy

Based on the conceptual model of the site, preliminary identification of potential remedial action objectives and appropriate response actions would be performed in order to identify the specific data needed to evaluate alternatives and support the design of probable response actions and/or confirm the effectiveness of existing actions at the site. This process would assist in streamlining the RI/FS so that data collection focuses on the data needs of specific evaluations. As appropriate, identification of remedial action objectives would address both short and long-term objectives for site management.

The development of the site management strategy would also address the potential for implementing interim remedies as separate operable units. The optimal sequence of site actions and activities would also be evaluated, including opportunities for combining the identification and screening of remedial action alternatives where the range of alternatives appears limited. The site management strategy would thus become the framework for data collection during the RI and intended uses of the data.

2.1.10 Data Collection Needs

Given a summation of existing data for the site, migration pathways of impacted media, receptors, and probable remedies, the data collection needs to complete a RI/FS can then be identified. This section will be targeted on identifying the physical and/or chemical data needs necessary to define the extent of impacted media or select/design specific remedial alternatives. Following WDNR approval of the Site Evaluation Report, more specific

technical details, such as sampling locations, depths, and analytical parameters would be addressed in the Work Plan and Project Plans.

HSI assumes that the WDNR/U.S. EPA will review and approve the Site Evaluation Report prior to the development and submittal of the Work Plan and Project Plans. As described below, the Site Evaluation Report provides direction as to the data collection requirements for the RI/FS and it is important that HSI and WDNR/U.S. EPA concur on the proposed data collection needs before expending significant effort in developing the specific Project Plans. A typical Table of Contents for the Site Evaluation Report is contained in Appendix A.

2.2 Work Plan

The Site Evaluation Report will form the basis for preparing the Work Plan and Project Plans for implementing the RI. A Work Plan (WP) would be developed by HSI in conformance with the September, 1990 Statement of Work (SOW), and the standards set forth in the following statutes, regulations, and guidance:

- Section 121 of CERCLA;
- U.S. EPA "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA," dated October, 1988;
- National Contingency Plan, as revised March, 1990;
- Additional Guidance documents provided by WDNR and U.S. EPA.

The WP will also detail the technical approach, personnel and equipment requirements, time schedule, and budget (cost plus fixed fee) for each task described in the SOW. The schedule will show the implementation of tasks and proposed dates for submittal of draft and final reports summarizing the findings of the tasks.

2.2.1 Description of Current Situation

As described previously, existing information and data will be used to prepare a Site Evaluation Report which would be referenced in the Work Plan. This task would define the existing data base and avoid duplication of efforts in the field.

2.2.2 Evaluation of Data Quality Objectives (DQOs)

Once the site data needs are identified, the quality of the data needed to support response decisions would be reviewed. The types of data needed, as well as the quantity and quality of data, would be reviewed for each major site activity. As appropriate, sampling and analysis options capable of providing the above would be identified. Data precision, accuracy, representativeness, completeness, and comparability (PARCC) goals would also be established and reviewed to select a technical approach toward sampling and analysis methods. Proper identification of DQOs results in a well-defined sampling and analysis plan, ensures quality of the data collected, and integrates the information required in the RI/FS process.

2.2.3 Identification of RI/FS Tasks

Based on the evaluation of the project data needs and quality objectives, the work elements of the RI/FS would be broken down into defined tasks and subtasks. The definition of work elements would serve as the basis for establishing methods and procedures which would need to be addressed in the Sampling and Analysis Plan (2.3.1).

2.2.4 Schedule

An anticipated schedule would be formulated to implement the RI/FS tasks and subtasks identified above. The schedule would also show deliverable dates and anticipated project planning/coordination meetings with WDNR.

2.2.5 Budget

A proposed budget would be prepared to implement the RI/FS tasks and subtasks identified above. The proposed budget would be presented on a cost plus fixed fee basis. ✓

2.2.6 Project Management

Lead personnel for WDNR and HSI would be established to facilitate project communications, progress reporting, quality assurance, and problem identification/resolution. These management elements would be addressed in the WP to assure that WDNR is kept abreast of RI/FS activities and progress, as well as assist in timely response to unanticipated site characterization findings potentially dictating modification of the WP, as appropriate.

2.2.7 Work Plan Format

The results of the above would be compiled in a formal WP to document the RI/FS approach to the site. This WP is not intended to be a lengthy and detailed analysis of existing conditions, remedial action alternatives, etc. Rather, the WP would concisely provide clear direction as to the goals and objectives of data collection efforts to be conducted during the RI. An example table of contents for the WP is provided in Appendix A.

2.3 Project Plans

The Project Plans include the description of detailed procedures and protocols to be used in conducting the RI/FS. These plans include the following:

- Sampling and Analysis Plan,
- Quality Assurance Project Plan,
- Health and Safety Plan,

- Baseline Risk Assessment Plan, and
- Data Management Plan.

A representative Table of Contents for each of these plans is contained in Appendix A. The scope of each of these plans are addressed below.

2.3.1 Sampling and Analysis Plan (SAP)

A SAP that addresses all data acquisition activities would be prepared. The plan would contain a statement of sampling objectives, specification of equipment, required analyses, sample types, sample location, and frequency. The plan would address specific hydrologic, hydrogeologic, and air transport characterization methods including, but not limited to, geologic mapping, geophysics, field screening, drilling and well installation, ground water flow determination, and sampling. The application of these methods would be described for each major subtask within the site investigation (e.g., waste characterization, migration pathway assessment, and contaminant characterization). The plan would also identify the data requirements of specific remedial technologies which may be necessary to evaluate remedial alternatives in the FS. The Compendium of Superfund Field Operations Method (EPA/540/P-87/001a, OSWER Directive 9355.0-14, Sept. 1987) would be utilized in the selection and definition of field methods, sampling procedures, and custody. These methods would be incorporated in the SAP by reference.

2.3.2 Quality Assurance Project Plan (QAPP)

The Quality Assurance Project Plan (QAPP) is necessary in order to ensure that detailed procedures are established for the quality of sampling and laboratory testing and that there are processes and procedures for the data analysis. This section describes the required elements of the QAPP as well as the information that would be included in each element. A computerized model QAPP prepared by U.S. EPA may be used if it can expedite the preparation and review process. The QAPP would include and address the following:

a. A project description (duplicated from the work plan).

b. A project organization chart illustrating the lines of responsibility of the personnel involved in the sampling phase of the project.

c. Quality assurance objectives for data such as the required precision and accuracy, completeness of data, representativeness of data, comparability of data, and the intended use of collected data.

d. Sampling procedures for data collection and sample identification.

e. Sample custody procedures during sample collection, in the laboratory, and as part of the final evidence files.

f. The type and frequency of calibration procedures for field and laboratory instruments, internal quality control checks, and quality assurance performance audits and system audits.

g. Analytical procedures for laboratory, field, and materials testing analyses.

h. Data reduction, validation, and reporting.

i. Internal quality control checks.

j. Performance and system audits.

k. Preventative maintenance procedures and schedule and corrective procedures for field and laboratory instruments.

l. Specific procedures to assess data precision, representativeness, comparability, accuracy, and completeness of specific measurement parameters.

m. Corrective action.

2.3.3 Health and Safety Plan (HSP)

The Health and Safety Plan (HSP) would be prepared to address measures to be taken during the investigation to insure the safety of the investigation team and the surrounding communities. The plan will be consistent with all applicable regulatory requirements contained in 29 CFR 1910.120(i)(2) - Occupational Health and Safety Administration, Hazardous Waste Operations and Emergency Response, Interim Rule December 19, 1986; US-EPA Order 1440.2 - Health and Safety Requirements for Employees Engaged in Field

Activities; US-EPA Order 1440.3 - Respiratory Protection; US-EPA Occupational Health and Safety Manual; and US-EPA Interim Standard Operating Procedures (September, 1982). The HSP would address issues pertaining to the following:

- Diggers Hotline and/or related services will be contacted prior to performing borings or excavations,
- type and characteristics of substances that may be encountered,
- hazard evaluation of constituents present,
- personnel protective clothing requirements,
- respiratory protection requirements,
- surveillance requirements and equipment such as air monitoring,
- decontamination procedures,
- investigation derived material handling and disposal (used gloves, tyvek, etc.),
- personnel health examinations, history and medical monitoring,
- public safety and control measures to prevent releases of any hazardous constituents to the environment, and
- personnel responsibilities for the different levels of the field team with respect to site safety requirements.

2.3.4 Baseline Risk Assessment Plan (BRAP)

A Baseline Risk Assessment Plan (BRAP) would be prepared which presents a detailed approach for evaluating public health and environmental risks associated with the presence of hazardous chemicals at the site. Inherent to this type of quantitative assessment is the incorporation of a number of assumptions to address the uncertainties resulting from the assignment of numerical factors to risk. In addition, approximations must be made of actual site conditions and of the factors which may impact human and environmental exposures. Ultimately, the accuracy of the assessment is dependent upon the completeness of field

investigation data, the toxicological information on the adverse effects of chemicals, and on the validity of exposure modeling calculations.

To provide consistency with other risk assessments undertaken in the evaluation of hazardous waste sites, the procedures outlined in EPA's Superfund Manuals would be followed in conducting the baseline risk assessment. The specific EPA manuals to be used for guidance are the "Interim Final Risk Assessment Guidance for Superfund, Vol. I, Human Health Evaluation Manual" (Part A)(December, 1989), and "Interim Final Risk Assessment Guidance for Superfund, Vol. II, Environmental Evaluation Manual" (March, 1989).

The RI baseline risk assessment would evaluate the potential exposures and risks associated with the site under the "No-Action" remedial alternative. The findings of this RI "No-Action" assessment would serve as a basis for the comparison of remedial treatment alternatives developed in the Feasibility Study (FS).

The BRAP would include assumptions for the risk assessment, detailed approach, and statement of work. The statement of work section would detail specific modeling requirements, if necessary, and special technical requirements of the assessment.

2.3.5 Data Management Plan (DMP)

A Data Management Plan would be developed to document and track the investigation data and results. The plan would identify and establish laboratory and data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. These reports and documents will include technical memoranda, monthly progress reports, quarterly progress reports (Cooperative Agreement Quarterly Results), and the RI report and FS report.

2.4 Project Meetings

This subtask accounts for anticipated project meetings with the WDNR. Five major meetings would be held at the Milwaukee Office of HSI including:

- Project kickoff meeting,
- Meeting at 50% completion of the Site Evaluation Report and pre-QAPP meeting,
- Meeting to discuss comments to the SER,
- Meeting at completion of Work Plan and Project Plans, and
- Meeting to discuss comments to the Work Plan and Project Plans.

3.0 SCHEDULE

A graphic project schedule is presented in Figure 3.1. HSI anticipates seven weeks to complete the data review and Site Evaluation Report (SER) and seven weeks to complete the Work Plans and Project Plans (WP/PP). The project schedule assumes the WDNR will need two weeks each for the review of the SER and the WP/PP. Assuming Phase I authorization by the end of May, 1991, HSI could be ready to initiate the RI/FS by the middle of October, 1991.

4.0 COSTS

HSI proposes to complete the Phase I effort on a cost plus fixed fee basis as detailed in Table 4-1. These costs are based on the assumptions provided in the proposal. These costs are based on the assumptions provided in Section 2.0 and as delineated below:

- Work will be completed in accordance with the schedule shown in Figure 3-1. Significant delays caused by WDNR/U.S. EPA would result in additional costs.

- HSI understands that all data for review will be collected by the WDNR and sent to HSI.

- Analytical data since 1987 has been entered on computer files and are in a format that HSI can access for producing summary tables. Analytical data prior to 1987 will not be evaluated unless data from period prior to 1987 is supplied by WDNR in suitable format (Appendix or table format).

- Additional meetings or conference calls required by the WDNR/U.S. EPA beyond the five proposed would be at additional cost.

- After submittal of draft reports/plans, one final report/plan issue will be submitted incorporating WDNR and U.S. EPA comments. Additional revisions will be at additional cost.

FIGURE

Contract Signed
7-30-91 = Aug = Month 1

PROPOSED WORK SCHEDULE

PROJECT: BETTER BRITE NPL SITES
PREPARED BY: HYDRO-SEARCH, INC.
PREPARED FOR: WISCONSIN DNR

	8-1							9-1						10-1				11-1				12-1		
Week Ending:	6/7	6/14	6/21	6/28	7/5	7/12	7/19	7/26	8/2	8/9	8/16	8/23	8/30	9/6	9/13	9/20	9/17	10/4	10/11	10/18	10/25	11/1	11/8	11/15
Contract Negotiation/Execution	///	///																						
Authorization for Phase 1				▒																				
Data Review & Site Evaluation Report					///	///	///	///	///	///	///			///										
Work Plan and Project Plans							///	///	///	///	///	///	///	///	///	///	///	///		///				
Meetings :				▒				▒						▒			▒			▒				
WDNR/U.S. EPA Review										///	///	///	///	///	///	///	///	///	///	///	///			

COMMENTS:

Figure 3-1

Hydro-Search, Inc.

HYDROLOGISTS-GEOLOGISTS-ENGINEERS

TABLE

TABLE 4-1 Page 1 of 2
WISCONSIN DEPARTMENT OF NATURAL RESOURCES
Better Brite - DePere, WI

23-May-91

		DR/SER	WP	SAP	QAPP	HSP	BRAP	DMP	MTGS.	PM	
		1-A	1-B	1-C	1-D	1-E	1-F	1-G	1-H	1-I	TOTAL
PERSONNEL/LABOR											
Director	Hrs.	5	4	5	2	2					18
$147.35/Hr.	$	737	589	737	295	295					2,652
Senior Hydrogeologist	Hrs.	50	10	32	8	6	4	4	20	40	174
$142.96/Hr.	$	7,148	1,430	4,575	1,144	858	572	572	2,859	5,718	24,875
Senior Engineer	Hrs.	24	16	16	16						72
$86.09/Hr.	$	2,066	1,377	1,377	1,377						6,198
Health & Safety Officer	Hrs.					32					32
$80.59/Hr.	$					2,579					2,579
Project Administrator	Hrs.									32	32
$61.73/Hr.	$									1,975	1,975
Hydrogeologist II	Hrs.	270	40	124	30	8			20		492
$52.81/Hr.	$	14,259	2,112	6,548	1,584	422			1,056		25,983
Hydrogeologist I	Hrs.	24	16	18	10						68
$43.86/Hr.	$	1,053	702	789	439						2,982
Technical Illustrator	Hrs.	80	30	40		12					162
$37.98/Hr.	$	3,038	1,139	1,519		456					6,153
Secretarial	Hrs.	120	48	60	30	24	8	8		16	314
$32.10/Hr.	$	3,852	1,541	1,926	963	770	257	257		514	10,079
	Hrs.	573	164	295	96	84	12	12	40	88	1,364
SUBTOTAL PERSONNEL/LABOR	$	32,153	8,891	17,472	5,802	5,380	829	829	3,915	8,207	83,477

TABLE 4-1 Page 2 of 2
WISCONSIN DEPARTMENT OF NATURAL RESOURCES
Better Brite - DePere, WI

23-May-91

	DR/SER	WP	SAP	QAPP	HSP	BRAP	DMP	MTGS.	PM	
	1-A	1-B	1-C	1-D	1-E	1-F	1-G	1-H	1-I	TOTAL
SUBCONTRACTORS ($)										
Gradient Corporation	800		2,200			3,000				6,000
Thresher & Son	2,000		2,500					500		5,000
Aerometrics	8,000									8,000
SUBTOTAL SUBCONTRACTORS	10,800		4,700			3,000		500		19,000
OTHER DIRECT COSTS ($)										
Photocopy ($0.018/page)	78	50	50	50	50	50	50			378
Blueline ($0.054/sq. ft.)	4		4							8
Mylar ($0.423/sq. ft.)	7		6							13
Fax ($0.049/page)									2	2
Postage	50	50	50	50	50	50	50		21	371
Telephone	25	25	25	25	25	25	25		25	200
Vehicles ($0.155/mile)	47									47
SUBTOTAL OTHER DIRECT COSTS	210	125	135	125	125	125	125		48	1,019
TOTAL ESTIMATED COSTS	43,163	9,016	22,307	5,927	5,505	3,954	954	4,415	8,256	103,496
15% FEE	6,474	1,352	3,346	889	826	593	143	662	1,238	15,524
TOTAL PRICE	$49,637	$10,368	$25,653	$6,816	$6,331	$4,547	$1,097	$5,078	$9,494	$119,020

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SITE EVALUATION REPORT

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TABLE OF CONTENTS (CONT'D)

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TABLE OF CONTENTS

TABLE

Hydro-Search, Inc.
Brookfield Lakes Corporate Center XII
175 N. Corporate Drive, Suite 100
Brookfield, Wisconsin 53045
HYDROLOGISTS-GEOLOGISTS-ENGINEERS
Phone (414) 792-1282 FAX (414) 792-1310

To: Wisconsin Dept. of Natural Resources
Lake Michigan District
1125 N. Military Avenue
Green Bay, WI 54307
Attn: Mr. Terry Koehn

Date: June 4, 1991
Subject: Better Brite NPL Sites
Job. No. 3M-9002

We are sending the following: _X_ Herewith ____ Under Separate Cover

# of Copies	Item
3	"Phase I Data Review and Work Plan Preparation, Remedial Investigation/
	Feasibility Study, Better Brite NPL Sites," dated June 4, 1991.

Comments: For routing for approvals.

Transmitted by:

___ First Class Mail
_X_ Federal Express
___ Express Mail
___ Messenger
___ Other

By:

Michael R. Noel, Vice President
Manager, Milwaukee Operations

FEDERAL EXPRESS

QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL
PACKAGE
TRACKING NUMBER

0787533972

0787533972

Date 6/4/91

RECIPIENT'S COPY

From (Your Name) Please Print: Mr. Michael R. Noel

Your Phone Number (Very Important): (414-792-1282

Company

Department/Floor No.

Street Address

City

State

ZIP Required

To (Recipient's Name) Please Print: Mr. Terry Koehn

Recipient's Phone Number (Very Important): ( )

Company: Wisconsin Dept. of Natural Resources Lake Michigan District

Department/Floor No.

Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): 1125 N. Military Avenue

City: Green Bay

State: WI

ZIP Required: 54307

YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.): 3M/09002

IF HOLD FOR PICK-UP, Print FEDEX Address Here

Street Address

City

State

ZIP Required

PAYMENT 1 ☐ Bill Sender 2 ☐ Bill Recipient's FedEx Acct No 3 ☐ Bill 3rd Party FedEx Acct No 4 ☐ Bill Credit Card 5 ☐ Cash/Check

SERVICES (Check only one box)

Priority Overnight (Delivery by next business morning†)
- 11 ☐ YOUR PACKAGING
- 16 ☐ FEDEX LETTER *
- 12 ☒ FEDEX PAK *
- 13 ☐ FEDEX BOX
- 14 ☐ FEDEX TUBE

Standard Overnight (Delivery by next business afternoon†)
- 51 ☐ YOUR PACKAGING
- 56 ☐ FEDEX LETTER *
- 52 ☐ FEDEX PAK *
- 53 ☐ FEDEX BOX
- 54 ☐ FEDEX TUBE

Economy Two-Day (Delivery by second business day†)
- 30 ☐ ECONOMY

Government Overnight (Restricted to authorized users only)
- 46 ☐ GOVT LETTER
- 41 ☐ GOVT PACKAGE

Freight Service (for Extra Large or any package over 150 lbs.)
- 70 ☐ OVERNIGHT FREIGHT ** (Confirmed reservation required)
- 80 ☐ TWO-DAY FREIGHT **

†Delivery commitment may be later in some areas

*Declared Value Limit $100

**Call for delivery schedule

DELIVERY AND SPECIAL HANDLING (Check services required)
- 1 ☐ HOLD FOR PICK-UP (Fill in Box H)
- 2 ☒ DELIVER WEEKDAY
- 3 ☐ DELIVER SATURDAY (Extra charge) (Not available to all locations)
- 4 ☐ DANGEROUS GOODS (Extra charge)
- 5 ☐
- 6 ☐ DRY ICE Lbs
- 7 ☐ OTHER SPECIAL SERVICE
- 8 ☐
- 9 ☐ SATURDAY PICK-UP (Extra charge)
- 10 ☐
- 11 ☐
- 12 ☐ HOLIDAY DELIVERY (If offered) (Extra charge)

PACKAGES	WEIGHT In Pounds Only
1	2
Total 1	Total 2

DIM SHIPMENT (Chargeable Weight)

☐ lbs.

____ X ____ X ____ =

Received At
- 1 ☐ Regular Stop
- 2 ☐ On-Call Stop
- 3 ☐ Drop Box
- 4 ☐ BSC
- 5 ☐ Station

Emp. No. | Date

☐ Cash Received
☐ Return Shipment
☐ Third Party ☐ Chg To Del ☐ Chg To Hold

Street Address

City State Zip

Received By: X

Date/Time Received | FedEx Employee Number

Release Signature:

FedEx Emp. No. 6711164 Date/Time

Federal Express Use
- Base Charges
- Declared Value Charge
- Other 1
- Other 2
- Total Charges

REVISION DATE 4/91
PART #137204 FXEM 5/91
FORMAT #082

082

MULTIPLE PACKAGE SERVICE

IF YOU ARE MAKING AN MPS SHIPMENT, APPLY THE SELF ADHESIVE MPS COPY HERE

TERMS AND CONDITIONS

DEFINITIONS

On this Airbill, we, our and us refer to Federal Express Corporation, its employees and agents. You and your refer to the sender, its employees and agents.

AGREEMENT TO TERMS

By giving us your package to deliver, you agree to all the terms on this Airbill and in our current Service Guide, which is available on request. If there is a conflict between the current Service Guide and this Airbill, the Service Guide will control. No one is authorized to alter or modify the terms of our Agreement.

RESPONSIBILITY FOR PACKAGING AND COMPLETING AIRBILL

You are responsible for adequately packaging your goods and for properly filling out this Airbill. Omission of the number of packages and weight per package from this Airbill will result in a billing based on our best estimate of the number of packages received from you and an estimated "default" weight per package, as determined and periodically adjusted by us.

AIR TRANSPORTATION TAX INCLUDED

Our basic rate includes a federal tax required by Internal Revenue Code Section 4271 on the air transportation portion of this service.

LIMITATIONS ON OUR LIABILITY AND LIABILITIES NOT ASSUMED

Our liability for loss or damage to your package is limited to your actual damages or $100, whichever is less, unless you pay for and declare a higher authorized value. We do not provide cargo liability insurance, but you may pay an additional charge for each additional $100 of declared value. If you declare a higher value and pay the additional charge, our liability will be the lesser of your declared value or the actual value of your package.

In any event we will not be liable for any damages, whether direct, incidental, special or consequential in excess of the declared value of a shipment, whether or not Federal Express had knowledge that such damages might be incurred including, but not limited to, loss of income or profits.

We won't be liable for your acts or omissions, including but not limited to improper or insufficient packing, securing, marking or addressing, or for the acts or omissions of the recipient or anyone else with an interest in the package. Also, we won't be liable if you or the recipient violates any of the terms of our agreement. We won't be liable for loss of or damage to shipments of prohibited items.

We won't be liable for loss, damage or delay caused by events we cannot control, including but not limited to acts of God, perils of the air, weather conditions, acts of public enemies, war, strikes, civil commotions, or acts or omissions of public authorities (including customs and quarantine officials) with actual or apparent authority.

DECLARED VALUE LIMITS

The highest declared value we allow for FedEx Letter and FedEx Pak shipments is $100. For other shipments, the highest declared value we allow is $25,000 unless your package contains items of "extraordinary value," in which case the highest declared value we allow is $500. Items of "extraordinary value," include artwork, jewelry, furs, precious metals, negotiable instruments, and other items listed in our current Service Guide.

If you send more than one package on this Airbill, you may fill in the total declared value for all packages, not to exceed the $100, $500 or $25,000 per package limit described above. (Example: 5 packages can have a total declared value of up to $125,000.)

If more than one package is shipped on this airbill, our liability for loss or damage will be limited to the actual value of the package(s) lost or damaged (not to exceed the lesser of the total declared value or the per package limits described above). You have the responsibility of proving the actual loss or damage.

FILING A CLAIM

ALL CLAIMS MUST BE MADE BY YOU IN WRITING: You must notify us of your claim within strict time limits. See current Service Guide.

We'll consider your claim filed if you call and notify our Customer Service Department at 800-238-5355 and notify us in writing as soon as possible.

Within 90 days after you notify us of your claim, you must send us all relevant information about it. We are not obligated to act on any claim until you have paid all transportation charges, and you may not deduct the amount of your claim from those charges.

If the recipient accepts your package without noting any damage on the delivery record, we will assume that the package was delivered in good condition. In order for us to process your claim, you must, to the extent possible, make the original shipping cartons and packing available for inspection.

RIGHT TO INSPECT

We may, at our option, open and inspect your packages prior to or after you give them to us to deliver.

NO C.O.D. SERVICES

NO C.O.D. SERVICES ON THIS AIRBILL. If C.O.D. Service is required, please use a Federal Express C.O.D. airbill for this purpose.

RESPONSIBILITY FOR PAYMENT

Even if you give us different payment instructions, you will always be primarily responsible for all delivery costs, as well as any costs we may incur in either returning your package to you or warehousing it pending disposition.

RIGHT OF REJECTION

We reserve the right to reject a shipment at any time, when such shipment would be likely to cause damage or delay to other shipments, equipment or personnel, or if the transportation of which is prohibited by law or is in violation of any rules contained in this Airbill or our current Service Guide.

MONEY-BACK GUARANTEE

In the event of untimely delivery, Federal Express will at your request and with some limitations, refund or credit all transportation charges. See current Service Guide for further information.

Part #137204/137205
Rev. 4/91

TK 5-24-91

Hydro-Search, Inc.
Brookfield Lakes Corporate Center XII
175 N. Corporate Drive, Suite 100
Brookfield, Wisconsin 53045
HYDROLOGISTS-GEOLOGISTS-ENGINEERS
Phone (414) 792-1282 FAX (414) 792-1310

May 23, 1991

Mr. Terry Koehn
State of Wisconsin
Department of Natural Resources
Lake Michigan District Headquarters
1125 N. Military Avenue
Green Bay, Wisconsin 54307

RE: Revised Proposal, Work Plan Preparation, Better Brite NPL Sites

Dear Terry:

Per our discussions, enclosed is our revised proposal for the referenced project. The proposal was revised reducing the level of effort anticipated to prepare the plan documents necessary to conduct the RI/FS at the Better Brite Chrome and Zinc Shops. The modifications are in accordance with your request and are summarized as follows:

- WDNR will be responsible for collecting all site data for HSI review (Section 2.1).
- WDNR will be responsible for monitor well inspection, basement inspections, and providing HSI with municipal and private well data and locations (Section 2.1).
- HSI will review water quality data obtained since 1987 only (Section 2.1.2).
- WDNR will provide HSI with the DOH/ATSDR preliminary health assessment report (Section 2.1.3).
- The summary of response actions will be limited to corrective actions. Enforcement actions will not be summarized (Section 2.1.4).
- A topographic map will be prepared from aerial photos (Section 2.4).

- All meetings will be held at HSI's office in Milwaukee (Section 2.4).
- In general, the SER will be prepared presenting only the information necessary to identify data needs and determine the appropriate scope of the RI/FS.

I trust this information meets your needs, and if you have any questions, please feel free to call.

Sincerely,

HYDRO-SEARCH, INC.

Michael R. Noel, Vice President
Manager, Milwaukee Operations

MRN/gf

enc.

FEDERAL EXPRESS

QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL PACKAGE TRACKING NUMBER 0596265445

1119N 0596265445

RECIPIENT'S COPY

Date 5/23/91

From (Your Name) Please Print	Your Phone Number (Very Important)	To (Recipient's Name) Please Print	Recipient's Phone Number (Very Important)
Mr. Michael R. Noel	(414) 792-1282	Mr. Terry Koehn	( )

Company	Department/Floor No.	Company	Department/Floor No.
HYDRO-SEARCH INC		State of Wisconsin Dept. of Natural REsources	

Street Address	Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.)
175 N CORPORATE DR STE 100	Lake Michigan District Headquarters 1125 N Military Avenue

City	State	ZIP Required	City	State	ZIP Required
BROOKFIELD	WI	53045	Green Bay	WI	54307

YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.)
3M/09002

IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address
City State ZIP Required

PAYMENT 1 [X] Bill Sender 2 [ ] Bill Recipient's FedEx Accl. No. 3 [ ] Bill 3rd Party FedEx Acct. No. 4 [ ] Bill Credit Card
5 [ ] Cash/Check

SERVICES (Check only one box)

Priority Overnight (Delivery by next business morning†)	Standard Overnight (Delivery by next business afternoon†)
11 [ ] YOUR PACKAGING	51 [ ] YOUR PACKAGING
16 [ ] FEDEX LETTER *	56 [ ] FEDEX LETTER *
12 [X] FEDEX PAK *	52 [ ] FEDEX PAK *
13 [ ] FEDEX BOX	53 [ ] FEDEX BOX
14 [ ] FEDEX TUBE	54 [ ] FEDEX TUBE
Economy Two-Day (Delivery by second business day†)	**Government Overnight** (Restricted for authorized users only)
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Freight Service (for Extra Large or any package over 150 lbs.)
70 [ ] OVERNIGHT FREIGHT ** (Confirmed reservation required)
80 [ ] TWO-DAY FREIGHT **
†Delivery commitment may be later in some areas.
*Declared Value Limit $100.
**Call for delivery schedule.

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2 [X] DELIVER WEEKDAY
3 [ ] DELIVER SATURDAY (Extra charge) (Not available to all locations)
4 [ ] DANGEROUS GOODS (Extra charge)
5 [ ]
6 [ ] DRY ICE ____ Lbs.
7 [ ] OTHER SPECIAL SERVICE
8 [ ]
9 [ ] SATURDAY PICK-UP (Extra charge)
10 [ ]
11 [ ] DESCRIPTION
12 [ ] HOLIDAY DELIVERY (If offered) (Extra charge)

PACKAGES	WEIGHT In Pounds Only
1	3
Total 1	Total 3

DIM SHIPMENT (Chargeable Weight)
[ ] ____ lbs.

Received At
1 [ ] Regular Stop 3 [ ] Drop Box 4 [ ] BSC 2 [ ] On-Call Stop 5 [ ] Station

FedEx Emp. No. 1504 Date/Time 5/24/91

5 Release Signature: ____

Emp. No. Date
[ ] Cash Received
[ ] Return Shipment
[ ] Third Party [ ] Chg. To Del. [ ] Chg. To Hold
Street Address
City State Zip
Received By: X
Date/Time Received FedEx Employee Number

Federal Express Use
Base Charges
Declared Value Charge
Other 1
Other 2
Total Charges

REVISION DATE 1/91
PART #137204 FXEM 3/91
FORMAT #068

068

MULTIPLE PACKAGE SERVICE

IF YOU ARE MAKING AN MPS SHIPMENT, APPLY THE SELF ADHESIVE MPS COPY HERE

TERMS AND CONDITIONS

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Our basic rate includes a federal tax required by Internal Revenue Code Section 4271 on the air transportation portion of this service.

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Part #137204/137205
Rev. 1/91

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Lake Michigan District Headquarters
P.O. Box 10448
1125 North Military Avenue
Green Bay, WI 54307-0448

TELEFAX NO. 414-492-5913

Celia
File

January 30, 1991

Mr. Dave Linnear
US EPA Region V
230 S. Dearborn St. 5HS-11
Chicago, Illinois 60604

SUBJECT: Better-Brite RI/FS - Existing Data Validation

Dear Dave:

Enclosed is the Documentation package coordinated by Russ Dunst, Technical Services, and prepared by The Wisconsin State Laboratory of Hygiene.

The actual list of samples was chosen by Pat Churilla, US EPA, in order to minimize the total number of sample data to retrieve by the State Lab.

Please forward this data package for validation to the appropriate office at Region V.

Sincerely,

A Weissbach

Annette E. Weissbach
Hydrogeologist
Environmental Response &
Repair Program

cc: Celia VanDerLoop - SW/3 w/ attach.
Susan Bangert - SW/3 w/o attach.

attach.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

FACSIMILE REQUEST AND COVER SHEET

OFFICE/PHONE	MACHINE NO.
TECH SERVICES	VERIFICATION NO.

TO: RUSS DUNST

FROM: PATRICK CHURILLA

PHONE NO.	MAIL CODE
312-353-2313	5TSCRL

OFFICE: U.S. EPA, REGION

DATE	NUMBER OF PAGES, INCLUDE COVER SHEET
12-14-90	11

PLEASE NUMBER ALL PAGES

INFORMATION FOR SENDING FACSIMILE MESSAGES

EQUIPMENT	FACSIMILE NUMBER	VERIFICATION NO.
PANAFAX UF-640	FTS-886-2591 COMM: (312) 886-2591	353-3808

ENVIRONMENTAL SCIENCES DIVISION

WILLIAM H. SANDERS III, DIRECTOR

PAGE 1 OF 11 PAGES

TO: RUSS DUNST, LDNR
FROM: PAT CHURILLA, USEPA

I HAVE PLACED CHECK MARKS NEXT TO THE SAMPLES I THINK WE NEED DOCUMENTATION FOR. I HOPE THAT THIS PUTS A DENT IN THE WORKLOAD FOR YOU.

BETTER BRITE CHROME AND ZINC SHOPS
STATE LAB ANALYSIS
1979-1990
SORTED BY DATE

L	DATE	TIME	SLIP NUMBER OF SAMPLE	LOCATION	CADMIUM	HEXCHROME	TOTAL CHROME	CYANIDE	LEAD	ZINC	TRICHLORO
C	/ /		0 29137	CONTRATH PROPERTY			86 MG/KG		24 MG/KG	80 MG/KG	
C	05/24/78	1440	75418	CAUSTIC WASH						650000 UG/L	
C	08/13/79	1130	15712	LANDE ST.	1.3 UG/L		210000 UG/P				
C	08/25/79	0	20792	BETTER BRITE PLATING		320 UG/L	330000 UG/L				
C	08/28/79	3	20795	BETTER BRITE PLATING		30 UG/L	200 UG/L				
C	08/28/79	2	20794	BETTER BRITE PLATING		270 UG/L	280000 UG/L				
C	08/28/79	1	20793	BETTER BRITE PLATING		70 UG/L	70000 UG/L				
C	08/28/79	0	20610	BETTER BRITE PLATING		<20 UG/L	26 UG/L				
Z	02/13/80	915	56326	BETTER BRITE PLATING	50 UG/L		500 UG/L	.6 MG/L	2600 UG/L	56000 UG/L	
Z	02/13/80	920	56327	BETTER BRITE PLATING	20 UG/L		600 UG/L	.1 MG/L	400 UG/L	69000 UG/L	
Z	02/13/80	930	56328	BETTER BRITE PLATING	<20 UG/L		<100 UG/L		200 UG/L	8100 UG/L	
C	09/19/80	1047	23201	WELL SAM CR CON. GROUTR	—	1000000 UG/L					
C	09/19/80	1039	23193	TAP H20 BLANK	<20 UG/L		<100 UG/L		<100 UG/L		
C	09/19/80	1040	23196	WELL-CR GW20		700000 UG/L					
C	09/19/80	1038	23184	WELL-CR GW20	<20 UG/L		700000 UG/L		100 UG/L		
C	09/19/80	1049	25203	TAP H20 BLANK METAL BOTTL		<20 UG/L					
C	09/19/80	1041	23195	WELL-CR GW20		<20 UG/L					
C	09/19/80	1033	23187	WELL-CR GW20	<20 UG/L		15000 UG/L		100 UG/L		
C	09/19/80	1042	23196	WELL CR GW20		<20 UG/L					
C	09/19/80	1036	23190	WELL-CR GW20	<20 UG/L		51000 UG/L		<100 UG/L		
C	09/19/80	1043	23197	WELL CR GW20		14000 UG/L					
C	09/19/80	1038	23192	WELL-CR GW20	<20 UG/L		160 UG/L		<100 UG/L		
C	09/19/80	1032	23186	WELL-CR GW20	<20 UG/L		1100 UG/L		350 UG/L		
C	09/19/80	1035	23189	WELL-CR GW20	<20 UG/L		810000 UG/L		150 UG/L		
C	09/19/80	1037	23191	WELL-CR GW20	<20 UG/L		1000000 UG/L		200 UG/L		
C	09/19/80	1044	23198	WELL CR GW20		26000 UG/L					

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C	DATE	TIME	SLIP NUMBER OF SAMPLE	LOCATION	CADMIUM	HEXCHROME	TOTAL CHROME	CYANIDE	LEAD	ZINC	TRICHLORO
C	09/19/80	1045	23199	WELL CR MW20		800000 UG/L					
C	09/19/80	1046	23200	WELL CR GW20		50000 UG/L					
C	09/19/80	1048	23202	WELL SAMP CR CON. GROWTR		95 UG/L					
C	06/23/81	1500	82298	HOLDING POND		63 UG/L -					
C	06/19/83	0	62677	UNFILTERED BURIED DRUM		200000 UG/L	220000 UG/L				
C	06/19/83	0	62678	CYCLONE COLLECTOR		210000 UG/G	310000 UG/G				
Z	06/21/83	0	63322	WATER FROM LOADING DOCK				25 MG/L		4900 UG/L	
Z	06/21/83	1	63323	WATER FROM STORM SEWER						5600 UG/L	
Z	06/21/83	2	63324	WATER FROM PUDDLE IN YARD						8400 UG/L	
Z	05/31/83	0	71720	BTWN SDWALK AND CURB	38 UG/GM		170 UG/GM	380 UG/GM		2600 UG/GM	
Z	05/31/83	1130	71719	BTWN SDEWALK AND CURB	28 UG/GM		100 UG/GM	270 UG/G		1500 UG/GM	
Z	09/27/85	0	29131	FRONT OF B.DOOR	11 MG/KG		350 MG/KG	64 MG/KG	300 MG/KG	1700 MG/KG	
C	09/27/85	0	29122	LANDE ST.	<20 UG/L		<100 UG/L		<100 UG/L	<20 UG/L	
C	09/27/85	0	29132	WEST SIDE SLOPE NO VEGETA			620 MG/KG		20 MG/KG	120 MG/KG	
C	09/27/85	0	29124	LANDE ST. W-3	<20 UG/L		3800000 UG/L		<100 UG/L	350 UG/L	
C	09/27/85	12	29133	AROUND SPACE WATER PUMP			65000 MG/KG		160 MG/KG	1000 MG/KG	
Z	09/27/85	0	29126	5 FT. FROM BUILDING	1 MG/KG		55 MG/KG	26 MG/KG	18 MG/KG	410 MG/KG	
C	09/27/85	0	29134	WEST SIDE SLOPE			210 MG/KG			60 MG/KG	
Z	09/27/85	0	29128	5 FT. FROM BUILDING	3 MG/KG		69 MG/KG	6.9 MG/KG	88 MG/KG	1100 MG/KG	
C	09/27/85	0	29135	FRONT CYCLONE	4 MG/KG		8000 MG/KG		100 MG/KG	2200 MG/KG	
C	09/27/85	0	29118	LANDE ST. W-7	<20 UG/L		<100 UG/L		<100 UG/L	30 UG/L	
C	09/27/85	0	29125	LANDE ST. W-5	<20 UG/L		1600 UG/L		<100 UG/L	20 UG/L	
Z	09/27/85	0	29127	5 FT. FORK CORNER	8 MG/KG		240 MG/KG	45 MG/KG	44 MG/KG	2700 MG/KG	
C	09/27/85	0	29121	HOLE ON COMRAD PROPERTY	<20 UG/L		3200 UG/L		<100 UG/L	<20 UG/L	
C	09/27/85	0	29123	LANDE ST. W-10	<20 UG/L		<100 UG/L		<100 UG/L	<20 UG/L	
C	09/27/85	0	29136	FRONT CYCLONE			4900 MG/KG		82 MG/KG	490 MG/KG	

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Z	09/27/85		0	2930 FRONT OF B.DOOR	9 MG/KG		410 MG/KG		93 MG/KG	1300 MG/KG	
C	09/27/85		0	29138 CONTRATH PROP.			74 MG/KG			52 MG/KG	
C	09/27/85		0	29231 BB PLATING SURFACE	<20 UG/L		51000 UG/L		<100 UG/L	110 UG/L	
C	09/27/85		961	29117 DISCHARGE TO SAN. SEWER				14 MG/L			
Z	09/27/85		0	29129 GRVL EDG UN SEE	43 MG/KG		1100 MG/KG		460 MG/KG	13000 MG/KG	
C	09/27/85		0	29130 IN FRONT OF BACK DOOR	9 MG/KG		410 MG/KG		93 MG/KG	1300 MG/KG	
C	09/27/85		0	29120 W-16 AND PUP	<20 UG/L		2700000 UG/L		<100 UG/L	110 UG/L	
C	09/27/85		0	29119 W-16	<20 UG/L		2600000 UG/L		<100 UG/L	110 UG/L	
C	04/07/86		0	75085 INSIDE BUILDING	<50 UG/L		1000000 UG/L		2200 UG/L	2910 UG/L	
C	05/19/86	1500		86396 SUMP PUMP HOLE # 2			8600000 UG/L				46 UG/L
C	05/19/86	1500		86397 HOLE # 3-4 COMBINED			700000 UG/L				44 UG/L
C	06/20/86	1000		96813 DAN SMET BASEMENT			5800 UG/L	.02 MG/L	<3 UG/L	80 UG/L	
	06/27/86		0	96815 BASEMENT SUMP HOLE	<02 UG/L		5800 UG/L		<3 UG/L	80 UG/L	
C	06/27/86	1000		96814 SMET BSEMT GRAB FROM HOLE			1100 UG/L	.01 MG/L	10 UG/L	60 UG/L	
C	10/02/86	1430		31287 DEPERE GRANT ST. WELL			<3 UG/L		<3 UG/L	<20 UG/L	
C	10/03/86	1000		31288 SUMP PUMP GRAB NRS.VASSER		H.T.	<3 UG/L		<3 UG/L	<20 UG/L	
Z	01/28/87	1300		59772 DRUM	1000 MG/KG		410 MG/KG		110 MG/KG		
C	05/20/87		0	91782 B103 26-28 FT.			30 MG/KG		<10 MG/KG	130 MG/KG	
C	05/20/87		0	91759 B101 17-19 FT.			40 MG/KG		<10 MG/KG	160 MG/KG	
C	05/20/87		0	91760 B101 21-23 FT.			40 MG/KG		<10 MG/KG	160 MG/KG	
C	05/20/87		0	91755 B101 1.5-3 FT.	<2.0 MG/KG		50 MG/KG		<10 MG/KG	53 MG/KG	
C	05/20/87		0	91761 B101 25-27 FT.			40 MG/KG		<10 MG/KG	160 MG/KG	
C	05/20/87		0	91792 B104B 27-29 FT.			20 MG/KG		<10 MG/KG	140 MG/KG	
C	05/20/87		0	91763 B101 29-31 FT.			30 MG/KG		<10 MG/KG	160 MG/KG	
C	05/20/87		0	91790 B104A 20-22 FT.			30 MG/KG		<10 MG/KG	120 MG/KG	
C	05/20/87		0	91762 B101 33-34 FT.			40 MG/KG		<10 MG/KG	87 MG/KG	

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C	05/20/87	0 91788 B104A 12-14 FT.-			30 MG/KG		<10 MG/KG	180 MG/KG	
C	05/20/87	0 91784 B101 37-38 FT.-			20 MG/KG		<10 MG/KG	25 MG/KG	
C	05/20/87	0 91786 B104A 4-6 FT.			40 MG/KG		<10 MG/KG	53 MG/KG	
C	05/20/87	0 91765 B102 0-2 FT.-			30 MG/KG		<10 MG/KG	23 MG/KG	
C	05/20/87	0 91784 B103 34-36 FT.			20 MG/KG		<10 MG/KG	33 MG/KG	
C	05/20/87	0 91786 B102 4-6 FT.-			50 MG/KG		<10 MG/KG	210 MG/KG	
C	05/20/87	0 91781 B103 22-24 FT.			120 MG/KG		<10 MG/KG	140 MG/KG	
C	05/20/87	0 91767 B102 8-10 FT.-			40 MG/KG		<10 MG/KG	160 MG/KG	
C	05/20/87	0 91779 B103 14-16 FT.			560 MG/KG		<10 MG/KG	170 MG/KG	
C	05/20/87	0 91768 B102 12-14 FT.-			30 MG/KG		<10 MG/KG	120 MG/KG	
C	05/20/87	0 91757 B101 9-11 FT.-			30 MG/KG		<10 MG/KG	180 MG/KG	
C	05/20/87	0 91769 B102 16-18 FT.-			40 MG/KG		<10 MG/KG	290 MG/KG	
C	05/20/87	0 91793 B104B 31-33 FT.			30 MG/KG		<10 MG/KG	330 MG/KG	
C	05/20/87	0 91770 B102 20-22 FT.-			60 MG/KG		<10 MG/KG	140 MG/KG	
C	05/20/87	0 91789 B104A 16-18 FT.			30 MG/KG		<10 MG/KG	240 MG/KG	
C	05/20/87	0 91771 B102 24-26 FT.-			30 MG/KG		<10 MG/KG	160 MG/KG	
C	05/20/87	0 91785 B104A 0-2 FT.			50 MG/KG		<10 MG/KG	310 MG/KG	
C	05/20/87	0 91772 B102 28-30 FT.-			30 MG/KG		<10 MG/KG	150 MG/KG	
C	05/20/87	0 91780 B103 18-20 FT.			50 MG/KG		<10 MG/KG	220 MG/KG	
C	05/20/87	0 91773 B102 32-34 FT.-			40 MG/KG		<10 MG/KG	49 MG/KG	
C	05/20/87	3 91758 B101 13-15 FT.-	<2 MG/KG		30 MG/KG		<10 MG/KG	180 MG/KG	
C	05/20/87	0 91787 B104A 8-10 FT.			40 MG/KG		<10 MG/KG	170 MG/KG	
C	05/20/87	0 91783 B103 30-32 FT.			30 MG/KG		<10 MG/KG	130 MG/KG	
C	05/20/87	0 91756 B101 5-7 FT.-			40 MG/KG		<10 MG/KG	230 MG/KG	
C	05/20/87	0 91791 B104B 22-24 FT.			20 MG/KG		<10 MG/KG	170 MG/KG	
C	05/20/87	0 91774 B102 36-38 FT.			30 MG/KG		<10 MG/KG	40 MG/KG	

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C	05/20/87	0 91775 B102 40-42 FT.			30 MG/KG		<10 MG/KG	27 MG/KG	
C	05/20/87	0 91776 B103 2-4 FT.			640 MG/KG		20 MG/KG	560 MG/KG	
C	05/20/87	0 91777 B103 6-8 FT.			1900 MG/KG		<10 MG/KG	180 MG/KG	
C	05/20/87	0 91778 B103 10-12 FT.			1200 MG/KG		<10 MG/KG	290 MG/KG	
Z	06/03/87	0 96141 B-2 #2			270 MG/KG		<10 MG/KG	55 MG/KG	
Z	06/03/87	0 96161 W-3 #9			60 MG/KG		<10 MG/KG	73 MG/KG	
Z	06/03/87	0 96160 W-3 #8			30 MG/KG		<10 MG/KG	67 MG/KG	
Z	06/03/87	0 96157 W-3 #6			90 MG/KG		<10 MG/KG	130 MG/KG	
	06/03/87	0 9256 1058 NORTH PRTY. 0-2 FT. <1 MG/KG			190 MG/KG		<5 MG/KG	120 MG/KG	
Z	06/03/87	0 96158 W-3 #5			60 MG/KG		<10 MG/KG	120 MG/KG	
Z	06/03/87	0 96135 B-1 #11	<2 MG/KG		30 MG/KG		<10 MG/KG	84 MG/KG	
Z	06/03/87	0 96136 B-1 #12	<2 MG/KG		30 MG/KG		<10 MG/KG	200 MG/KG	
	06/03/87	0 9262 1058 NORTH PRTY 24-26 FT <1 MG/KG			47 MG/KG		<5 MG/KG	190 MG/KG	
Z	06/03/87	0 96137 B-1 #13	<2 MG/KG		30 MG/KG		<10 MG/KG	100 MG/KG	
	06/03/87	0 9257 1058 NORTH PRTY. 4-6 FT. <1 MG/KG			84 MG/KG		<5 MG/KG	150 MG/KG	
Z	06/03/87	0 96138 B-1 #14			30 MG/KG		<10 MG/KG	62 MG/KG	
	06/03/87	0 9259 1058 NORTH PRTY. 12-14 FT <1 MG/KG			38 MG/KG		<5 MG/KG	120 MG/KG	
Z	06/03/87	0 96139 B-1 #15			30 MG/KG		<10 MG/KG	71 MG/KG	
Z	06/03/87	0 96166 W-3 #14			30 MG/KG		<10 MG/KG	57 MG/KG	
Z	06/03/87	15 96140 BETTER BRITE B-2 #1			190 MG/KG		38 MG/KG		
Z	06/03/87	0 93140 B-2 #1			190 MG/KG		38 MG/KG		
Z	06/03/87	0 96164 W-3 #12			40 MG/KG		<10 MG/KG	110 MG/KG	
Z	06/03/87	0 96165 W-3 #13			40 MG/KG		<10 MG/KG	150 MG/KG	
Z	06/03/87	0 96162 W-3 #10			40 MG/KG		<10 MG/KG	58 MG/KG	
Z	06/03/87	0 96163 W-3 #11			40 MG/KG		<10 MG/KG	87 MG/KG	
Z	06/03/87	0 96159 W-3 #7			40 MG/KG		<10 MG/KG	33 MG/KG	

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Z	06/03/87		0	96156 W-3 #5			80 MG/KG		<10 MG/KG	170 MG/KG	
Z	06/03/87		0	96125 B-1			40 MG/KG		30 MG/KG	450 MG/KG	
Z	06/03/87		0	96126 B-1 #2	<2 MG/KG		60 MG/KG		<10 MG/KG	690 MG/KG	
Z	06/03/87		0	96127 B-1 #3	<2 MG/KG		180 MG/KG		<10 MG/KG	170 MG/KG	
Z	06/03/87		0	96128 B-1 #4	<2 MG/KG		100 MG/KG		<10 MG/KG	120 MG/KG	
Z	06/03/87		0	96129 B-1 #5	<2 MG/KG		100 MG/KG		<10 MG/KG	120 MG/KG	
Z	06/03/87		0	96142 B-2 #3			60 MG/KG		<10 MG/KG	150 MG/KG	
Z	06/03/87		0	96131 B-1 #7	<2 MG/KG		1100 MG/KG		<10 MG/KG	110 MG/KG	
Z	06/03/87		0	96143 B-2 #4			80 MG/KG		<10 MG/KG	120 MG/KG	
Z	06/03/87		0	96133 B-1 #9	<2 MG/KG		30 MG/KG		10 MG/KG	110 MG/KG	
Z	06/03/87		0	96144 B-2 #5			80 MG/KG		<10 MG/KG	140 MG/KG	
	06/03/87		0	9258 105B NORTH PRTY. 8-10 FT. <1 MG/KG			92 MG/KG		<5 MG/KG	160 MG/KG	
Z	06/03/87		0	96145 B-2 #6			580 MG/KG		<10 MG/KG	240 MG/KG	
	06/03/87		0	9260 105B NORTH PRTY. 16-18 FT <1 MG/KG			34 MG/KG		<5 MG/KG	120 MG/KG	
Z	06/03/87		0	96146 B-2 #7			1200 MG/KG		<10 MG/KG	91 MG/KG	
Z	06/03/87		0	96155 W-3 #2			60 MG/KG		<10 MG/KG	210 MG/KG	
Z	06/03/87		0	96147 B-2 #8			40 MG/KG		<10 MG/KG	96 MG/KG	
Z	06/03/87		0	96130 B-1 #6	<2 MG/KG		240 MG/KG		<10 MG/KG	220 MG/KG	
Z	06/03/87		0	96148 B-2 #9			30 MG/KG		<10 MG/KG	77 MG/KG	
Z	06/03/87		0	96134 B-1 #10	<2 MG/KG		30 MG/KG		<10 MG/KG	74 MG/KG	
Z	06/03/87		0	96167 W-3 #15			40 MG/KG		<10 MG/KG	62 MG/KG	
Z	06/03/87		0	96154 W-2 #15			30 MG/KG		<10 MG/KG	62 MG/KG	
Z	06/03/87		0	96132 B-1 #8	<2 MG/KG		20 MG/KG		<10 MG/KG	52 MG/KG	
	06/03/87		0	9261 105B KONRATH PRTY.20-22FT <1 MG/KG			29 MG/KG		<5 MG/KG	67 MG/KG	
Z	06/03/87		0	96149 B-2 #10			30 MG/KG		<10 MG/KG	93 MG/KG	
Z	06/03/87		0	96150 B-2 #11			40 MG/KG		<10 MG/KG	84 MG/KG	

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L	DATE	TIME	SLIP	LOCATION NUMBER OF SAMPLE	CADMIUM	HEXCHROME	TOTAL CHROME	CYANIDE	LEAD	ZINC	TRICHLORO
O											
C											
Z	06/03/87		0	96151 B-2 #12			30 MG/KG		<10 MG/KG	120 MG/KG	
Z	06/03/87		0	96152 B-2 #13			30 MG/KG		<10 MG/KG	31 MG/KG	
Z	06/03/87		0	96153 B-2 #14			30 MG/KG		<10 MG/KG	77 MG/KG	
Z	06/12/87	1400		95697 DEPERE MW-2	.8 UG/L		2300 UG/L		<3 UG/L	<20 UG/L	
Z	06/12/87	1430		95700 DEPERE MW-3	.7 UG/L		2300 UG/L		<3 UG/L	68 UG/L	
Z	06/12/87	1615		95699 DEPERE MW-3A	2.2 UG/L		40000 UG/L	.17 MG/L	17 UG/L	<20 UG/L	
Z	06/12/87	1625		95698 DEPERE MW-2A	2.1 UG/L		310000 UG/L	.07 MG/L	<3 UG/L	31 UG/L	
Z	06/12/87	1350		95695 DEPERE MW-1	1.5 UG/L		<100 UG/L		<3 UG/L	<20 UG/L	
Z	06/12/87	1345		95696 DEPERE MW-1A	2.6 UG/L		180000 UG/L	.06 UG/L	5 UG/L	26 UG/L	
C	08/12/87	1430		15297 GROUNDWATER B-102A	.9 UG/L		<3 UG/L		<3 UG/L	<20 UG/L	
C	08/12/87	1620		15298 GROUNDWATER B-103			6600 UG/L		<3 UG/L	<20 UG/L	
C	08/12/87	1600		15299 GROUNDWATER B-106A	1.8 UG/L		15 UG/L		<3 UG/L	<20 UG/L	
C	08/12/87	1645		15300 GROUNDWATER B-105B	1.1 UG/L		62000 UG/L		<3 UG/L	<20 UG/L	
C	08/12/87	1507		15296 GROUNDWATER B-101			44 UG/L			<20 UG/L	
C	08/12/87	1534		15295 GROUNDWATER B-101A	1.4 UG/L		<3 UG/L		<3 UG/L	<20 UG/L	
C	03/09/88	1500		67010 FISCHER STORM SEWER NORTH	4/26 <20	flame A.A.	17000 UG/L		<100 UG/L	100 L/L	
C	03/09/88	1500		67008 HENDRICKS STORM SEWER SOU	<20 UG/L		5800 UG/L		<100 UG/L	<20 UG/L	
C	03/09/88	1500		67009 KOMRATH BACK YARD	4/26 <20		76000 UG/L		<100 UG/L	40 L/L	
C	03/09/88	1500		67011 PUDDLE ABOVE SUMP NW CORN	<20 UG/L		300 UG/L		<100 UG/L	<20 UG/L	
~~C~~	~~03/09/88~~	~~1500~~		~~806701 FISCHER STORM SWER N. GRA~~	~~<20 UG/L~~		~~17000 UG/L~~		~~<100 UG/L~~	~~100 UG/L~~	
~~C~~	~~03/09/88~~	~~1500~~		~~806700 KOMRATH BAC YARD GRAB~~	~~<20 UG/L~~		~~76000 UG/L~~		~~<100 UG/L~~	~~40 UG/L~~	
C	03/30/88	1430		72070 SANITARY MAN HOLE		400000 UG/L	400000 UG/L			30 UG/L	
C	07/ /88	1430		900504 MUNICIPAL			<3 UG/L		<3 UG/L	<20 UG/L	
C	07/ /89	1500		9387 SEDIMENT SUMP PIT GRAB			12 MG/KG		19 MG/KG	95 MG/KG	
Z	10/16/89	1400		35273 ZINC MW-1A				.16 MG/L			400.0 UG/L
Z	10/16/89	1345		1207 ZINC MW-3A							

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L O C	DATE	TIME	SLIP NUMBER OF SAMPLE	LOCATION	CADMIUM	HEXCHROME	TOTAL CHROME	CYANIDE	LEAD	ZINC	TRICHLORO	
Z	10/16/89	1400	35275	ZINC MW-2A				.23 MG/L				N
Z	10/16/89	1345	35276	ZINC MW-2				.08 MG/L				N
Z	10/16/89	1345	35268	ZINC MW-2	<20 UG/L		38000 UG/L		<100 UG/L	<20 UG/L		N
Z	10/16/89	1400	35269	ZINC MW-2A	<20 UG/L		68000 UG/L		<100 UG/L	24 UG/L		N
Z	10/16/89	1330	35270	ZINC MW-3	<20 UG/L		6600 UG/L		<100 UG/L	<20 UG/L		N
Z	10/16/89	1340	35271	ZINC MW-3A	<20 UG/L		35000 UG/L		<100 UG/L	<20 UG/L		N
Z	10/16/89	1340	35277	ZINC MW-3A				.17 MG/L				N
Z	10/16/89	1330	1208	ZINC MW-3							180 UG/L	N
Z	10/16/89	1400	35267	ZINC SHOP MW-1A	<20 UG/L		570 UG/L		<100 UG/L	<20 UG/L		N
Z	10/16/89	1330	35276	ZINC MW-3				.09 MG/L				N
Z	10/16/89	1410	35272	ZINC MW-1				.10 MG/L				N
Z	10/16/89	1400	1205	ZINC MW-2A							5.3 UG/L	N
Z	10/16/89	1345	1204	ZINC MW-2							<1.0 UG/L	N
Z	10/16/89	1400	1205	ZINC MW-1A							4.0 UG/L	N
Z	10/16/89	1410	1206	ZINC MW-1							21.0 UG/L	N
IA0	C	10/17/89	935	35955	CHROME MW-101 11/15	<20 UG/L		<100 UG/L		<100 UG/L	<20 UG/L	
IA0	Z	10/17/89	1410	35266	ZINC MW-1 11/15	<20 UG/L		160 UG/L		<100 UG/L	<20 UG/L	N
	C	10/17/89	930	1234	CHROME MW-105B						69 UG/L	N
	C	10/17/89	1010	1227	CHROME MW-103						<1.0 UG/L	N
	C	10/17/89	950	35960	CHROME MW-104B	<20 UG/L		<100 UG/L		<100 UG/L	<20 UG/L	N
	C	10/17/89	1000	1229	CHROME MW-102A						500 UG/L	N
IA0	C	10/17/89	950	35960	MW-104B 11/15	<20 UG/L		<100 UG/L		<100 UG/L	<20 UG/L	
	C	10/17/89	945	1231	CHROME MW-101A						15 UG/L	N
	C	10/17/89	0		CHROME MW-105 DUPLICATE						67 UG/L	N
	C	10/17/89	950		CHROME MW-104B						53 UG/L	N
	C	10/17/89	950		CHROME MW-102						<1.0 UG/L	N

CORRESPONDENCE MEMORANDUM _____ ***STATE OF WISCONSIN***

DATE: October 15, 1990

TO: Russ Dunst - Technical Services

FROM: Annette Weissbach - LMD

SUBJECT: Special Request to the State Lab of Hygiene
Better-Brite Site(s) Superfund RI/FS, De Pere

Per our telephone discussion a week ago, I am sending you the list of samples taken at the Better-brite shops in De Pere. This request is in order to begin work on the Cooperative Agreement for a State-Lead Remedial Investigation through the EPA Superfund program.

A similiar request was made to the State Lab in September of 1988 for the Mauthe RI/FS in Appleton, and I expect the process to be identical this time around. Enclosed are lab slip numbers and results of samples taken since 1978 at the sites.

There are two lists, one sorted by date the other by slip number. The far left column indicates either Chrome or Zinc Shop samples and the far right column indicates if the sample was taken following chain of custody procedures (enforcement). In order to incorporate the data in the current investigation, it must be validated through EPA's QA/QC program.

Unfortunately, this effort on behalf of the State Lab will necessitate a vist to the archives to obtain the original lab notes and QA procedures followed at that time. I understand the lab is experiencing staff shortages at the present time, therefore I will not need this compilation until January 7, 1991. Immediately upon receipt of the information from the State Lab, I will submit the packet to the EPA for data validation.

Thank you for your help.

Enclosures

cc: Jennifer Huffman, SF Coordinator -LMD
Sue Bangert, SF Unit Lead - SW/3
David Linnear - EPA, Region V

Date 7-15-90
Analyst CM
Test Cyanide

Instrument 3040
Wave Length 578 nm
Slit Width 2.0 nm
Operation Mode ABS
Cell Size 1.0cm

	Sample #	Volume		Abs.	mg x factor = mg/L	
	Blank		20		0.00	
	Std 98.28 mg/200 mL		5/20		~~24.57~~ ~~19.57~~	r = 1.0000
			10/20		~~49.14~~ ~~39.14~~ mg/L	b = 0.0016
			20/20		98.28 mg/L	a = 0.0084
1	Dig BLK	500	20		0.195	
2	Dig Std	500 +49.14 mg	20		48.0	97.7 %
3	106252	500			35.2 / 500 =	0.07 D=0.07
4	~~104716~~	~~500~~			~~346~~ will dilute	~~0.06~~
5	104717	500			~~230~~ will dilute	
6	D-106252	395			27.6 / ~~500~~ 395 =	~~0.06~~ 0.07 (D)
1	4050	500			0.900 / 500 =	<0.01
2	4051	500			0.665 / 500 =	<0.01
3	4052	500			1.01 / 500 =	<0.01
4	4053	500			1.72 / 500 =	<0.01
5	SP4051 +49.14 mg	420			47.2 / 420 = (0.112 - (0.111+0) =	95.7% Rec
6	~~Blank~~ Dig Std	+49.14 mg 500	↓		45.4	92.4%
	104716	500	4		~~178 (5)~~ * will dilute	
	104717	500	5		60.3 (4) = 241 / 500 =	0.48

* will dilute 104716 1 → 10

QC Audit [signature] date 7-16-90

#22

Date 7-24-90
Analyst CM
Test Cyanide

Instrument DR 6
Wave Length 578
Slit Width 2.0
Operation Mode ABS
Cell Size 1.0cm

#	Sample #	Volume		Abs.	mg x factor = mg/L	
	Blank		20		-0.055	0
	Std 98.25 mg / 250 mL		5		24.6	24.6
	↓		10		48.9	49.1
	↓		20		98.3	98.3
						r = 1.0000
						b = -0.0027
						a = 0.0085
1	Dig Blank	500mL	20		0.309	
2	Dig Std	+ 49.14 mg/L Std 500mL	20		49.3 / 49.14 =	100%
3	4054	500mL	20		0.187	<0.01
4	4055	500mL	20		-0.055	<0.01 D<0.01
5	4056	500mL	20		-0.055	<0.01
6	D-4055	390mL	20		-0.055	<0.01
1	4057	500mL	20		-0.055	<0.01
2	+ 49.14 mg SP-4057	420mL	20		48.0 / 420 = 0.117 / (0.117 + 0) =	100% Rec
3	Dig Std	+ 49.14 mg Std 500mL	20		45.6 / 49.14 =	92.8%
4	Dig Blank	500mL	20		0.673	
5	104716	500mL	2		91.9 / 500 * 10 =	1.84
6						

QC Audit JD date 7-25-90

Form #22

t1351.924 conc = 9811.8 ug/l

AFC

Interlock - Water

Interlock - Water Argon

prim 10-31

erlock - Argon

ALL ARE CMT test coded.

Interlock - Water Argon

Interlock - Argon

?

?

?

Interlock - Bad discharge

standard

10/31/89 13:48

cd	av	447.20		sd	16.259	%cv	3.64	conc 40
pb	av	399.60		sd	11.231	%cv	2.81	conc 400
cr	av	197.78		sd	10.048	%cv	5.08	conc 80

blank

10/31/89 13:54

cd	av	8.52		sd	4.522	%cv	53.10	
pb	av	11.57		sd	1.174	%cv	10.15	
cr	av	5.88		sd	1.134	%cv	19.30	

standard

10/31/89 13:57

cd	av	2181		sd	41.3	%cv	1.90	conc 1000
pb	av	2078		sd	30.6	%cv	1.47	conc 10000
cr	av	1011		sd	30.2	%cv	2.99	conc 2000

#2

10/31/89 14:02

cd	av	203	ug/l 200	sd	8.1	%cv	4.00	
pb	av	1962	ug/l 2000	sd	38.1	%cv	1.94	
cr	av	394	ug/L 400	sd	3.0	%cv	0.76	

cntrl IN V

10/31/89 14:10

cd	av	126	ug/l 125	sd	7.8	%cv	6.21	
pb	av	1176	ug/l 1250	sd	4.5	%cv	0.38	
cr	av	243	ug/L 250	sd	19.6	%cv	8.08	

IA009345

10/31/89 14:13

cr	av	4	ug/L	sd	2.4	%cv	66.67	FURNACE

IA035266E

10/31/89 14:16

cd	av	-3	ug/l <20	sd	3.0	%cv	118.04	
pb	av	-17	ug/l <100	sd	5.0	%cv	29.84	
cr	av	162	ug/L <	sd	4.7	%cv	2.87	

035267E

10/31/89 14:20

cd	av	1	ug/l <20	sd	4.7	%cv	608.73	
pb	av	-22	ug/l <100	sd	52.0	%cv	240.00	

IA035267E

cr	av	570	ug/L	sd	24.0 %cv	4.22
35270E						
10/31/89 14:23						
cd	av	1	ug/l	sd	4.5 %cv	512.29
pb	av	4	ug/l	sd	59.1 %cv	1388.8
cr	av	6228	ug/L	sd	11.5 %cv	8.18

DILF. 3

IA035955E						
10/31/89 14:27						
cd	av	-1	ug/l	sd	0.4 %cv	48.14
pb	av	-30	ug/l	sd	40.4 %cv	135.60
cr	av	10	ug/L	sd	2.3 %cv	21.86
IA035956E						
10/31/89 14:30						
cd	av	1	ug/l	sd	1.2 %cv	95.78
pb	av	-56	ug/l	sd	4.3 %cv	7.76
cr	av	-5	ug/L	sd	0.2 %cv	3.12
IA035957E						
10/31/89 14:34						
cd	av	1	ug/l	sd	2.3 %cv	296.26
pb	av	1	ug/l	sd	7.1 %cv	849.32
cr	av	-3	ug/L	sd	0.2 %cv	6.07
IA035958E						
10/31/89 14:38						
cd	av	-1	ug/l	sd	3.1 %cv	445.64
pb	av	28	ug/l	sd	24.6 %cv	88.41
cr	av	38	ug/L	sd	6.7 %cv	17.90
IA035959E						
10/31/89 14:43						
cd	av	2	ug/l	sd	1.1 %cv	63.43
pb	av	4	ug/l	sd	33.8 %cv	958.61
cr	av	996	ug/L	sd	24.2 %cv	2.43
IA035960E						
10/31/89 14:47						
cd	av	-3	ug/l	sd	4.3 %cv	130.73
pb	av	-1	ug/l	sd	30.1 %cv	3647.3
cr	av	13	ug/L	sd	1.5 %cv	11.39
#3						
10/31/89 14:50						
cd	av	1001	ug/l	sd	10.5 %cv	1.05
pb	av	9585	ug/l	sd	50.7 %cv	0.53
cr	av	1732	ug/L	sd	16.1 %cv	0.93
standard						
10/31/89 14:54						
cd	av	2205		sd	77.3 %cv	3.51 conc 1000
pb	av	2082		sd	17.2 %cv	0.83 conc 10000
cr	av	903		sd	4.7 %cv	0.52 conc 2000
35268E/50						
10/31/89 14:57						
cr	av	34336	ug/L	sd	685.5 %cv	1.95

DILF.

/269E/50
1/89 14:58
cr av 475772 ug/L sd 2620.8 %cv 0.55 DIL. P3

035271E/50
1/89 15:00
cr av 34898 ug/L sd [illegible] %cv [illegible]

IA035961E/50
10/31/89 15:02
cr av 28396 ug/L sd 235.0 %cv 0.83

IA035962E/50
10/31/89 15:03
cr av 29354 ug/L sd 688.9 %cv 2.35

IA035268D/25
10/31/89 15:08
cr av 38398 ug/L sd 639.1 %cv 1.66

IA035269E/250
10/31/89 15:10
cr av 482271 ug/L sd 13972.4 %cv 2.90

IA035271E/25
10/31/89 15:12
cr av 35022 ug/L sd 963.8 %cv 2.75

IA035961E/25
10/31/89 15:13
cr av 29576 ug/L sd 125.7 %cv 0.43

IA035962E/25
10/31/89 15:15
cr av 28145 ug/L sd 191.2 %cv 0.68

IA035270E/5
10/31/89 15:18
cr av 4603 ug/L sd 104.9 %cv 1.59

IA035271E/25 D
10/31/89 15:20
cr SA 35022 av DIFF 495 34537 ug/L sd D 86.5 %cv 0.25
±25=1406. ±25=19.4 OR 1.4% RD ±25=1321.

IA035959E D
10/31/89 15:22
cd SA 2 av (1) 1 ug/l sd 0.5 %cv 49.25
pb 4 av (12) -8 ug/l sd 25.9 %cv 316.45
cr 996 av 17 1013 ug/L sd 11.3 %cv 1.12

#3
10/31/89 15:55
cd av 1003 ug/l 1000 sd 13.1 %cv 1.30
pb av 9853 ug/l 10000 sd 194.3 %cv 1.97
cr av 1765 ug/L 2000 sd 18.5 %cv 1.05

Standard
10/31/89 15:56
cr av 826 sd 7.6 %cv 0.93 conc 2000

(3)

2267E SP
31/89 15:58
cr SA 570 avSP 1000 1483 ug/L R= 107% sd SP 13.5 %cv 0.80

035267E SP
31/89 15:59
cd SA 1 av SP 500 515 ug/l 103% sd SP 11.7 %cv 2.27
pb ↓ -22 av ↓ 2000 2092 ug/l 105% sd 0.4 %cv 0.02

IA035958E SD
10/31/89 16:03
cd SA -1 av SP 500 528 ug/l 106% sd SP 12.3 %cv 2.33
pb ↓ 28 av ↓ 2000 2067 ug/l 103% sd 46.8 %cv 2.26
cr ↓ 38 av ↓ 1000 1132 ug/L 109% sd 33.9 %cv 3.00

IA035268E
10/31/89 16:06
cd av -3 ug/l <20 sd 3.1 %cv 88.41
pb av -16 ug/l <100 sd 2.4 %cv 14.89

IA035269E
10/31/89 16:08
cd av -2 ug/l <20 sd 4.3 %cv 244.51
pb av -8 ug/l <100 sd 20.4 %cv 258.01

IA035271E
10/31/89 16:11
cd av -0 ug/l <20 sd 0.0 %cv 3.78
pb av -17 ug/l <100 sd 11.8 %cv 69.09

35961E
31/89 16:13
cd av -0 ug/l <20 sd 0.3 %cv 85.88
pb av -2 ug/l <100 sd 11.8 %cv 633.19

IA035962E
10/31/89 16:15
cd av 0 ug/l <20 sd 1.5 %cv 591.14
pb av -13 ug/l <100 sd 15.8 %cv 123.76

IA035269E SP
10/31/89 16:17
cd SA -3 av SP 500 545 ug/l R= 109% sd SP 6.0 %cv 1.11
pb SA -16 av ↓ 2000 2107 ug/l ↓ 105% sd 80.0 %cv 3.80

rinse
10/31/89 16:19
cr av 38 ug/L sd 4.5 %cv 11.76

rinse
10/31/89 16:24
cr av 3 ug/L sd 7.1 %cv 338.79

Interlock - Argon

035

QC Audit AFC date 11-2-89

SEC 10-26

AFE

weal std
10/26/89 11:09

ca	av	106.22		sd	0.303	%cv	0.28	conc 1.0
fe	av	74.43		sd	3.004	%cv	4.04	conc 0.10
na	av	985.43		sd	28.912	%cv	2.93	conc 1.0
mn	av	107.26		sd	0.109	%cv	0.10	conc 20
mg	av	69.76		sd	2.037	%cv	2.92	conc 1.0
cu	av	147.51		sd	1.400	%cv	0.95	conc 50

blank
10/26/89 11:11

ca	av	1.96		sd	0.336	%cv	17.18
fe	av	5.69		sd	0.250	%cv	4.39
na	av	44.96		sd	6.590	%cv	14.66
mn	av	6.37		sd	3.464	%cv	54.38
mg	av	0.74		sd	0.123	%cv	16.59
cu	av	27.84		sd	3.481	%cv	12.50

#3 std
10/26/89 11:14

ca	av	5199.2		sd	35.95	%cv	0.69	conc 50.0
fe	av	3295.93		sd	14.222	%cv	0.43	conc 5.00
na	av	47862.6		sd	347.02	%cv	0.73	conc 50.0
mn	av	5049		sd	94.1	%cv	1.86	conc 1000
mg	av	3320.4		sd	10.27	%cv	0.31	conc 50.0
cu	av	6644		sd	93.9	%cv	1.41	conc 2500

#2
10/26/89 11:16

ca	av	10.0	mg/l	10.0	sd	0.02	%cv	0.17
fe	av	1.01	mg/l	1.00	sd	0.014	%cv	1.36
na	av	10.0	mg/l	10.0	sd	0.25	%cv	2.55
mn	av	206	ug/l	200	sd	3.3	%cv	1.61
mg	av	10.3	mg/L	10.0	sd	0.03	%cv	0.28
cu	av	501	ug/L	500	sd	14.6	%cv	2.91

#1
10/26/89 11:18

ca	av	1.0	mg/l	1.0	sd	0.03	%cv	3.51
fe	av	0.10	mg/l	0.10	sd	0.001	%cv	0.96
na	av	1.0	mg/l	1.0	sd	0.01	%cv	1.02
mn	av	20	ug/l	20	sd	0.9	%cv	4.58
mg	av	1.0	mg/L	1.0	sd	0.01	%cv	1.10
cu	av	43	ug/L	50	sd	0.9	%cv	2.15

cntrl I V
10/26/89 11:20

ca	av	19.9	mg/l	20.0	sd	0.14	%cv	0.72
fe	av	1.97	mg/l	2.00	sd	0.020	%cv	1.00
na	av	19.8	mg/l	20.0	sd	0.20	%cv	1.00
mn	av	801	ug/l	800	sd	2.7	%cv	0.34
mg	av	20.5	mg/L	20.0	sd	0.06	%cv	0.31
cu	av	991	ug/L	1000	sd	13.4	%cv	1.35

IA034264
26/89 11:22

ca	av	53.8	mg/l	/	sd	0.90	%cv	1.68
na	av	13.0	mg/l	/	sd	0.12	%cv	0.92

IA034265

IA035101 dis

/89 12:34

l	av	39	ug/l	sd	3.3	%cv 8.27

37352

/26/89 12:37

al	av	82	ug/l	sd	3.5	%cv 3.99
zn	av	28	ug/l	sd	3.8	%cv 13.89
ca	av	2.2	mg/l	sd	0.03	%cv 1.36
mg	av	0.7	mg/L	sd	0.01	%cv 1.29
cu	av	5	ug/L	sd	0.0	%cv 0.87

IA037353

10/26/89 12:40

al	av	73	ug/l	sd	1.0	%cv 1.37
zn	av	17	ug/l	sd	3.3	%cv 18.87
ca	av	2.1	mg/l	sd	0.01	%cv 0.57
mg	av	0.7	mg/L	sd	0.01	%cv 1.43
cu	av	3	ug/L	sd	1.9	%cv 68.66

IA035085dis D

10/26/89 12:43

al	av	191	ug/l	sd	6.9	%cv 3.61

IA037352 D

10/26/89 12:45

al	av	113	ug/l	sd	2.3	%cv 2.00
zn	av	68	ug/l	sd	4.7	%cv 6.86
ca SA 2.2	av	2.2	mg/l	sd	0.02	%cv 0.74
mg 0.7	av	0.7	mg/L	sd	0.00	%cv 0.47
cu	av	25	ug/l	sd	0.4	%cv 1.65

35093dis SP

10/26/89 12:48

alSA225	avSP	448	ug/l	sd	0.2	%cv 0.04

IA037353 SP

10/26/89 12:50

alSA 73	av SP	250	ug/l	sd	10.4	%cv 4.14
zn 17	av	407	ug/l	sd	1.4	%cv 0.34
ca 2.1	av	21.8	mg/l	sd	0.17	%cv 0.77
mg 0.7	av	21.0	mg/L	sd	0.04	%cv 0.20
cu 3	av	980	ug/L	sd	28.1	%cv 2.87

#3

10/26/89 12:53

ca	av	49.3	mg/l	sd	0.49	%cv 0.99
fe	av	4.91	mg/l	sd	0.035	%cv 0.71
na	av	49.2	mg/l	sd	1.07	%cv 2.17
mn	av	1015	ug/l	sd	2.2	%cv 0.21
mg	av	50.1	mg/L	sd	0.28	%cv 0.56
cu	av	2477	ug/L	sd	6.3	%cv 0.25

#3

10/26/89 12:56

al	av	996	ug/l	sd	19.8	%cv 1.99
zn	av	983	ug/l	sd	13.2	%cv 1.34

IA037352 D

10/26/89 13:01

alSA 60	av	60	ug/l	sd	12.5	%cv 20.96

SA12	av	13	ug/l	sd	1.5	%cv	11.92
u 5	av	1	ug/L	sd	0.5	%cv	38.37
37352							
/26/89 13:04							
al	av	60	ug/l	sd	7.3	%cv	12.19
zn	av	12	ug/l	sd	0.5	%cv	4.19
A035085dis D							
0/26/89 13:06							
al 164 SA	av	178	ug/l	sd	6.8	%cv	3.80
A035262E							
0/26/89 13:09							
ca	av	33.6	mg/l	sd	0.36	%cv	1.07
fe	av	0.10	mg/l	sd	0.001	%cv	0.87
mg	av	8.5	mg/L	sd	0.01	%cv	0.06
cu	av	9	ug/L	sd	0.7	%cv	7.77
A035262E D							
0/26/89 13:11							
ca SA 33.6	av	33.2	mg/l	sd	0.15	%cv	0.44
fe 0.10	av	0.11	mg/l	sd	0.008	%cv	7.69
mg 8.5	av	8.5	mg/L	sd	0.02	%cv	0.18
cu 9	av	8	ug/L	sd	0.2	%cv	2.66
A035265E							
0/26/89 13:13							
zn	av	11	ug/l	sd	1.2	%cv	11.09
35267E							
26/89 13:15							
zn	av	4	ug/l	sd	1.1	%cv	25.60
A035268E							
0/26/89 13:16							
zn	av	2	ug/l	sd	1.8	%cv	102.26
A035269E							
0/26/89 13:18							
zn	av	24	ug/l	sd	1.0	%cv	3.98
A035270E							
0/26/89 13:19							
zn	av	9	ug/l	sd	0.3	%cv	3.50
A035271E							
0/26/89 13:21							
zn	av	4	ug/l	sd	1.6	%cv	40.07
A035955E							
0/26/89 13:22							
zn	av	-3	ug/l	sd	3.7	%cv	109.78
A035956E							
26/89 13:24							
zn	av	4	ug/l	sd	1.5	%cv	35.72
A035957E							
0/26/89 13:26							

MW
IL70 cmt

IA035957E

zn	av	-2	ug/l	L20	sd	1.3	%cv	65.10
035958E								
10/26/89 13:28								
zn	av	408	ug/l		sd	0.7	%cv	0.17
035959E								
10/26/89 13:29								
zn	av	-3	ug/l	L20	sd	1.7	%cv	60.64
IA035960E								
10/26/89 13:31								
zn	av	1	ug/l		sd	2.7	%cv	291.15
IA035961E								
10/26/89 13:32								
zn	av	0	ug/l		sd	0.2	%cv	51.81
IA035962E								
10/26/89 13:34								
zn	av	-3	ug/l		sd	1.1	%cv	38.55
#3								
10/26/89 13:35								
zn	av	923	ug/l	1000	sd	5.0	%cv	0.54
standard								
10/26/89 13:36								
zn	av	777			sd	12.5	%cv	1.61 conc 1000
35269E D								
10/26/89 13:37								
zn SA 24	av	23	ug/l		sd	3.9	%cv	17.08
IA035958E D								
10/26/89 13:39								
zn SA 408	av	429	ug/l		sd	6.5	%cv	1.53
IA035268E SP								
10/26/89 13:40								
zn SA 2	avSP 400	402	ug/l	R 100%	sd SP	0.6	%cv	0.16
IA035961E SP								
10/26/89 13:41								
zn SA 0	av SI 400	390	ug/l	R 97.5%	sd SP	2.5	%cv	0.65

Interlock - Water

Interlock - Water Argon

Interlock - Water

QC Audit AFC date 10-27-89

Element Pb (RCRA 1 WA's)
Flame type C2H2 / AIR
Digestion date 3-17-88
Comments λ=217 D2 ARC

Analyst DXP
Date 3-23-88
Digestion data 1.00 HOCK TUT
Instrument 403

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate ABS	Conc.	Conc. of Sample	✓
0.5% HNO3 zero std			0.000	0.0	mg/l	BLK
std 0.1			0.002	0.1		STD
std 0.4			0.009	0.4		
std 1.0			0.025	1.0		
std 2.0			0.047	2.0		
std 5.0			0.108	5.0		
CONTROL I	—	—	2.0 SHOULD 2.0		BF —	OK
BLK	100ml MS	25ml	0.1		<0.025 mg/l digest	BLK
64091	100ml	25ml	0.1		0.025 mg/l	✓
64092			<0.1		<0.025	✓
64093			<0.1		<0.025	✓
64094			<0.1		<0.025	✓
66079			0.2		0.050	✓
67008	25ml		<0.1		<0.1 mg/l	✓
std 0.4	—	—	0.4		—	STD
67009	25ml	25ml	<0.1		<0.1 mg/l	✓
67010			<0.1		<0.1	✓
67011			<0.1		<0.1	✓
62797	NOT DIGESTED		1.0		1.0 mg/l	✓
64091D	100ml	25ml	0.1		0.025 mg/l	(D)
67009D	25ml		<0.1		<0.025	(D)
64093SP	100ml + 1ml SPIKE (B)		2.1		0.525 %R = 0.525 / 0.5 + 0.025 = 102%	SP
67011SP	25ml + 1ml SPIKE (C)		2.1		2.1 %R = 2.1 / 2.1 = 102%	SP
SPIKE (C)	1ml		2.0 SHOULD 2.0		BF —	OK
std						
std						

QC Audit AFC date 4/5/88

Form # 38

F-1738

Element Cr (total) | Analyst DKP
Flame type N_2O/C_2H_2 | Date 3-23-88
Digestion date 3-17-88 | Digestion data p. 29 BOOK
Comments SM. BURNER | Instrument 403

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate	Conc. of Sample	✓
zero std			0.000 0.0	mg/l	Blk
std 0.1			0.002 0.1	↓	STD
std 0.5			0.010 0.5		↓
std 1.0			0.020 1.0		
std 2.0			0.039 2.0		
std 5.0			0.095 5.0	↓	↓
CONTROL I	—	—	2.0 SHOULD BE 2.0	—	CONTROL
Blk	100ml MQ	25ml	<0.1	<0.1 mg/l	Blk
EL7008	25ml	↓	2.9 X2	5.8 mg/l	✓
EL7009	↓		3.8 X20	76. ↓	✓
EL7010			1.7 X10	17.	✓
EL7011	↓	↓	0.3	0.3 ↓	✓
SPIKE SOLN. (C)	1.0ml	25ml	1.9 SHOULD BE 2.0	—	SPIKE SOLN.
EL7009D	25ml	25ml	3.8 X20	76 mg/l %RD = 0%	D
std 5.0	—	—	5.0	—	STD
EL7011SP	25ml + 1ml SPIKE SOLN (C)	25ml	2.3	$\%R = \frac{2.3}{2+0.3} = 100\%$	SP
std					
std					

QC Audit AFC date 4/4/88

Form # 38 F-1738

Element Cd (DIG LIQ+SOL.)
Flame type C_2H_2 / AIR
Digestion date 3-16, 3-17, 3-30
Comments D2 DNC

Analyst DKD
Date 4-12-88
Digestion data pp. 29, 30, 39 BOOK VIII
Instrument 403

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate (Abs / Conc)	Conc. of Sample	✓
B.F. 0.521 Abs zero std 3			0.000 0.00	mg/l	BLK
std 0.02			0.003 0.02		STD
std 0.05			0.010 0.05		
std 0.20			0.039 0.20		
std 0.50			0.096 0.50		
std 1.0			0.190 1.02		
CONTROL I	—	—	1.00 SHOULD BE 1.00		OK
BLK 3-16	0.0 gms	100 ml	<0.02	<20 ug/l	BLK
62261	1.01 gms		<0.02	<2 mg/kg	✓
62261D	1.04		<0.02	<2 mg/kg	D
62261SP	1.00 +2ml SCLN (C)		0.46	46.0 mg/kg SPK SP50 %R = 460/500 = 92%	SP
SP SOLN (C)	20 ml		0.46	%R = 480/500 = 96%	SP SOLN.
BLK 3-17	100 ml	25 ml	<0.02	<20 ug/l	BLK
SP. SOLN (C) 3+1	25 ml + 1 ml SP SOLN (C)		0.95	%R = 950/1,000 = 95%	SP SOLN
std 0.5	—	—	0.51	—	STD
67008	25 ml	25 ml	<0.02	<20 ug/l	✓
67009			<0.02		✓
67010			<0.02		✓
67011			<0.02		✓
67009D			<0.02		D
67011SP	25 ml + 1 ml SP SOLN (C)		0.96	%R = 960/1,010 = 95%	SP
BLK #1	TCLP (LEACHATE)	25 ml EXTRACT	<0.02	<20 ug/l	BLK
BLK #2			<0.02		BLK
EP 50490			0.09	90. ug/l <0.1 mg/l	
EP 50490D			0.09	90.	D
std 0.5	—	—	0.50	—	STD
50490SP	25 ml + 0.5 ml SOLN TCLP (C)	EXTRACT	0.56	%R = 560/590 = 94.9%	SP
EP EPA		25 ml	1.00 X20	20,000 ug/l 20 mg/l	
EP EPA D			1.03 X20	20,600	D
TC EPA SP	25 ml + 0.5 ml SOLN (C)		1.03 X20	%R = 20,600 / 20,300 + 1,000 = 96.7%	SP

QC Audit AFC date 4/13/88

std
Form # 38

F-1738

Element Zn (DIDK/IFH WAIS)
Flame type C2H2/AIR
Digestion date 3-17, 4-6
Comments LEAN BLUE FLAME (EDL @ 6.5 watts EXCELLENT RUN)

Analyst DKP
Date 4-11-88
Digestion data p.29, p43 BOOK VIII
Instrument 403

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate ABS	Conc.	Conc. of Sample	✓
0.5% HNO_3 zero std			0.000	0.00	mg/l	BLK
std 0.02			0.006	0.02		STD
std 0.10			0.028	0.10		
std 0.50			0.133	0.50		
std 1.0			0.260	1.0		
std 2.0			0.522	2.0		↓
CONTROL I	—	—	1.02		SHOULD BE 1.00 mg/l	OK
BLK 3-17	100ml MQ	25 ml	0.10	(0.0)	~~10.0 ug/l~~ 100 ug/l	BLK
67008	25 ml	↓	0.11	(0.01)	<20. ug/l	✓
67009	↓		0.13	(0.03)	30. AVG 40 ug/l	✓
67010			0.20	(0.10)	100.	✓
67011			0.07	(0.00)	<20.	✓
67009D	↓		0.15	(0.05)	50. ↓ %RD = ~~50%~~ DIFF SHOULD NEAR D.L.	D
67011SP	25ml + 1ml SP SOLN (C)	↓	1.09	(0.99)	%R = 990/1000+10 = 98%	SP
std 0.10	—	—	0.10			STD
SP SOLN (C) 3-17	25ml MQ + 1ml SP SOLN	25ml	1.05	(0.95)	%R = 950/1000 = 95%	SP SOLN
BLK 4-8	100ml MQ	25 ml	0.13	(0.0)	~~32.5 ug/l~~ 30 ug/l	BLK
SP SOLN (C) 4-8	100ml MQ + 1ml SP SOLN	↓	0.99	(0.86)	%R = 860/1000 = 86% LOW	SP SOLN
65226	100ml		0.36	(0.23)	~~230~~ 58. ug/l	✓
65227	↓		0.32	(0.19)	~~190~~ 48.	✓
70582			1.49 x 3	(1.34 x 3)	~~4,300~~ 1100	✓
70583			0.46	(0.33)	~~330~~ 82. AVG 81 ug/l	✓
71387			0.43	(0.30)	~~300~~ 75	✓
71386			1.18	(1.05)	~~1000~~ 250	✓
72189	↓	↓	0.40	(0.27)	~~270~~ 68.	✓
std 0.5	—	—	0.5		—	STD
72190	100ml	25 ml	1.37	(1.24)	~~310~~ 310 ug/l	✓
73750			0.25	(0.12)	~~120~~ 30.	✓
73751			0.27	(0.14)	~~140~~ 35.	✓
70583D	↓		0.45	(0.32)	~~320~~ 80 ug/l %RD = 3.1%	D
72190SP	100ml + 1ml SP SOLN (C)	↓	1.32 x 2	(1.19 x 2)	%R = ~~2540~~ 540/500+310 = 112%	SP
std 0.10	—	—	0.10		250 + 310	STD
72070	NOT	DIGESTED	0.03		30. ug/l	✓
72070SP	50ml +	1ml SP SOLN. (C)	0.54		%R = 540/500+30 = 102%	SP

std
Form # 38

QC Audit ___ date 4/13/88

F-1738

Element Pb (RCRA)
Flame type C2H2/AIR
Digestion date 6-12-87
Comments D2 BRC 217nm

Analyst JKP
Date 6-17-87
Digestion data BOOK VII p. 32
Instrument 403

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate	Conc. of Sample	✓
0.5% HNO3 zero std			0.000 0.0		STD
std 0.1			0.003 0.1		
std 1.0			0.020 1.0		
std 5.0			0.117 5.0		
std 10.0			0.223 10.0		↓
CONTROL 59595			0.4	SHOULD BE 0.4	OK
BLK 6-12	0.0 ml	100 ml	<0.8	~~SHOULD BE 0.8~~ <10 mg/kg	BLK
SPIKE SOLN.	4.0 ml		~~1.8~~ 1.9	SHOULD BE 2.0	OK
91760	1.01 gms		<0.1	<10 mg/kg	✓
91774	1.01		<0.1		✓
91775	1.00		<0.1		✓
91776	1.02		0.2	20 mg/kg	✓
91777	1.04		<0.1	<10 mg/kg	✓
91778	1.00		<0.1	<10 mg/kg	✓
std 0.1	—	—	0.1	0.1 mg/l	STD
91779	1.03 gms	100 ml	<0.1	<10 mg/kg	✓
91780	1.02		<0.1		✓
91781	1.02		<0.1		✓
91782	1.02		<0.1		✓
91783	1.03		<0.1		✓
91784	1.04		<0.1		✓
91785	1.01		<0.1		✓
91786	1.01		<0.1		✓
91787	1.02		<0.1		✓
91788	1.00		<0.1		✓
std 0.1	—	—	0.1	0.1 mg/l	STD
91789	1.01 gms	100 ml	<0.1	<10 mg/kg	✓
91790	1.05		<0.1		✓
91791	1.00		<0.1		✓
91792	1.00		<0.1		✓
91793	1.00		<0.1		✓
91776D	1.02		0.2	20 mg/kg %RD = 0%	D
91790D	1.05		<0.1	<10 mg/kg	D
91783SP	1.03		2.0	194 %R = 194/(194+5) = 97%	SP
STD 5.0	—	—	5.0	5.0 mg/l	STD

std

Form # 38

QC Audit AFL date 6-25-87

F-1738

Element Zn (KCRH)
Flame type AIR/C_2H_2
Digestion date 6-12-87
Comments VERY LEAN BLUE FLAME

Analyst DKP
Date 6-15-87
Digestion data BOOK VII p.32
Instrument H03

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate ABS	Conc. CONC	Conc. of Sample	✓
0-5% HNO_3 zero std			0.001	0.00	mg/l	STD
std 0.02			0.004	0.02		
std 0.20			0.047	0.20		
std 0.50			0.114	0.50		
std 1.0			0.224	1.00		
std 2.0			0.429	2.00	↓	↓
CONTROL 58595			0.42		SHOULD BE 0.40	OK
BLK 6-12	0.0 ml	100 ml	0.03			Blk
SPIKE SOLN (C)	4.0 ↓		1.01		0.98 SHOULD BE 1.0	OK
91760	1.01 gms		1.62		160. mg/kg	✓
91774	1.01		0.43		40 ~~42.~~	✓
91775	1.00		0.30		27 ~~30.~~	✓
91776	1.02		~~0.57~~ X10		556 ~~559.~~ AVG 532.	✓
91777	1.04 ↓	↓	1.86		180. ↓	✓
std 1.0	—	—	1.02		1.02 mg/l	STD
91778	1.00 gms	100 ml	1.46 X2		290. mg/kg	✓
91779	1.03		1.76		170.	✓
91780	1.02		1.16 X2		220 ~~230.~~	✓
91781	1.02		1.43		140.	✓
91782	1.02		1.35		130.	✓
91783	1.03		1.34		(127) 130.	✓
91784	1.04		0.37		33 ~~36~~	✓
91785	1.01		1.60 X2		310 ~~320~~	✓
91786	1.01		0.57		53 ~~56~~	✓
91787	1.02 ↓	↓	1.76		170. ↓	✓
std 2.0	—	—	2.02		202 mg/l	STD
91788	1.00 gms	100 ml	1.78		180 mg/kg	✓
91789	1.01		1.24 X2		240. AVG	✓
91790	1.05		1.27		118 ~~120.~~ 120	✓
91791	1.00		1.72		170.	✓
91792	1.00		1.38		140.	✓
91793	1.00		1.65 X2		330.	✓
91776D	1.02		0.52 X10		507 ~~510.~~ %RD = 9.2%	D
91790D	1.05		1.25		116 ~~120.~~ %RD = ~~3.3%~~ 1.7%	D
917835P	1.03 ↓	↓	1.23 X2		231 ~~239.~~ %R = 236/198 = 105%	SP
std 2.0	—	—	2.01		2.01 mg/l	STD

Form # 38

QC Audit JPC date 6-16-87

F-1738

Element Pb (RCRA)
Flame type N2O/C2H2
Digestion date 6-9-87
Comments LINE 317.

Analyst DKP
Date 6-12-87
Digestion data BACKTILL p.39
Instrument 403

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate ABS	Conc. of digestate CONC	Conc. of Sample	✓
zero std			0.000	0.0	mg/L	STD
std 0.1			0.003	0.1		
std 1.0			0.025	1.0		
std 5.0			0.125	5.0		
std 10.0			0.237	10.0		↓
CONTROL 5459515 EPTAM			0.4		SHOULD BE 0.4	OK
Blk 6-9	0.0 ml	100 ml	<0.10		<10. mg/kg	Blk
SPIKE (C) SOLN	2.0 ↓		0.9		SHOULD BE 1.0	STD
91755	1.00 gms		<0.1		<10. mg/kg	✓
91756	1.01		<0.1			✓
91757	1.00		<0.1			✓
91758	1.00		<0.1			✓
91759	1.05		<0.1			✓
91761	1.02 ↓	↓	<0.1		↓	✓
std 0.1	—	—	0.1		0.1 mg/L	STD
91762	1.01 gms	100 ml	<0.1		<10. mg/kg	✓
91763	1.01		<0.1			✓
91764	1.02		<0.1			✓
91765	1.01		<0.1			✓
91766	1.02		<0.1			✓
91767	1.02		<0.1			✓
91768	1.03		<0.1			✓
91769	1.00		<0.1			✓
91770	1.02		<0.1			✓
91771	1.00 ↓	↓	<0.1		↓	✓
std 5.0	—	—	5.0		5.0 mg/L	STD
91772	1.05 gms	100 ml	<0.1		<10 mg/kg	✓
91773	1.02		<0.1			✓
91761D	1.02		<0.1			(D)
91771D	1.04		<0.1		↓	(D)
91766SP	1.01 ↓	↓	1.0		99 mg/kg %R = 99/99+5 = (95%)	SP
std 1.0	—	—	1.0		1.0 mg/L	STD

QC Audit AFL date 6-16-87

std

Form # 38

F-1738

Element Cr (RCRA) | Analyst DRP
Flame type N_2O / C_2H_2 | Date 6-16-87
Digestion date 6-12-87 | Digestion data BOOK VII p-32
Comments SLOT BURNER, NEW STDS | Instrument 403

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate mg/l	Conc. of digestate mg/kg	Conc. of Sample	✓
0.5% HNO_3 zero std			0.000	0.0	mg/l	STD
std 0.1			0.002	0.1		
std 0.5			0.009	0.5		
std 1.0			0.018	1.0		
std 2.0			0.036	2.0		
std 5.0			0.092	5.0		
CONTROL 58595			0.3		SHOULD BE 0.25	OK
Blk 6-12	0.0 ml	100 ml	< 0.1			Blk
SPIKE SOLN	~~1.0~~ ml		2.0		SHOULD BE 2.0	OK
91760	1.01 gms		0.4		40. mg/kg	✓
91774	1.01		0.3		30.	✓
91775	1.00		0.3		30.	✓
91776	1.02		1.3 X5		6.37	✓
91777	1.04		2.0 X10		1,900	✓
std 1.0	—	—	1.0		1.0 mg/l	STD
91778	1.00 gms	100 ml	2.4 X5		1,200 mg/kg	✓
91779	1.03		2.8 X2		540	✓
91780	1.02		0.5		50	✓
91781	1.02		1.2		120	✓
91782	1.02		0.3		30	✓
91783	1.03		0.3		29	✓
91784	1.04		0.2		20	✓
91785	1.01		0.5		50	✓
91786	1.01		0.4		40	✓
91787	1.02		0.4		40	✓
std 0.5	—	—	0.5		0.5 mg/l	STD
91788	1.00 gms	100 ml	0.3		30 mg/kg	✓
91789	1.01		0.3		30	✓
91790	1.05		0.3		28	✓
91791	1.00		0.2		20	✓
91792	1.00		0.2		20	✓
91793	1.00		0.3		30	✓
91790D	1.05		0.2		19	Diff > D.L. & Poor ✓
91776D	1.02		1.3 X5		6.37	%RD = 39% (D)
91783SP	1.03		2.4		238	%AD = 0% (D)
std 2.0	—	—	2.0		2.0 mg/l	STD

AVG 28

%R = $\frac{233}{29 + 194}$ = 104% SP

Form # 38

F-1738

QC Audit AFC date 6-17-87

Element Cr (RCRA) | Analyst DKP
Flame type N_2O/C_2H_2 | Date 6-12-87
Digestion date 6-9-87 | Digestion data BOOK VIII p.29
Comments | Instrument 403

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate ABS	Conc. of Sample	✓
0.5% HNO_3 zero std			0.000 c.0	mg/l	STD
std 0.1			0.002 0.1		
std 0.5			0.010 0.5		
std 1.0			0.017 1.0		
std 2.0					
std 5.0			0.084 5.0		
CONTROL 58595 EXTRA			0.2	SHOULD BE 0.25	OK
BLK 6-9	0.0ml	100ml	<0.1		BLK
SPIKE SOLN (E)	2.0		0.9	SHOULD BE 1.0	STD
91755	1.00 gmw		0.5	50 mg/kg	✓
91756	1.01		0.4	40	✓
91757	1.00		0.3	30	✓
91758	1.00		0.3	30	✓
91759	1.05		0.4	40	✓
std 0.5	—		0.5	5.0 mg/l	STD
~~91760~~		SPILLED	DURING	DIGESTION	
91761	1.02 gmw	100ml	0.4	40 mg/kg	✓
91762	1.01		0.3	30	✓
91763	1.01		0.4	40	✓
91764	1.02		0.2	20	✓
91765	1.01		0.3	30	✓
91766	1.02		0.5	50	✓
91767	1.02		0.4	40	✓
91768	1.03		0.3	30	✓
91769	1.00		0.4	40	✓
std 0.5	—		0.5	0.5 mg/l	STD
91770	1.02	100ml	0.4	40	✓
91771	1.00		0.3	30	✓
91772	1.05		0.3	30	✓
91773	1.02		0.4	40	✓
91761D	1.02		0.4	40 (0.0% RD)	D
91771D	1.04		0.3	30 148 (0.0% RD)	D
91766SP	1.01		1.5	148 %R = 99+50 = (99%)	SP
90072	—	—	2.2	2,200 ug/l	
std 5.0	—	—	5.0	5.0 mg/l	STD

std

QC Audit AFL date 6-16-87

Form # 38 F-1738

Element Cd (RCRA)
Flame type C_2H_2/AIR
Digestion date 6-12-87
Comments D.2 ARC

Analyst DXP
Date 6-17-87
Digestion data BOOK III p 32
Instrument 403

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate ABS	Conc. of digestate CONC	Conc. of Sample	✓
0.5% HNO_3 zero std			0.000	0.00	mg/l	STD
std 0.02			0.004	0.02		
std 0.05			0.011	0.05		
std 0.20			0.040	0.20		
std 0.50			0.101	0.50		
std 1.0			0.198	1.00		
CONTROL 58595			0.07		SHOULD BE 0.07 mg/l	OK
Blk 6-12	0.0 ml	100 ml	<0.02			Blk
SPIKE SOLN. (C)	4.0 ml		0.95		SHOULD BE 1.0 mg/l	OK
91760	1.01 gms		<0.02		<20 mg/kg	✓
91774	1.01		<0.02			✓
91775	1.00		<0.02			✓
91776	1.02		<0.02			✓
91777	1.04		<0.02			✓
std	—	—	0.02		0.02 mg/l	STL
91778	1.00 gms	100 ml	<0.02		<2.0 mg/kg	✓
91779	1.03		<0.02			✓
91780	1.02		<0.02			✓
91781	1.02		<0.02			✓
91782	1.02		<0.02			✓
91783	1.03		<0.02			✓
91784	1.04		<0.02			✓
91785	1.01		<0.02			✓
91786	1.01		<0.02			✓
91787	1.02		<0.02			✓
std	—	—	0.02		0.02 mg/l	STL
91788	1.00 gms	100 ml	<0.02		<2.0 mg/kg	✓
91789	1.01		<0.02			✓
91790	1.05		<0.02			✓
91791	1.00		<0.02			✓
91792	1.00		<0.02			✓
91793	1.60		<0.02			✓
91776D	1.02		<0.02			D
91790D	1.05		<0.02			D
91783SP	1.03		≈0.96		93.2 %R = 93.2 / 1+97 (96%)	SP
std 1.0 std	—	—	1.0		1.0 mg/l	STL

Form # 38

F-1738

QC Audit AFC data 6-15-87

Element Cd (RCRA)
Flame type C_2H_2 / AIR
Digestion date 6-7-87
Comments

Analyst DKP
Date 6-12-87
Digestion data Book VII p 29
Instrument 403

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate ABS	Conc. of digestate CONC	Conc. of Sample	✓
0.5% HNO_3 zero std			0.000	0.00	mg/l	STD
std 0.02			0.004	0.02		
std 0.05			0.011	0.05		
std 0.20			0.042	0.20		
std 0.50			0.105	0.50		
std 1.0			0.206	1.00		
CONTROL 58595 (EPIAA)			0.06		SHOULD BE 0.07	OK
DLK 6-9	0.0 ml	100 ml	<0.02		<2.0 mg/kg	BLK
SPIKE SOLN (C)	2.0		0.48		SHOULD BE 0.50	STD
91755	1.00 gms		<0.02		<2.0 mg/kg	✓
91756	1.01		<0.02			✓
91757	1.00		<0.02			✓
91758	1.00		<0.02			✓
91759	1.05		<0.02			✓
std 0.02	—	—	0.02		0.02 mg/l	STD
91761	1.02 gms	100 ml	<0.02		<2.0 mg/kg	✓
91762	1.01		<0.02			✓
91763	1.01		<0.02			✓
91764	1.02		<0.02			✓
91765	1.01		<0.02			✓
91766	1.02		<0.02			✓
91767	1.02		<0.02			✓
91768	1.03		<0.02			✓
91769	1.00		<0.02			✓
91770	1.02		<0.02			✓
std 0.02	—	—	0.02		0.02 mg/l	STD
91771	1.00 gms	100 ml	<0.02		<2.0 mg/kg	✓
91772	1.05		<0.02			✓
91773	1.02		<0.02			✓
91761D	1.02		<0.02			D
91771D	1.04		<0.02			D
91766SP	1.01		0.49		47.5 % R = 47.5 / 49.5 + 1. = 94%	SP
88918	—	—	0.10		100 ug/l	✓
88919	—	—	0.10		100 ug/l	✓
88920	—	—	0.10		100 ug/l	✓
std 0.20	—	—	0.20		0.20 mg/l	STD

Form # 38

QC Audit AFL date 6-16-87

F-1738

Element Cr
Flame Type N_2O
Comments dig - book D p121
5-16-86

Analyst S.J.D
Date 6-10-86
Instrument 403

Sample (Dilution)	Concentration (Dilution factor) abs / conc	✓	Sample (Dilution)	Concentration (Dilution factor)	✓
zero std 0.5% HNO_3	0.000 / 0.0	STD			
std. 0.1 ~~1.0~~	0.002 / 0.1				
std. 0.5 ~~2.0~~	0.010 / 0.5				
std. 2.0 5.0	0.045 / 2.0 0.110 / 5.0				
control I	2.3 / unknown 2.0	OK			
73194	1.9 ave = 1.85	✓	std.		
E 78104	0.9	✓			
E 83659	3.0	✓			
E 83660	4.7	✓			
E 85033	4.1	✓			
~~std.~~ E 85422	3.3	✓			
E 85423	0.2	✓			
E 84396	4.3 (2000) = 8600	✓			
E 84397	0.7 (1000) = 700	✓			
5-16 BLK	0.3	BLK	std. 0.0g	50mL	
STD 1.0	1.0	STD		ave = 23.6	
48684	0.5 ~~ave = 0.5~~	—	1.05g	50mL 23.8 mg/kg	✓
D48684	0.5 ~~RD = 0%~~	~~D~~	1.07g	50mL 23.4 mg/kg	(D)
D 73194	1.8 RD (5.4%) SA = 3.3	(D)		RD = (1.7%)	
~~std.~~ SP85422	4.5 SP = 1.0	(105%)			

QC Audit AFL date 6/18/86

std.

std.

std.

Form #21

F-6297

Element Zn
Flame Type C_2H_2-air
Comments

Analyst AS
Date 9/30/85
Instrument 403

Sample (Dilution)	Concentration (Dilution factor)		✓	Sample (Dilution)	Concentration (Dilution factor)		✓
zero std. 0.5% HNO_3	.000	conc = 0	Std	20306	260	Ave = 260	✓
std. 20	.004	20		bottle 20716	<20		✓
std. 200	.043	210		20717			✓
std. 500	.115	500		20718			✓
2000	.431	2000	✓	bottle 22414			✓
Control T	1070	known 1000	OK	std. 22415			✓
17393	20		✓	22416			✓
18407	<20		✓	22417			✓
18408	<20		✓	Std 200	210		Std
18419	130	Ave = 140	✓	22418	<20		✓
std. 19322	340		✓	22419	<20		✓
(E) 23438	700 x 5 = 3500		✓	22637	180		✓
23439	1500 x 3 = 4500		✓	22638	790		✓
23476	<20		✓	22639	110		✓
24879	1380 x 5 = 6900		✓	std. 23481	100	Ave = 100	✓
24880	1350 x 200 = 270,000		✓	23482	400		✓
Std 500	500		Std	21583	130		✓
(E) 26592	410 x 25 = 10,250		✓	22587	30		✓
26593	620 x 25 = 15,500		✓	24847	210		✓
std. 27934	90		✓	Std 2000	2000		Std
27935	50	Ave = 50	✓	D 18419	140		(D)
27936	~~30~~ 40		✓	D std. 27935	50		(D)
27937	<20		✓	D 20306	260		(D)
27938	<20		✓	D 23481	100		(D)
Son. BLANK	<20		BL	23482 +spike	910	SA 400 SP = 500	101%
19968			✓	22638 +spike	1310	SA 790 SP = 500	102%
19969			✓	(E) 29116	1340 x 25 = 33,500		✓
std. 19970			Std	29118	30		✓
19971			✓	29119	110	Ave = 110	✓
19972			✓	std. 29120	110		✓
Std 20	20		Std	Std 200	210		Std

Form #21

F-6297

Zn 9/30/85

(E) 29121	<20	✓	
29122		✓	
29123		✓	
29124	350	✓	
29125	20	✓	
↓ 29231	110	✓	
D 29119	110	(D)	
29124 spike	860	SA 350 Sp 500	101%

QC Audit AFC date 9/30/85

Element Zn
Flame type Air/C2H2
Digestion date 10/3/85
Comments

Analyst RKD
Date 10/7/85
Digestion data Book II pg 46-7
Instrument

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate (mg/l)	Conc. of Sample	✓
zero std 0.00	mg/l		0.00	Abs = .000	Std
std 0.02			0.02	.007	
std 0.5			0.50	.118	
std 1.0			1.06	.236	
std 2.0			2.01	.448	
Blank	—	50 ml	0.06	—	BLK
29126	1.09 g		1/25 (0.36)25	410 mg/Kg	✓
29127	1.02		(2.18)25	2700	✓
29128	1.08		(0.91)25	1100	✓
29129	1.01		1/10 (1.04)250	13,000	✓
29130	1.07		(1.11)25	1300	✓
29131	1.07		(1.42)25	1700	✓
std 1.0	—	—	1.02	—	Std
29132	1.02	50 ml	1/2 (1.24)2	120 mg/Kg	✓
29133	1.02		1/25 (0.85)25	1080 (AVE 1000)	✓
29133 D	1.06		(0.87)25	1020 1.9% RD	D
29134	1.01		1.22	60	✓
29135	1.09		1/25 (1.89)25	2200	✓
29136	1.22		(0.48)25	490	✓
29137	1.05		1.69	80	✓
29138	1.01		1.06	52.4 (52)	✓
std 2.0	—	—	2.00	—	Std
29138 SP	1.04	50 ml	1.58	SA 52.4 SP 24.0 76.0 99.4%	SP
27160	1.04		1/25 (0.76)25	913 (AVE 920)	✓
27160 D	1.05		(0.78)25	928 1.6% RD	D
27161	1.04		(1.76)25	2120 (2100)	✓
27161 SP	1.01		(1.73)25	SA 2120 SP 2148 2140 0.9% RD	A
27933	10 ml		(0.44)25	55,000 ug/l	✓
27933 SP	1		(0.49)25	SA 55,000 SP 2500 61,200 106%	SP
24881	1.03		1/200 1/35 (0.76)5000	18,000,000 mg/Kg	✓
std 1.0	—	—	1.01	—	Std

Form # 38

F-1738

Flame Type AIR/C2H2
Comments D2 arc

Analyst RKD
Date 10/2/85
Instrument 403

Sample (Dilution)	Concentration (Dilution factor)	✓	Sample (Dilution)	Concentration (Dilution factor)	✓
zero std. 0.0	Abs = .000	Blk			
std. 0.02 mg/l	.005	STD			
std. 0.05	.010				
std. 0.5	.094				
1.0	.181				
Ni Cu 29116	0.31 AVE 320 ug/l	✓	std.		
29118	<0.02 <20 ug/l	✓			
29119		✓			
29120		✓			
29121		✓			
std. 0.5	0.51	STD			
29122	<0.02 <20 ug/l	✓			
29123		✓			
29124		✓			
29125		✓	std.		
29231		✓			
29231 SP	SA 0.01 SP 0.50 0.53 (104%)	SP			
29116 D	0.33 (3.1% RD)	D			
29116 SP	SA 0.32 SP 0.50 0.85 (104%)	SP			
std. 1.0	1.03	STD			
			std.		

QC Audit AFC date 10/4/85

std.

std.

Form #21

F-6297

Element Cd
Flame type Air/C_2H_2
Digestion date 10/3/85
Comments Pz acc.

Analyst RKD
Date 10/4/85
Digestion data RooK I pg 46
Instrument 403

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate (mg/L)	Conc. of Sample	✓
zero std			0.00	0.000	STD
std			0.02	0.003	
std			0.2	0.039	
std			0.5	~~0.100~~ 0.098	
~~std~~			1.0	0.191	
Blank	←	50 ml	<0.02		Blk
29126	1.09 g		0.03	(1.4) mg/Kg	✓
29127	1.02		0.17	8.3	✓
29128	1.08		0.06	2.8	✓
29129	1.01		0.87	43	✓
29130	1.07		0.19	8.9	✓
29131	1.07		0.24	11	✓
std 0.5			0.50		STD
29132	1.02	50 ml	<0.02	<1 mg/Kg	✓
29133	~~1.02~~ 1.06		~~0.06~~ 0.07	3.4	✓
29133 D	1.06		0.07	3.3 AVE 3 3% RD	D
29134	1.01		<0.02	<1	✓
29135	1.09		0.09	4.1	✓
29136	1.22		<0.02	<1	✓
29137	1.05				✓
29138	1.01				✓
std 0.2			0.20		STD
29138 SP	1.04	50 ml	0.48	SA 0.5 SP 24.0 23.1 mg/Kg 94.3%	SP
29581	1.01		½ (0.95)2	94	✓
27160	1.04		<0.02	<1	✓
27160 D	1.05				D
27161	1.04		0.02		✓
27161 SP	1.01		0.50	SA 0.5 SP 24.8 24.8 98.0%	SP
27933	10 ml		<0.02	<0.1 mg/L -<100 ug/L	✓
27933 SP			0.51	SA 50 SP 2500 2550 100%	SP
std 0.5			0.50		Std

Form # 38

F-1738

Element Pb
Flame Type Air / C_2H_2
Comments D_2 arc

Analyst RKD
Date 10/2/85
Instrument 403

Sample (Dilution)	Concentration (Dilution factor)	✓	Sample (Dilution)	Concentration (Dilution factor)	✓
zero std. 0.0	Abs = .000	STD			
std. 0.1 mg/l	.004				
std. 1.0	.021				
std. 5.0	.087				
std 10.0	.172				
Control	1.0 mg/l	CNTRL	std.		
29116	<0.1 mg/l <100 mg/l	✓			
29118		✓			
29119		✓			
29120		✓			
std. 1.0	1.1	STD			
29121	<0.1	✓			
29122		✓			
29123		✓			
29124		✓	std.		
29135		✓			
29231		✓			
29231 SP	SA 0.05 SP 1.0 1.0	95.2% SP			
29116 D	<0.1	0% D			
std. 1.0	1.1	STD			
			std.		

QC Audit AFC date 10/4/85

std.					
			std.		

Form #21

F-6297

Element Pb
Flame type Air/C_2H_2
Digestion date 10/3/85
Comments D_2 acc

Analyst RKD
Date 10/7/85
Digestion data Book I pg 46-7
Instrument 403

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate (mg/L)	Conc. of Sample	✓
zero std			0.0	0.000	Std
std 0.1 mg/L			0.1	0.001	
std 1.0			1.0	0.022	
std 5.0			5.0	0.096	
std 10.0			10.1	0.190	
Blank	—	50 ml	<0.1	—	BLK
29126	1.09 g		0.4	18 mg/Kg	✓
29127	1.02		0.9	44	✓
29128	1.08		1.9	88	✓
29129	1.01		9.4	460	✓
29130	1.07		2.0	93	✓
29131	1.07		6.4	300	✓
std 5.0	—		5.0	—	Std
29132	1.02	50 ml	0.4	20 mg/Kg	✓
29133 S	1.02		3.1	150 AVE: 415	
29133 D	1.06		14.4	680 129%	D
29134	1.01		~~0.3~~ <0.1	<5	✓
29135	1.09		2.2	100	✓
29136	1.22		2.6	82	✓
29137	1.05		0.5	24	✓
29138	1.01		<0.1	<5	✓
std 1.0/5.0	—		0.9/5.0	—	Std
29138 SP	1.04	50 ml	1.0	SA 2.5 SP 48.1 48.1 mg/Kg 95.0%	SP
29531	1.01		2.1	100	✓
27160	1.04		0.8	38.5 AVE 36	✓
27160 D	1.05		0.7	33.3 14.5% RD	D
27161	1.04		1.2	57.7	✓
27161 SP	1.01		2.3	SA 57.7 SP 49.5 114 106%	SP
27933	10 ml		1.0	5000 ug/L	✓
27933 SP	↓		2.0	SA 5000 SP 5000 10,000 100%	SP
std 1.0	—		1.0	—	Std

Form # 38

F-1738

Element Cr
Flame type N_2O / C_2H_2
Digestion date 10/3/85
Comments

Analyst RKD
Date 10/7/85
Digestion data Book II pg 46-47
Instrument 403

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate (mg/l)	Conc. of Sample	✓
zero std			0.0	Abs = .000	Std
std 0.1			—	.002	
std 1.0			1.0	.016	
std 2.0			2.0	.031	
std 5.0			5.0	.076	
Blank	—	50 ml	<0.1	—	Blk
29126	1.09 g		1.2	55 mg/Kg	✓
29127	1.02		4.9	240	✓
29128	1.08		1.5	69	✓
29129	1.01		(0.9)25	1100	✓
29130	1.07		(4.4)2	410	✓
29131	1.07		(3.7)2	350	✓
std 2.0	—	—	2.1	—	Std
29132	1.02	50 ml	(4.2)3	620 mg/Kg	✓
29133	1.02		1/600 1/2 (3.4)	66,700 AVE 65,000	✓
29133 D	1.06		↓ (3.4)	64,200 3.8% RD	D
29134	1.01		- 4.2	210	✓
29185	1.09		1/25 1/2 (3.5) 50	8000	✓
29136	1.22		1/25 (4.8)25	4900	✓
29137	1.05		- 1.8	86	✓
29138	1.01		1.5	74	✓
std 5.0	—	—	5.0	—	Std
29138 SP	1.04	50 ml	2.6	SA 74.2 SP 48.1 125 mg/Kg 102%	SP
27160	1.04		0.8	38.5 AVE 38	✓
27160 D	1.05		0.8	38.1 1.0% RD	D
27161	1.04		0.6	(28.8) 29	✓
27161 SP	1.01		1.7	SA 28.8 SP 49.5 84.2 108%	SP
27933	10 ml		0.5	2500 ug/L	✓
27933 SP	↓		1.5	SA 2500 SP 5000 7500 100%	SP
28481	1.03		1/200 (4.2)200	41,000 mg/Kg	✓
std 2.0	—	—	2.1	—	Std

Form # 38

F-1738

Cr

Flame Type air-C_2H_2

Comments

Analyst NFC

Date 9/30/85

Instrument 360

Sample (Dilution)	Concentration (Dilution factor)	✓	Sample (Dilution)	Concentration (Dilution factor)	✓
zero std. 0.5% HNO_3	ABS = .000 CONC = 0	STD			
std. 0.1 mg/l	= .005 0.1				
std. 0.5	= .030 0.5				
std. 1.0	= .060 1.0				
2.0	= .119 2.0				
5.0	= .272 5.0		std.		
CONTROL I	2.1 KNOWN 2.0 mg/l	OK			
(E) 24880	X11 2.8 ⇒ 31,000 ug/l	✓			
29116	1.0 ⇒ 1000	✓			
29118	<0.1 ⇒ <100	✓			
~~std.~~ 29119	~~X1200~~ X1600 1.6 ⇒ 2,600,000	✓			
29120	~~X1200~~ X1600 1.7 ⇒ 2,700,000	✓			
29121	3.2 ⇒ 3200 AVE	✓			
29122	<0.1 ⇒ <100	✓			
29123	<0.1 ⇒ <100	✓	std.		
29124	~~X1200~~ X1600 2.4 ⇒ 3,800,000	✓			
STD 5.0	5.0	STD			
(E) 29125	1.6 ⇒ 1600 ug/l	✓			
29231	X11 4.6 ⇒ 51,000	✓			
~~std.~~ 29121 D	3.2 ⇒ 3200 ug/l	(D)			
29116 SP	2.1 SP 1.0 (105%) SP 1.0	SP			
STD 2.0	2.0	STD	std.		

QC Audit NFC date 9/30/85

std.

std.

Form #21

F-6297

Date 10-1-85
Analyst AFC
Test CN -

Instrument DU-6
Wave Length 578
Slit Width 2.0 nm
Operation Mode ABS
Cell Size 10 mm

#		Sample #	Volume		Conc or ~~%T~~ ABS	µg ~~mg~~ x factor = mg/L
DST.	1	Undistilled Blank	~~X~~	20ml	0.000	0
1	2	570.80 µg/20ml	~~X~~	5+20	0.139	90
	3	↓	~~X~~	10+20	0.279	40
	4	↓	~~X~~	20ml	0.560	80
1	5	DIST. Blank	500ml MC	20ml	0.007	<5 ÷ 500ml ⇒ <0.01 mg/l BL
2		~~29246~~	500ml		Spilled in Transfer	
3	6	29246 ~~X~~	↓	3.0ml/20ml	0.354	50.64 (20/3) ÷ 500ml ⇒ 0.68 mg/l L
4	7	29117	WET	0.1ml/20ml	0.236	33.79 (20/0.1) ÷ 500ml ⇒ 14 mg/l L
5	8	29126	30.08gm	1.0ml/20ml	0.224	32.07 (20/1) ÷ 24.30 DRY gm ⇒ 26.4 mg/l = 26. L
6	9	29126 SP +1.0ml STOCK	WET 30.12gm	1.0ml/20ml	0.246	35.21 (20/1) ÷ ~~26.75~~ 24.39 DRY gm ⇒ 28.9 SP
11	10	29127	WET 30.858gm	1.0ml/20ml	0.417	59.63 (20/1) ÷ ~~26.67~~ 25.72 DRY gm ⇒ 45. 60.9 L
21	11	29128	WET 30.56gm	50ml/20ml	0.311	44.50 (20/5) ÷ 25.70 DRY gm ⇒ ~~60~~ L
31	12	29131	WET 30.01gm	0.5ml/20ml	0.252	36.07 (20/0.5) ÷ 23.83 DRY gm ⇒ 60.5 AVG 64. L
41	13	29131 D	WET 30.20gm	0.5ml/20ml	0.287	41.07 (20/0.5) ÷ 23.98 DRY gm ⇒ 68.5 12.49 RPD

% Moisture		
29126	19.2%	
29127	12.8%	
29128	15.9%	
29131	20.6%	

$y = 0.007003x - 0.0006$
$r^2 = 0.99999$

SPIKE Calc
29126 SA 26.4
SC 1.6
SA+SP 28.9
R = 103%

QC Audit AFC date 10/10/85

FORM# 22

Element Pb - dig solids
Flame type Air/C_2H_2
Digestion date 10/21/85
Comments D2 arc

Analyst RKP
Date 10/24/85
Digestion data Book IV pg 50
Instrument 403

Sample Number	Amount digested	Final Vol. of digestate	Conc. of digestate mg/l	Conc. of Sample	✓
zero std					Std
std 0 mg/l			0.0	0.000	
std 1			1.0	0.020	
std 5			5.0	0.088	
std 10			10.0	0.181	
Blank	—	50 ml	<1	—	Blk
29133	1.12 g		3.9	174 mg/kg AVE 160	✓
29133 D	1.15		3.6	156 10.9% RD	D
29133 SP	1.00		8.5	SA 165 SP 250 425 102%	SP
				QC Audit AFC date 10/25/85	
std					
std					
std					

Form # 38

F-1738

Element Zn
Flame Type air/C_2H_2
Comments

Analyst DR
Date 4/25/83
Instrument 403

Sample (Dilution)	Concentration (Dilution factor)	✓
0 std. HNO_3 Blk	<20 .000	Std
20 ug/l	20 .005	
200	210 .044	
1000	1010 .216	
Control A	1760 Sa=1740 Rec=101%	
63053	100	✓
63054	210 —	✓
63055	(Y20) 580 x 20 = 11600	✓
63056	(Y2) 820 x 2 = 1640	✓
63057	(Y6) 640 x 6 = 3840	✓
63322	(Y6) 820 x 6 = 4920	✓
63323	(Y10) 560 x 10 = 5600	✓
1000	1010	
63324	(Y10) 840 x 10 = 8400	✓
63034	<20	✓
63047	<20	✓
63413	~~<20~~ 230 —	✓
63414	~~230~~ <20	✓
63415	<20	✓
48545	40	✓
48546	<20	✓
48547	580	✓
48548	60	✓
1000	1010	
48549	30	✓
48550	880	✓
48551	110	✓
48552	<20	✓
48553	950 av=745	✓
48554	<20	✓
48555	<20	✓
48556	(Y3) 650 x 3 = 1950	✓
1000	1010	
48557	680	✓
48558	30	✓
49048	(Y2) 630 x 2 = 1260	✓

Sample (Dilution)	Concentration (Dilution factor)	✓
49049	30	✓
49050	<20	✓
49051	300 —	✓
49052	70	✓
49053	20	✓
50642 ~~49054~~	570	✓
std. 1000	1010	
50643	<20	✓
50644	<20	✓
50645	130 av=135	✓
50646	~~<20~~ 20	✓
50647	20	✓
50648	320	✓
50649	30	✓
50650	<20	✓
50651	50	✓
50652	<20	✓
std. 1000	1010	
50653	<20	✓
63322D	(Y6) 820 x 6 = 4920	D
48547D	580	D
48553D	740 av=745	D
49052D	70	D
50645D	140 av=135	D
63054Sp	Sa=210 420 Sp=200 Rec=(102%)	
63413Sp	Sa=230 430 Sp=~~200~~ Rec=(100%)	
std. 1000	1020	Std
49051Sp	Sa=300 500 Sp=200 Rec=~~100%~~	

QC Audit DM date 4/28/83

std.

#21

F-6297

Date 4-22-83
Analyst AFC
Test Cyanide

Instrument PE HITACHI 200
Wave Length 578 nm
Slit Width 1mm
Operation Mode ABS
Cell Size 10 mm

#	Sample #	Volume	Conc or %T	~~mg~~ µg x factor = mg/L
1	63322	250ml → 200ml → 20ml	MAX	———
2	Blank distilled	500ml → 200 → 20ml	0.004	
3	Blank	undistilled 20ml	0.000	$r^2 = 0.99371$
4	21 µg CN / 200ml		0.154	$y = 0.00605x + 0.017$
5	42 µg		0.290	
6	84 µg		0.513	
~~7~~	~~84 µg~~			
	63322	250 → 200 → 0.5ml	0.988	160 x 4
	63322	↓ ↓ → 5 → 200 .5ml	0.255	39.4 µg ~~x (250 / 20ml) x 1000~~ ~~x 4 x 40~~ = ~~63 mg/L~~

$$\left(\frac{39.4\ \mu g}{200\ ml}\right)\left(\frac{1000}{1\ mg}\right)\left(\frac{200\ ml}{250\ ml}\right) = 252\ mg/L$$

(160 = dilution factor)

QC Audit [redacted] date 4/22/83

NOTE: NOT ENOUGH SAMPLE RECIEVED TO RUN DUPE OR SPIKE.

(x4)(x40)

FORM# 22

F-6055

Date 6/24/81
Analyst LT
Test Cr+6

Instrument PE Hitachi 200
Wave Length 540
Slit Width 1mm
Operation Mode ABS
Cell Size 10mm flow cell

#	Sample #	Volume	Conc of ABS or %T	µg/L (x factor) = mg/L
1	Blank		.000	
2	20 µg/mL std	2 mL	.062	80 µg/L r^2 = .99998
3	↓	4 ↓	.124	160 y = .00076x + .0009
4		6	.183	240
5	↓	8 ↓	.244	320 ↓
6	82122	35mL	.087	green - interference ✓
7	82121	2mL	.041	yellow - interference ✓
8	82123	50 mL	.569	747 µg/L - out of curve range
9	82120	50	.060	yellow - interference ✓
10	82119 -414-497-4054	50mL	.013	(✓positive) 16 ~~320 x 2 = 62 µg/L~~ ✓
11	82298 [redacted]	50	.049	63 µg/L ✓
12	82125 (D)	50mL	.567	744 µg/L out of curve range
13	82298+ [redacted] 4 µg Cr+6	35	.101	132 µg/L ~~Sa = 95/50 x 13 = 11 Sp = 80~~ rec = 106%
14	82122 + ↓	2mL	.040	yellow - interference
15	82123 ↓	25 mL	.299	392 x 2 = 784 µg/L ✓
16	2.0 µg/mL	15mL	.457	600 µg/L
	QC Audit ok'd	init	6/24/81	

FORM# 22

F-6055

1.2M H_2SO_4
5mL color reagent
r reagent has phthalic anhydride

Date 9/23/80
Analyst LT
Test Hex Cr

Instrument PE 200
Wave Length 540 nm
Slit Width 1 nm
Operation Mode %T
Cell Size 10 mm

	Sample #	Volume	Conc or %oT	µg x factor = mg/L
1	5 µg/mL std	1 mL	83	5
2		2	70	10
3		3	59	15
4		4	50	20
5		5	43	25
6		6	37	30
7		7	32	35
8		8	27.5	40
9	↓	9	23.3	45
1	23194	0.1 mL	17	RESET
2	23195	50	97	<1 X20 = <20 ✓
3	23196	50	98	↓ ↓ ✓
4	23197	1.0	64,60	14.5 X 10^3 = 14,500 ✓
5	23198	1.0	44,42	25.5 ↓ = 25,500 ✓
6	23199	0.1	12	RESET
7	23200	1.0	23	44.5 X 10^3 = 44,500 See below
8	23201	0.1	8.8	RESET
9	23202	50 mL	85	4.75 X 20 = 95 ✓
10	23203	50	100	<1 X 20 = <20
11	5 µg/mL std	2	71,70	ok
12	23194D	0.1	15	RESET
13	23202 + 2mL std	25	66,65	12.5 Sa = 2.375 Sp = 10.0 rec = 101%
14	14264	50	99	<1
15	6143	50	99	↓
16	21369	50	98	↓
	RESETS			
	23194	0.02	62	14.5 X 50 X 10^3 = 725,000 ~~700,000~~ ✓
	23199	0.02	57	17 ↓ = 850,000 ~~800,000~~ ✓
	23200	0.1	84	5 X 10 X 10^3 = 50,000 ✓
	23201	0.02	50	21 X 50 X 10^3 = 1,050,000 ✓

QC audit ~~QY~~ date 9/24/80

Element Cd
Flame Type air/C_2H_2
Comments

Analyst DR
Date 9/17/80, 9/23/80
Instrument 403

Sample (Dilution)	Concentration (Dilution factor)		✓
zero std.			
std. HNO_3 Bl	ND	0.00	Std
std. 50	50	.008	
std. 200	100	.035	
1,000	1000	.176	↓
Bl A (dig)	<20		Bl
20671	30 →	1.5 µg/g	✓
20672	<20	<1 µg/g	✓
20673	<20	<1 µg/g	✓
20674	<20	<1 µg/g	✓
5268 dig	40	1.9 µg/g	✓
20671-D dig	30	1.5 µg/g	✓
20674 Sp dig	100	Sa=<20 Sp=100	
std.		rec = 83-100%	
digestion data on p. 1 book II			
QC Audit LY	date 9/18/80		
9/23/80	20 mv		
std zero	ND		Std
std 1	20.5		
std 2	35.5		
std. 4	64		↓
21370	ND	<0.2	✓
OR 22254	3		✓
22266	ND		✓
22300	ND		✓
22301	1		✓
21369	ND		✓
22266 Sp			
+Bl	13	Sa = <0.2	
std. +1	20.5	Sp = 2	
+2	26	Rec =	
+4	39	91-100%	
QC Audit LY	date 9/23/80		

Sample (Dilution)	Concentration (Dilution factor)		✓
std. 0.5	0.50	.118	
std 1.0	0.99	.232	
std 0.02	0.02	.006	
std. zero	0.00	.000	
23184	<0.02		✓
23185			✓
23186	<0.02		✓
23187			✓
23188			✓
23189			✓
23190			✓
23191			✓
23192			✓
23193			✓
std. 0.2	0.19		
23184+Sp 2ml	0.20	Sa=<.02 Sp=0.2 rec=91-100%	
23186(½)+Sp	0.1	Sa=<.01 Sp=0.1 rec=91-100%	
23190+Sp	0.09	Sa=<0.02 Sp=0.1 rec=75-90%	
QC Audit LY	date 9/25/80		
std.			

Element Pb
Flame Type air/C_2H_2
Comments 217 λ
fairly noisy today

DK
9/17/80
403

Sample (Dilution)	Concentration (Dilution factor)		✓	Sample (Dilution)	Concentration (Dilution factor)	✓
zero std.						
std. HNO_3 Bl	<100	0.00 .001	std	23188	<0.1	✓
std. 100	100	~~.002~~		23189	0.15	✓
std. 200	200	.003		23190	<0.1	✓
1000	1000	.016		23191	0.2	✓
Bl A(dig)	<100			23192	<0.1	✓
20671 1/3	1.0 x 1/3 = 3 = 3000 µg/l			std. 23193	<0.1	✓
20672	0.5 = 500			0.4	0.38	
20673	0.4 = 400			23186D	0.35	D
20674	0.5 = 500			23186(½)+Sp	0.55 Sa=.175 Sp=0.5 rec=81%	
5268	0.18 = 180			23190+Sp	0.5 Sa=<0.1 Sp=0.5 rec=100%	
20671D 1/3 1/4	0.85 x 1/4 = 3.4 = 3400			23184+Sp 2mL	1.0 Sa=0.1 Sp=1.0 rec=91%	
20674 Sp	1.0					
std.	see below			Spike sol'n 1mL/25	1.0	
	digestion data on p.1 book IV			~~Recd 2 3186 duplicate~~		
20671	150 µg/g Av=160		✓			
20672	25 µg/g		✓	QC Audit KY date 9/25/80		
20673	20 µg/g		✓	std.		
20674	25 µg/g		✓			
5268	8.6 µg/g		—			
20671D dig	170 µg/g	±8.8%	D dig			
20674 Sp dig	Sa=510 Sp=600 rec=90%					
std.						
QC Audit KY date 9/17/80						
9/24/80 LT				std.		
403 Air/C_2H_2						
Std 1.0	1.0	.009				
std 0.4	0.4	.004				
std 0.1	0.1	.002				
std zero	.05	.000				
std 23184	0.1		✓			
23185	<0.1		✓			
23186	0.35		✓			
23187	0.1		✓	std.		

Element Cr
Flame Type Air/C_2H_2
Comments

Analyst LT
Date 9/24/80
Instrument 403

Sample (Dilution)	Concentration (Dilution factor)	✓	Sample (Dilution)	Concentration (Dilution factor)	✓
zero-std.	0 ,000				
std. 1.0 mg/L	1.00 .033				
std. 5.0 |	5.00 .165				
std. 0.1 ↓	0.1 ,003				
23184 (1/200)	3.5 x200 = 700	✓			
23185	0.3	✓	std.		
23186	1.1	✓			
23187 (1/5)	3.0 x 5 = 15	✓			
23188 (1/10)	3.1 x10 = 31	✓			
23189 (1/200)	4.05 x200 = 810	✓			
23190 (1/25)	2.05 x25 = 51	✓			
23191 (1/500)	2.1 x500 = 1050	✓			
std. 1.0	1.05				
23192	0.16	✓			
23193	<0.1	✓			
Hex Cr std (5 ppm)	4.93 .986	—			
23184 (1/200) D	3.5 x200 = 700	D	std.		
23186 (1/2) D	.54 x2 = 1.08	D			
23186 (1/2) + Sp	1.03 Sa=.54 Sp=0.6 rec=90%				
23187 (1/5) D	3.1 x 5 = 15.5				
CC std: KY Date: 9/24/80					
std.					
			std.		
std.					
			std.		

Date 2/14/80 - 2/15/80
Analyst LT
Test Cyanide

Instrument PE Hitachi 200
Wave Length 578 nm
Slit Width 1 nm
Operation Mode %T
Cell Size 10 mm

#	Sample #	Volume		Conc or %T	mg x factor = mg/L
	56326	500	5	28.2	} rerun color rx
	56326 D	400	5	26.2	
	56327	500	20	37.0	.0565 x 2 = 0.113
	56327 + 17.7 µg Spike	400	20	28.6	rerun color rx
	std 22,125 µg			67.9	
	44.25 µg			46.2	
	66.375 µg			30.9	
	56326	500	2	61.5	.0275 x 10 x 2 = 0.55 } Av = 0.64 ✓
	56326	400	2	59.3	.0295 x 10 x 2.5 = 0.74 } D
	56327	500	20	37.2	.0565 x 2 = 0.113 ✓
	56327 + 17.7 µg Spike	400	10	53.0	.036 Sa = ~~.085~~ .0226 Sp = .00885

rec = 114%

QC Audit BJS date 2/19/80

Note: $MgCl_2$ was used as a catalyst rather than CuCl. $MgCl_2$ will be used henceforward (see EPA manual)

Element Zn
Flame Type Air/C_2H_2
Comments

Analyst DK + LT
Date 2/5/80 + 2/15/80
Instrument 403

Sample (Dilution)	Concentration (Dilution factor)	✓	Sample (Dilution)	Concentration (Dilution factor)	✓
zero std. HCl Bl	ND Abs	Std	2/5/80	LT	
std. 20	20 .005				
std. 500	510 .128		std 1.0 mg/l	0.98 .277	
std. 1000	1000 .252	↓	std .20	0.20 .057	
45731 ½	850 X 2 = 1700	✓	std 0.02	0.03 .007	
51196	dig?		std blank 0.5% HCl	0.01 .002	
51197			std. dig bl	0.06	
51404 Bl •	40	✓	10 ml/50 51196 dig (1/20)	0.82 x 20 x 5 = 82	
51405	40	✓	10 ml/50 ml 51196 D dig (1/20)	0.66 x 20 x 5 = 66	
51406	70	✓	2/18/80	LT	
51407	40	✓	std 1.0 mg/l	0.98 .275	
51408	60	✓	std 0.5	0.51 .142	
~~51409~~			std 0.02	0.03 .007	
std. 500	510	Std	std 0.5% HCl blank	0.01 .001	
~~51410~~			dig bl	0.07	
51409	40	✓	56326 (HNO_3) (1/100)	0.56 x100 Av = ~~55.75~~	✓
51410	<20	✓	↓ (HCl)	0.57 x100 1.7% dig D	
51411	60	✓	std 56327 (HNO_3)	0.50 x100 Av = 49	✓
51412	70	✓	↓ (HCl)	0.48 x100 2% dig D	
51413	70	✓	56328 (HNO_3) (1/10)	0.79 x 10 Av = 8.1	✓ dig D
51414	80	✓	↓ (HCl)	0.83 x 10 3.5% dig D	
51415 ↓	40	✓	10 ml/50 51196 (1/50)	0.33 x 50 x 5 = 82.5	✓
51468	30	✓	51197	1.12	reset dig D
51717	30	✓	10 ml/50 51196 dig D (1/50)	0.33 x 50 x 5 = 82.5	I dig P dig D
std. 500	510	Std	56326 HNO_3 spike (1/100)	0.55 Sp = .002	
53483 ½	800 X 2 = 1600	✓	56326 HCl spike (1/100)	0.55 nearly on duplicates	
53484	100 see dupes		std. 0.5	0.50	
Sonifier Bl •	<20	Bl	51197 (1/3)	0.38 x 3 = 1.14	✓
51408-D	60	D			
51408-Sp	260 Sa = 60 Sp = 200	Rec = 100%			
53484-D	90	D			
53484-D	90		QC Audit DJ date 2/18/80		
std. QC Audit DJ date 2/6/80					
			std.		

Element Pb
Flame Type Air/C_2H_2
Comments D, arc

Analyst LT
Date 2/1/80
Instrument 403

Sample (Dilution)	Concentration (Dilution factor)	✓	Sample (Dilution)	Concentration (Dilution factor)	✓
zero std.	0.0 .000				
std. 2.0	2.0 .048				
std. 0.4	0.4 .004				
std. 0.1	0.1 .001				
dig bl. G	0.0	—			
53547 (x2)	0.3 (x½) = 0.15 Av=125	✓			
53547 dig D	0.1 D	±23%	std.		
53547 dig Sp	1.1 Sa=0.125 Sp=1.0 rec=98%				
QC Audit KG date 2/4/80					
2/18/80					
std 2.0	2.0 .018				
std 0.4	0.4 .004				
std 0.1	0.1 .001		std.		
std bl. 1% HNO_3	0.0 .000				
dig bl	<0.1				
56326 (HNO_3)	2.4 Av = 2.4	✓			
↓ (HCl)	2.5 ±7.8%	dig D			
56327 (HNO_3)	0.4 Av=0.4	✓			
56327 (HCl)	0.4 ±16%	dig D			
std. 5.0	5.0 .042	—			
56328 (HNO_3)	0.25 Av=0.2	✓			
↓ (HCl)	0.2 ±16%	dig D	std.		
10 mL/50 mL 51196	4.4 X 5 = 22	✓			
51197	0.4	✓			
10 mL/50 mL 51196 dig D	4.4 X 5 = 22 ±0	dig D			
56326 HNO3 spike	2.6 Sa=2.4 Sp=0.5 rec=90%	dig spike			
56326 HCl spike	2.5 (no Pb in spike)	dig D			
std. 5.0	5.0				
QC Audit KG date 2/18/80					
			std.		

Element Cr
Flame Type N_2O/C_2H_2
Comments

Analyst LT
Date 2/1/80
Instrument 403

Sample (Dilution)	Concentration (Dilution factor)		✓
zero std.	.00	.001	
std. 1.0	1.03	.026	
std. 0.5	0.49	.013	
std. 0.1	0.12	.002	
dig bl. G	0.00		
43081	<0.1		—
43081 dig D	<0.1		D
43083	0.1		✓
43083 dig D (x2)	0.2 (x½) = 0.1		D
43084	0.1		✓
43084 dig D (x2)	0.1		D
53547 (x2)	0.3 ÷ 2 = 0.15		✓
53547 dig D	0.15		D
std. 0.5	0.51		
53547 dig sp	1.3	Sa=1.0 Sp=0.15 (Rec= 113%)	
53547 undig.	0.3		
std 5.0	5.00	.121	

QC Audit LY date 2/4/80

2/18/80

Sample (Dilution)	Concentration (Dilution factor)		✓
std 0.1	0.1	.002	
std. 0.5	0.5	.0115	
std 1.0	1.0	.023	
std blank	0.0	.000	
dig bl	<0.1		
56326 (HNO_3)	0.45	Av= .47	✓
(HCl)	0.49	±4.5%	dig D
56327 (HNO_3)	0.69	Av= 0.64	✓
(HCl)	0.59	±11%	dig D
56328 (HNO_3)	<0.1 (.07?)		✓
std. 1.0	1.01		
56328 (HCl)	<0.1 (0.05?)		dig D
10ml/6ml 51196 (1/20)	0.80 x20x5 = 80	} see	
51196 dig D (1/20)	0.65 x20x5 = 65	} below	
51197	0.82		✓

Sample (Dilution)	Concentration (Dilution factor)		✓
1ml/50 51196 (1/50)	0.30 x50x5 = 75		✓
51196 dig D (1/50)	0.30 x50x5 = 75		dig D
56326 dig HNO_3 spike	1.00	Sa= .47 Sp= 0.5 (rec= 103%)	dig sp.
56326 dig HCl spike	0.48	no Cr in spike	dig D
std. 0.50	0.51		

QC Audit LY date 2/18/80

std.

std.

std.

Element Cd
Flame Type Air / C_2H_2
Comments D_2 arc

Analyst LT
Date 2/1/80 & 2/18/80
Instrument 403

Sample (Dilution)	Concentration (Dilution factor)		✓
zero std.	0.0	.006	
std. .02	.02	.004	
std. .05	.05	.010	
std. 0.2	.20	.042	
std 1.0	1.00	.216	
dig bl. G	.00		—
43081	<.02		—
43081 dig D	↓		—
43083			✓
43083 dig D			—
43084			—
43084 dig D	↓		—
53547 (X2)	0.05 (X ½) = 0.025	Av=22.5	✓
std. 0.2	0.20		
53547 dig D	0.02		D±16%
53547 dig Sp	0.22	Sa=.0225 Sp=0.2 rec = 99%	
QC Audit [initials] date 2/4/80			
2/18/80 LT			
std. 1.0	1.00	.195	
std 0.5	0.49	.098	
std 0.02	0.02	.003	
std 1% HNO_3	.00	.000	
dig bl	<.02		—
56326 (HNO_3)	0.05		✓
56326 (HCl)	0.05	±0	dig D
56327 (HNO_3)	0.02		✓
56327 (HCl)	0.02	±0	dig D
std. 0.50	0.50		—
56328 (HNO_3)	<0.02		✓
56328 (HCl)	<0.02		D
10 ml/50 51196	0.17 X5 = .85		✓
51197	<0.02		—

Sample (Dilution)	Concentration (Dilution factor)	✓
10 ml/50 51196 dig D	0.17 X 5 = 0.85	dig D ±0
56326 HNO_3 spike	0.14 Sa=.05 Sp=0.1 rec = 93%	
56326 HCl spike	0.05 No Cd in spike	dig D ±0
std 0.50	0.48	
~~std~~		
QC Audit [initials] date ~~2/18/80~~		
std.		
std.		
std.		

Date 9/6/79
Analyst LT
Test Nox Cr

Instrument Hitachi 200
Wave Length 540 nm
Slit Width 1 nm
Operation Mode % T
Cell Size 10 mm

Sample #	Volume	Conc or %oT	mg x factor = mg/L
5 ppm std	1 ml	84	
↓	3 ml	60	
	6 ml	37.7	
↓	10 ml	21.7	
17420	50 ml	97	<.001 x 20 = <.02 ✓negative (interference)
19526	50 ml	99.5	<.001 ↓ = <.02 ✓positive ✓
15712	2 ml	RESET - TOO HIGH	
20795	50 ml	94.3	.0015 x 20 = .03 ✓
20794	2 ml	RESET - TOO HIGH	
20793	4 ml	↓	↓
20792	2 ml	↓	↓
20610	50 ml	98.6	<.001 x 20 = <0.02 ✓positive ✓
19526+ 5 ml std	45	43.1	.026 Sa=<.001 Sp=.025 rec = 100 → 104%
std	3 ml	60.1	
15712	0.1 ml	49.9	.0215 x 10^4 = 215 210 ✓
20792	↓	35.7	.0315 ↓ = 315 320 ✓
20793	↓	78.3	.0075 ↓ = 75 20 ✓
20794	↓	41.6	.027 ↓ = 270 ✓
20795D	50 ml	94.2	.0015 x 20 = .03 D

Element Cr
Char 1350/20sec Atomize 2700/12sec
Recorder Scale TC2 x 10mV
Comments

Analyst LT
Date 9/24/79
Instrument 360
Standard Volume 50µl

Sample (Dilution)	Peak height	Concentration (Dilution factor)	✓
zero std.	1		
std. 10	17		
std. 20	33		
std. 40	58.5		
21948 360 portion	32.5	20	
21948 +0	15	20	
+10	21		
+20	28		
+40	39.5		
21949 360 portion	54	35	
21949 (½) +0	23	33	
+10	30		
+20	37		
std. +40	48		
Std 20	33		
blank for 21948 + 21949	ND	<3	
20610	40.5	26	
20599	6	3	
23545	1	<3	
20608	1		
20609	1		
22732	2		
22733	2		
22734	54	35 Av = 34	
std. 10	18		
Hipure HNO_3 6% lot 66758	3	<3	
25385	3		
25383	1		
25384	1		
25382	3		
25622	1		
24946	1		
25378	1		
25379	1		
std. 20	34		
9/25/79 cont'd			
zero	3		
std 10	19		
std 20	35		

Sample (Dilution)	Peak height	Concentration (Dilution factor)	✓
std 40	68		
25380	3	<3	
25381	2		
25865	17 ~~58.5~~	9	
21734 D 503 portion	58.5	34	D ± 3.8%
std. 21949 D	64	38	D ± 3.8%
25380 + Sp A + 0	23	29	Sa = <3 Sp = 30
+10	28.5		
+20	37		
+40	53.5		Rec = 88-97%
Std 40	68		
360 portion 21949	63	37	D 3.9%
QC Audit 9/25/79 date KY			
std.			
std.			

Element Cr
Flame Type N_2O/C_2H_2
Comments

Analyst LT
Date 9/10/79 & 10/29/79
Instrument 403

Sample (Dilution)	Concentration (Dilution factor)	✓	Sample (Dilution)	Concentration (Dilution factor)	✓
zero std. 1% HNO_3	0.0 .00				
std. 1.0	1.00 .021				
std. 5.0	5.0 .105				
std. 10.0	10.0 .209				
15712 (1/50)	4.2 x50 = 210	✓			
20793 (1/50)	1.45 = 72.5	✓			
20794 (1/50)	5.6 = 280	✓	std.		
20792 (1/50)	6.6 = 330	✓			
15712 (1/50) D	4.2 = 210	D			
20793 (1/50) + Sp	1.95 sa = 1.45 Sp = 0.5 rec = 100%				
std 0.1	0.11 .002				
std 0.5	0.48 .0105				
23545	<0.1				
20610	<0.1				
20795	0.2	✓			
20795 + Sp	0.70 sa = 0.2 Sp = 0.5 rec = 100%				
std 1.0	1.00				
15216 (3/10)	$4.05 \times 10/3 \times \frac{.105\ell}{1.05g} = .64\ mg/g$	✓	std.		
dig bl	0.00				
QC LJ	date 9/10/79				
std 0.1	0.1 .002				
std 0.5	0.5 .011				
std. 1.0	1.0 .021				
std zero	0.0 .000				
dig bl T	<0.1		std.		
25875	0.6 → 28 µg/g	reset to wonder			
25875 dig D	0.4 → 20 µg/g				
35479	0.4 → 20 µg/g	✓			
35476	0.5 → 20 µg/g	✓			
35480	0.6 → 23 µg/g	✓			
35478	0.45 → 23 µg/g	✓			
bdl 35477	<0.1 → <100 µg/ℓ	✓			
35474	0.3 → 14 µg/g	✓ 13.10			
35478 dig D	0.5 → 22 µg/g	dig			
35478 dig Sp	1.0 sa = 0.4 Sp = 0.5 rec = 111%		std.		
std 0.5	0.5				

QC Audit LJ date 10/30/79