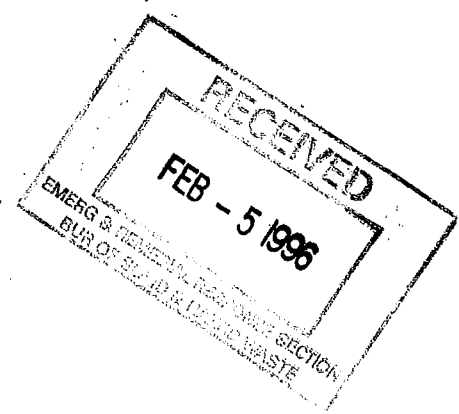




**INTERNATIONAL
TECHNOLOGY
CORPORATION**



February 1, 1996

Mr. Paul Kozel
Wisconsin Dept. of Natural Resources
SW/3-GEF2
101 South Webster Street
Madison, WI 53707

CONTRACT: DACW45-94-D-0054; Delivery Order No. 06; Oconomowoc Electroplating Plant Phase III; Ashippun, WI

SUBJECT: Transmittal of the Revised Final Report; Phase III

Dear Mr. Kozel:

In compliance with the requirements of the contract, enclosed is the revised Closure Report with comments being addressed. In attempts to save government funds, only the first volume of the closure report was reprinted. The additional volumes shall stay the same with the exception of the covers. You will find additional covers for the completed closure reports. Note: existing Volume One shall be revised Volume Two; existing Volume Two will be revised Volume Three, etc. The figures included in the original draft form did not change, therefore, please remove the folded drawing from the sleeves in the initial draft form and replace them in the sleeves of the revised final report.

If you have any questions, or further comments, please call me at (412) 372-7701 ext. 2592.

Sincerely,
IT Corporation

John Kauth
Project Manager

JK/bjs

enclosures

cc: Tom Marti
Al Myers

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List of Acronyms

<i>Acronym</i>	<i>Title</i>
CAD	computer-aided drafting
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
ERT	U.S. Environmental Response Team
FIT	Field Investigation Team
HAZMAT	hazardous material
HSWA	Hazardous and Solid Waste Amendments
IT	IT Corporation
mg/kg	milligrams per kilogram
ND	nondetect
OEC	Oconomowoc Electroplating Company Inc.
ppm	parts per million
PRP	Potentially Responsible Party
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
TAT	Treatment, Storage or Disposal
TCL	total compound list
TCLP	toxicity characteristic leaching procedure
TSD	Treatment, Storage or Disposal
USACE	U.S. Army Corps of Engineers
WDNR	Wisconsin Department of Nature Resources
WGNHS	Wisconsin Geological and Natural History Survey
WPDES	Wisconsin Pollution Discharge Elimination System

Executive Summary

This final report has been prepared by IT Corporation (IT) for the U.S. Army Corps of Engineers (USACE), Omaha District on behalf of the U.S. Environmental Protection Agency (EPA) Region V. This report presents a summary of activities for the Oconomowoc Electroplating Facility, Contract number DACW45-94-D-0054, Delivery Order Number 06, Ashippun, Wisconsin from March 6, 1995, to April 9, 1995, and June 2, 1995, to June 16, 1995.

Phase III activities were performed using conventional excavation methods. This scheme became necessary when dredging operations, performed during Phase II, were inadequate. Conventional excavation was performed throughout the project site utilizing swamp mats. A new IT field management team was assigned to complete Phase III.

All analytical results indicated that collected samples were below appropriate levels with the exception of the following four samples at the central section of Davy Creek: Sample OS 516, at station 136, sample grid 5269, which was above ecological limits for nickel (61.4 mg/kg); sample OS 512 at station 134, sample grid 5287, which was above ecological limits for nickel (85.7 mg/kg); sample OS 325 at station 132, sample grid 5425, which was above ecological limits for nickel (122 mg/kg); and sample OS 324 at station 131, sample grid 5426, which was above ecological limits for nickel (134 mg/kg), and copper (154 mg/kg). These results were reviewed by the USACE, and EPA officials, who determined that since these levels are only slightly above desired levels it would not be necessary to excavate further.

Additional work conducted during Phase III which was not addressed in the Phase III work plan included the following:

- A french drain was installed approximately 100 ft from and parallel to Elm Street in the wetlands. This work was originally scheduled for Phase II.
- An earthen dam constructed during Phase II operations at Lincoln Bridge was removed to allow free flow through Davy Creek.
- Paving and sod work was performed at Firemen's Park at the direction of the USACE.

- Mobilized Louisiana swamp mats, and conventional excavating equipment to the site.
- Created a sediment collection pond at the westernmost boundary of the site (near Fireman's Park).
- Loaded and disposed of the vegetation/sediments which remained on the asphalt pad from Phase II operations.
- Conventionally excavated the entire length of Davy Creek, and the wetlands. Material was stabilized, loaded directly into dump trailers, and transported to EnviroSAFE's treatment facility in Oregon, Ohio.
- Collected samples from select locations to verify progress, and confirm clean areas.
- Placed backfill (with Palms Series material) in select locations within the wetlands, and along the creek banks to restore the natural contour of the site.
- Removed and disposed of all temporary gravel roadways (approximately 19,000 tons), and restored the wetlands to near pre-remedial condition. The gravel was donated to local businesses, who provided off-site transportation.
- Installed the wetlands wells, and well pads.
- Performed an inventory of Phase I and II government property, and shipped material to IT's storage yard in Minden, Louisiana. The material was eventually bought by IT Corporation, after bids from outside vendors were determined to be insignificant.
- Excavated 3,440 cu. yd of materials from Davy Creek and wetlands.
- Transported and disposed of 3,440 cu. yd. of material and 1,870 cu. yd of kiln dust to EnviroSAFE Services in Thornsberg, Ohio.
- Removed over 6,000 LF of turbidity boom and miscellaneous debris from Davy Creek and wetlands.
- Dismantled all temporary structures, and demobilized all site equipment and materials.
- Restored the site by dressing and turbing all areas which were disturbed during project activities. Asphalt was replaced on the damaged portion of Elm Street, and in areas around Fireman's Park.

- Final drawings were provided by R.A. Smith, inc. upon completion of project activities.

Phase III activities were performed during the period of March 6 through June 16, 1995 in compliance with the Final Work Plan dated March 1995. Phase III was an extension of Phase II, and therefore, was also performed as part of Delivery Order No. 06. Modification P00002 in the amount of \$95,000, P00003 in the amount of \$2,999,885, and P00004 in the amount of \$75,000 were issued to finance Phase III operations. As a result, delivery Order No. 06 totaled \$7,275,472. The total funding awarded to the project including Delivery Order 91, Delivery Order 06 and all seven modifications amounted to \$11,190,895.

Section 1.0 of This report discusses the site history; Section 2.0 summarizes Phase III project activities including mobilization and site preparation, stone filtration dike and peak berm barrier construction, the excavation of Davy Creek and affected wetlands, material transport and disposal, discharge pipe and well pad installation, access road removal, site restoration and demobilization. Section 3 summarizes sampling and analytical with Section 4 discussing lessons learned and Section 5 providing conclusions.

1.0 Introduction

1.1 Site Background/History

Site History. Electroplating processes performed at Oconomowoc Electroplating Company Inc. (OEC) used nickel, chrome, zinc, copper, brass, vanadium, and tin. Finishing processes had included chromate conversion, coating, and anodizing. Spent process solutions, the drag-out of various processing baths into subsequent rinses, accidental spills, leaks, plating tanks filter systems, and sludge from the bottom of plating baths all contributed to the waste stream.

Waste waters formerly generated at the OEC facility can be divided into three categories: 1) cyanide-bearing; 2) chromium-bearing; and 3) acid-alkaline. Tin plating was suspended at the facility in 1981, and chromium, copper, and nickel plating in 1982. Plating of cadmium ceased in 1984, and cyanide plating in 1985. Zinc plating was ceased when the facility closed.

In conjunction with the electroplating process, degreasing operations were also performed at the OEC facility and contributed to the waste stream. A number of volatile organic compounds are believed to have been used by OEC and include chloroform, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, tetrachloroethylene, 1,1,1-trichloroethane, and trichloroethylene. These contaminants become incorporated in both sludge bottoms and wastewater streams.

In 1972, OEC constructed two unlined settling lagoons to supplement their wastewater treatment system. Each lagoon was 60 feet long by 40 feet wide with a sidewall depth of 5 feet. The walls were concrete on two sides and sloped gravel on the others. There was a concrete divider running lengthwise between the two lagoons. Over the years, both lagoons accumulated large volumes of plating sludge. Untreated plating sludge overflowed the settling lagoons and accumulated in the wetlands between the OEC site and Davy Creek, which is also known as Davy Creek wetlands.

Prior to 1972, untreated wastewaters were discharged directly into the wetland area south of the OEC property. In November 1973, after installation of a wastewater treatment system, a Wisconsin Pollution Discharge Elimination System (WPDES) Permit was issued for discharging treated wastewater to the creek. Spills from the wastewater treatment unit are well documented in the Wisconsin Department of Nature Resources' (WDNR) files. In August 1978, OEC was denied a WPDES Permit by the WDNR; however, since the facility appealed the permit denial, it was still operational.

In 1979, the effects of the wastewater discharge and sludge overflow were investigated by the Solid Waste Management Division of the WDNR. Analytical results of stream sediment samples collected from Davy Creek downstream of the OEC's discharge point confirmed the presence of high concentrations of heavy metals specifically cadmium, chromium, copper, and nickel. An analysis of surface soil samples collected from the wetlands area adjacent to the facility showed comparable concentrations of metals.

In 1980, OEC contracted with Waste Management, Inc. to remove the lagoons' sludge. Approximately one million pounds of sludge were removed and disposed. However, OEC did not have sufficient funds to complete the job. These lagoons were approximately one-third full of electroplating sludge. Because this sludge was wastewater treatment sludge from

electroplating operations, it was defined as listed hazardous waste (F006) by the Resource Conservation and Recovery Act (RCRA) 40 Code of Federal Regulations (CFR) part 261 subpart D-261.31.

In 1981, the WDNR inspection documented that OEC was violating the 90-day storage limit for hazardous wastes under RCRA. Although some corrective actions were taken, they were not sufficient to ameliorate the violation.

OEC was subject to regulations under RCRA for the generation and storage of hazardous waste (electroplating sludge - F006; spent halogenated solvents - F002). In addition, the two wastewater lagoons which contained the F006 wastes were hazardous waste surface impoundments which are defined as land disposal units under RCRA. On July 22, 1980, OEC submitted a RCRA notification to EPA as a hazardous waste generator. OEC did not submit a RCRA Part A application or state permit application for interim status as a Treatment, Storage or Disposal (TSD) facility. At that time, OEC was storing the hazardous waste described above in containers and using a surface impoundment. Therefore, OEC never received interim status as a storage or disposal facility under RCRA, nor did they receive an interim license for WDNR for those activities. Since the use of the surface impoundments was in violation of RCRA requirements, the WDNR required closure of these lagoons. On December 8, 1988, the WDNR issued a conditional closure plan approval for the lagoons. This approval required OEC to clean close these lagoons in accordance with state RCRA requirements by March 1989. Since OEC did not attain clean closure of the lagoons, the approval required RCRA closure of wastes in-place and long-term care requirements be met. OEC never closed the lagoons.

The state of Wisconsin filed suit against OEC in 1981 for alleged violations of the WPDES discharge permit. A guilty decision against OEC was entered in the Dodge County Circuit Court in March 1981, but OEC continued operating its discharge system. Subsequently, in April 1982, the state moved for a remedial sanctions against OEC for contempt of court. After a hearing on May 10, 1982, OEC was ordered to cease discharges. The case was finally settled by stipulation and OEC was fined \$47,000. OEC was involved in additional lawsuits because of WPDES permit and RCRA violations.

In 1983, in order to alleviate the local flooding problem, the Dodge County Drainage Board proposed to dredge and rechannel a 5,000-foot stretch of the Davy Creek near the OEC facility.

However, the EPA and the USACE disapproved the dredging proposal because they believed that dredging would increase the migration of contaminated sediments from the wetlands into the Rock River.

A Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) preliminary assessment was performed in May 1983 by the EPA Field Investigation Team (FIT). The site (including the Davy Creek wetlands) received an HRS score of 31.86 and was placed on the National Priorities List. By letter dated September 18, 1985, the EPA notified OEC that they had been identified as a Potentially Responsible Party (PRP) under CERCLA for the documented release or threatened release of hazardous substances. No other responsible parties were named. On October 9, 1985, OEC informed the EPA that they did not have the financial resources to conduct a remedial investigation/feasibility study (RI/FS) and formally declined to participate in the CERCLA process.

Between 1983 and 1987, the WDNR sampled residential wells in the area on seven different occasions. In 1985, three shallow monitoring wells were installed by the Wisconsin Geological and Natural History Survey (WGNHS), two near the lagoons and one southeast of the site on the Town Garage property. Sampling efforts indicated elevated concentrations of cadmium, nickel, and zinc, and revealed the presence of 1,1-dichloroethane, 1,1,1-trichloroethane, and trichloroethylene.

In December 1985, the WDNR performed a Hazardous and Solid Waste Amendments (HSWA) initial screening, and in March 1986, they prepared the Facility Management Plan and the Site Investigation Report. In the course of their investigations, the WDNR Horicon Area office received an anonymous report of cyanide-filled drums buried on the OEC property 11 to 12 years previously (1972- 1973). In October 1984, two test pits were dug following an investigation with a metal detector. Badly deteriorated sheet metal, metal scrap, and 1/4-inch metal wire was found in Test Pit 1, and sheet metal was found in Test Pit 2.

On April 8, 1986, a WDNR inspection reported that OEC was using wastewater treatment sludge, a listed hazardous waste (F006) under RCRA, to seal the space between the floor and walls of the wastewater treatment building. This sludge spread out of the building and into the adjacent area. Dead and stressed vegetation was observed around the building. Additionally, an uncovered container full of electroplating sludge overflowed when snow and rain water

accumulated within the container causing it to spill on the ground. WDNR stated that OEC did not report the spill or properly clean up the area. Some soil material was removed from the perimeter of the foundation and a new curb installed inside the building.

On June 10, 1986, OEC reported that about 10 cubic yards of sludge had been spilled onto the ground at the north lot. A month later, on July 14, 1986, the electroplating sludge waste containers were observed leaking by WDNR staff, violating state and federal hazardous waste storage and transportation regulations. The spill has remained on the ground around the containers.

During the summer of 1986, the Technical Assistance Team (TAT), a contractor to the EPA Emergency Response Section, conducted a limited sediment sampling survey in the wetlands. The analytical results of these samples indicated high concentrations of metal and cyanide in the wetlands area immediately south of OEC. In March and April of 1987, the TAT conducted an extensive sampling program which covered approximately 300 acres of wetlands along Davy Creek. This program also included sampling of the OEC sludge lagoons and soils at the ballpark located southeast of OEC. The analytical results indicated that approximately 75,000 square feet of the wetlands adjacent to OEC was contaminated with metals and cyanide associated with facility's electroplating process.

In early December 1987, the U.S. Environmental Response Team (ERT) conducted a toxicity investigation in the wetlands south of the OEC site to determine if the contaminated sediments from the wetlands are toxic to aquatic organisms. The analytical results indicated severe metals and cyanide contamination of the sediments in the wetlands. As a result, the sediments from several locations were considered as being highly toxic. The toxicity data collected showed conclusively that the contamination in the wetlands was toxic to fathead minnows and algae.

CERCLA Enforcement. After OEC declined to participate in the RI/FS, the EPA decided to use federal funds to perform the RI/FS due to OEC's refusal to participate. The EPA contracted with EBASCO, Inc. to perform the RI/FS on December 30, 1987, under contract number 68-01-7251, work assignment number 211-5LM8. The EPA erected a partial fence along Elm Street to minimize access to these wetland areas, also around the wastewater treatment lagoons (to the southwest) and the drum storage facility (to the northwest).

A letter was sent to the chairman of OEC on July 30, 1990 pursuant to Section 122(a) of CERCLA via certified mail informing OEC that work would be undertaken by EPA pursuant to Section 104(a) of CERCLA because OEC appeared to lack the resources to conduct the remedial design and implement the remedial action. On July 27, 1990, EPA filed a complaint in civil court against OEC for past costs associated with the RI/FS, construction of the fence as described above, and future costs for design and implementation of the remedial action along with violations of the Clean Water Act.

Location. The OEC encompasses an inactive electroplating facility located at 2572 West Oak Street, Ashippun, Wisconsin, and the adjacent wetlands area located to the southwest. The cities of Oconomowoc and Watertown are approximately 8 miles south and 10 miles west of the site, respectively. Milwaukee lies approximately 35 miles to the southeast. The OEC site occupies approximately 10.5 acres of which 5 acres are the OEC facility. The site is in the northwest 1/4 of the southeast 1/4 of Section 30, township 9 North, Range 17 East in the town of Ashippun, in Dodge County, Wisconsin. A small creek, Davy Creek, is located approximately 500 feet south of the OEC facility. Davy Creek, which flows through the wetlands, is a tributary of the Rock River, and is a warm water sport fishery.

The OEC site is bordered on the north by Eva and Oak Streets and on the south by Davy Creek and the property owned by the Ashippun Town Garage. Residential areas are 200 feet west and northwest of the site beyond Eva Street, and 1400 feet southeast of the site, beyond the Ashippun town Garage. Several small businesses line Oak Street to the northwest, and back up to the Chicago and North Western Railroad tracks. Residential areas are west and northwest of the site beyond Eva Street, and southeast of the site beyond the Town Garage facilities. Two parks with facilities for playing baseball, skeet shooting, and picnicking are also near the site. One park is adjacent to the Town Garage between Oak and Elm street across from the fenced wetlands. The other is northwest of the site, northwest of the residential area.

2.0 Project Activity Summary

2.1 Site Visit/Advance Sampling

During Phase II operations, site characterization samples were collected from throughout the site. Sample locations were determined jointly between USACE and IT representatives. Analytical

data pertaining to Phase II sampling will be addressed in the Phase II final report. Phase III IT personnel visited the site the week of February 12, 1995, to observe current Project status and to meet with USACE personnel to plan Phase III operations.

Phase III activities became necessary due to the failure of hydraulic dredging methods performed during Phase II. The Phase III approach consisted of conventional excavation utilizing swamp mats.

2.2 Mobilization/Site Preparation

From February 20, to March 3, 1995, IT personnel prepared the Phase III Work Plan, prepared for mobilization and procured required materials. Members of the site management staff and field personnel mobilized to the site on March 6, 1995, and began setting up the office and utilities, receiving heavy equipment, office equipment and materials, and continued procurement activities. Mobilization activities included the inventory of materials procured and left on site during Phase I and II operations. Sampling supplies, personal protective equipment, and miscellaneous tools and supplies were reorganized in order to facilitate Phase III work activities. Inventory and equipment organization activities continued periodically throughout the duration of Phase III work.

Heavy equipment procured during this period included; two 330 Caterpillar Excavators, two 966 Caterpillar Loaders, and two D-6 wide track dozers.

The remainder of the crew was mobilized during the week of March 6, 1995, with contract work beginning March 6, 1995.

A second mobilization effort began on June 2, 1995. A D-3 dozer and a 1-120 Cat excavator was procured at this time in order to complete disposal activities and for site restoration work.

2.3 Stone Filtration Dike and Peat Berm Barrier Construction

From March 7, to March 9, 1995, a stone filtration dike and a peat berm barrier was constructed at the downstream project boundary of Davy Creek, for water/sediment filtration, during excavation activities on Davy Creek and the affected wetlands. The stone filtration dike was constructed using Graded Stone" C" followed by a one foot thick area of No. 57 stone, and a one foot thick area of natural peat. A 330 Caterpillar excavator and both 966 loaders were used to

construct the filtration dike. Once excavation operations within Davy Creek and the affected wetlands were complete the stone dike and peat barrier were removed and disposed of accordingly. In order to ensure turbidity containment during excavation, three separate sets of turbidity booms were installed and maintained downstream of the filtration dike.

2.4 Excavation of Davy Creek and Affected Wetlands

Excavation operations consisted of the removal of contaminated material from both Davy Creek and affected wetlands. The 330 Caterpillar excavators, 966 loaders, and D-6 dozers were utilized to remove, consolidate, and stage material. The project excavation area can be divided into three separate sections; the upstream section of Davy Creek, the central Davy Creek and wetlands section, and the downstream section of Davy Creek. Approximately 3440 cu. yds. of material was removed from these sections.

2.4.1 Upstream Section of Davy Creek

Excavation operations at this section began on March 8, 1995, and continued through March 11, 1995. Excavation operations started at the upstream section of Davy Creek beginning at Lincoln Bridge and continuing downstream to the wetlands section, approximately 900 feet, to station 128 (see Figure 2-2 for station and excavation locations). Excavation of the upstream section of Davy Creek consisted of the removal of material from specific areas that prior sampling analysis indicated were above ecological levels for, cyanide, nickel, and/or copper, and above human health levels for, cadmium, chromium, and/or zinc.

The two 330 Caterpillar excavators set up on the south side of the creek and excavated designated grid areas. The excavated material was placed on the south bank of the creek where it was removed by two 966 loaders and deposited at the west side of the wetlands. The 330 Caterpillar excavators used swamp mats as working platforms along the creek bank. The material removed from the upstream section of Davy Creek was above ecological levels but below the human health levels established for the wetlands. The material removed from this section of Davy Creek was therefore placed in the west side of the wetlands at the direction of the USACE. After This Davy Creek material was placed in the wetlands, the wetlands area was backfilled with clean topsoil. Post excavation confirmation sampling was also conducted after affected areas were excavated. A sampling team was on site collecting samples as excavation was completed at each grid which required sampling. Approximately 695 cu. yds. of material was removed from this section.

Further work was conducted at the site on June 7, 1995. EPA and USACE representatives directed IT to clear the creek channel below Lincoln Bridge. Material had accumulated below the bridge and restricted current flow. The accumulated material below the bridge was rearranged to allow improved current flow.

2.4.2 Central Section of Davy Creek and Affected Wetlands

Excavation operations at this section began March 11, 1995, and continued through March 28, 1995. This section began at station 128 and continued east through station 148 (see Figure 2-2 for station locations). The southern boundary of the wetlands began immediately north of Elm Street and extended north approximately 375 feet.

Excavation of the central section of Davy Creek and affected wetlands consisted of the removal of material from specific areas, that prior sampling analysis indicated were above ecological levels, within Davy Creek and above human health levels within the wetlands. Utilizing swamp mats, the two 330 Caterpillar excavators initiated excavation within Davy Creek. The excavators casted contaminated material south toward Elm Street. This casting procedure allowed the excavators to move through the contaminated portion of the wetlands without cross contaminating excavated areas. Casting operations were performed throughout the appropriate grid areas of Davy Creek and the wetlands. Material was placed on Elm Street where the 966 loaders transferred the material to the staging area. Post excavation confirmation sampling was also conducted after affected areas were excavated. A sampling team was on site collecting samples as excavation was completed at each grid which required sampling. Approximately 1745 cu. yds. of material was removed from this section.

2.4.3 Downstream Section of Davy Creek

Excavation operations at this section began March 12, 1995, and continued through March 15, 1995. This section began at station 148 and continued east approximately 1100 feet to the project boundary at station 189 (see Figure 2-2 for station locations). Excavation of the downstream section of Davy Creek and affected wetlands consisted of the removal of material from specific areas, that prior sampling analysis indicated were above ecological levels, within Davy Creek and above human health levels within the wetlands. Utilizing swamp mats, one 330 Caterpillar excavator initiated excavation within this section. The excavator casted contaminated material south toward Fireman Park. This casting procedure allowed the excavator to move through the contaminated portion of This section without cross contaminating excavated

areas. Casting operations were performed throughout the appropriate grid areas of Davy Creek and the wetlands. Material was eventually placed at the eastern project boundary staging site, where the 966 loaders transferred the material to haul trucks for disposal at an approved TSDF. Postexcavation confirmation sampling was also conducted after affected areas were excavated. A sampling team was on site collecting samples as excavation was completed at each grid which required sampling. Approximately 1000 cu. yds. of material was removed from this section. Further work was conducted at This site on June 7, 1995. EPA and USACE representatives directed IT to clear the creek channel near Firemans' Park. Material had accumulated at This site and restricted current flow. The accumulated material was rearranged, utilizing a 1-120 Cat excavator working on crane mats, to allow improved current flow. Stone used for the site access road was also removed from This section of Davy Creek. The stone was manually removed and stockpiled at Firemans' Park, as requested by the Town of Ashippun.

2.5 Material Transport and Disposal Operations

Material transport and disposal operations began on March 17, 1995, and continued through March 30, 1995. All material was hauled to Envirosafe Services (Envirosafe) in Oregon, Ohio. Material was wet when removed from the creek and wetlands, therefore all material was blended with dolimetric kiln dust prior to transport to Envirosafe. After several loads of material were sent to Envirosafe, IT along with the USACE, decided to increase the amount of kiln dust used for blending. As a result a 50/50 mixture of kiln dust and material was then blended prior to material loadout. Material was blended using a 330 Caterpillar excavator. The 966 Caterpillar loaders loaded material in truck beds. Approximately 1870 cu. yds of kiln dust was used to blend all material sent off site. Expended turbidity booms and miscellaneous debris was also sent to Envirosafe for disposal.

Approximately 1160 cu. yds of stockpiled material from Phase II work was removed and transported to Envirosafe on March 16 and 17, 1995. Material loadout from Phase III work began March 18, and continued through March 30, 1995.

Material transport was halted by the Ohio EPA on March 21, 1995, due to liquid leaking from trucks contracted by Envirosafe Services. Envirosafe was responsible for supplying material loadout trucks that were of sound quality, this was often not the case. As a result a seven part truck bed inspection checklist was developed by IT Corp, with assistance from, and at the request of the Ohio EPA (see appendix A for checklist example).

After the Ohio EPA approved of the checklist, material loadout and delivery was resumed the afternoon of March 22, 1995. Truck inspections were conducted by Envirosafe and Envirosafe contracted trucking firms representatives, with oversight by IT Corp QA personnel. Any truck failing any part of the checklist was removed from the loadout area for repairs or sent off site empty.

Material loadout operations were halted on March 30, 1995, after all allocated funds for disposal were exhausted. Material which remained was transferred to a soil staging area approximately 200 feet east of the asphalt staging pad. Approximately 2500 cu. yds. of material remained on site awaiting disposal. A security fence was constructed around the perimeter of this pile for safety purposes.

The site was remobilized on June 2, 1995. The remaining stockpiled soil was disposed of beginning June 4, 1995 and continuing through June 9, 1995. A total of 2224 cu. yds. of material was disposed of. All material was transported by Wills, and Jack Gray Trucking to Envirosafe Services in Oregon, Ohio. As with previous transport and disposal operations, all material was blended with kiln dust as required by the Ohio EPA. This procedure was instituted even though the material was extremely dry during This phase of loadout.

An asphalt soil staging pad was constructed during Phase I activities. The staging pad was power washed once all soil was removed. The pad was sampled with analytical results indicating the material was non-hazardous. The asphalt pad was demolished and all material was given to local businesses who supplied trucking.

During Phase II operations a rock access road, comprised of No. 57 stone was constructed along the south bank of Davy Creek, was removed. As directed by the on site USACE representative, the rock was donated to local businesses who supplied transport.

2.6 Removal of Turbidity Booms and Debris

Once excavation activities were completed March 30, 1995, all turbidity booms, survey stakes, fencing, and miscellaneous debris was removed from both Davy Creek and the surrounding wetlands. All material was transported to the Envirosafe facility for disposal.

2.7 Discharge Pipe and Well Pad Installation

On March 31, 1995, work began on the installation of the water treatment plant discharge pipe. Initially a soil dike was constructed, east to west, through the central wetlands area in order to drain the area for pipe installation (see Figures 3A and 3B for detailed drawing). Both Caterpillar 330 excavators removed soil from the wetlands for dike construction. Upon completion of dike construction two, six inch and one, three inch centrifical, self priming pumps were used to drain the wetlands.

Discharge pipe installation started at the Elm Street locations. Five sections of eight inch schedule 40 polyvinyl chloride (PVC) perforated pipe was positioned inside five 40-foot sections (two 20-foot sections welded together) of 12-inch schedule 40 steel casing pipe. These five sections of pipe were buried 6 feet 6 inches below the surface. Due to the unstable nature of the subgrade, five feet of three inch stone was used to stabilize the pipe placed under Elm Street, followed by 18 inches of crush run and four inches of asphalt at the surface. The stone placed above the pipe was compacted using a vibroplate with two tampers to assure proper compaction.

Discharge pipe installation continued into the wetlands beginning April 3, 1995. A ditch was excavated at appropriate locations with a geotech liner covering the excavation. Once the liner was laid, No. 57 stone was placed on and surrounding the pipe, with the stone and pipe wrapped with geotech liner. Backfill was then placed over the geotech liner and compacted. Backfill was approved native palm series peat. Approximately 2600 cu. yds. of backfill was used to cover the affected area. Backfill was supplied by two local contractors: Wondra Inc., and Lieseners Soils Inc. The contract with Wondra Inc. was terminated April 4, 1995, due to the unsuitable quality of the backfill and drivers' unsafe unloading practices. The stone was supplied by Halquist, Inc.

2.8 Rock Access Road Removal and Final Dressing

Between March 22, and 30, and April 7, and April 10, 1995, the rock access road, which was constructed during Phase I to allow heavy equipment access to Davy Creek, was removed. The entire access road from Route 608 to the site was dressed and brought to equal or better than original conditions.

2.9 Site Restoration

Site revegetation and dressing was conducted to ensure that all areas disturbed by construction activities were brought to original or better conditions. Revegetation was also conducted along Davy Creek, the wetlands and other disturbed areas.

During Phases I and II activities including the Fireman's Park area, the town's people and management from the township of Ashippun, Wisconsin were very displeased with the original revegetation efforts due to sparse germination of the previous seed mixtures. It became apparent after consulting local horticulturalists that the original seed mixture selected was not suitable for the wet swamplike conditions of the marsh land. Therefore, acting on behalf of the USEPA, the state, and the township of Ashippun, the new mixture discussed below was placed throughout the jobsite with the exception of the Fireman's Park Area where the EPA and the township of Ashippun requested that sod be placed. At demobilization, the township of Ashippun was completely satisfied with the revegetation efforts.

Between April 10 and 12, 1995, the second seeding with the new mix took place. Olds Seed Company of Madison, WI prepared a seed mixture called Ashippun Pitch Bench Seed, which consisted of 26.46 percent Tall Fescue, 19.96 percent Climax Timothy, 19 percent Reed Canary Grass, 11.96 percent Alsike Clover, 9.5% Potomac Orchard Grass, 6.86 percent Perennial Rye Grass, 3.9 percent Kentucky Blue Grass, and 2.36 percent inert materials. This seed was spread evenly and abundantly throughout the site. The seed was then covered with straw for protection.

Further site restoration work was conducted at Firemans' Park during June, 1995. Disturbed areas were backfilled with top soil, groomed and seeded. C&D Construction was contracted for asphalt and sod work at Firemans' Park. As directed by the USACE, asphalt was laid on roads at the park. A three foot wide shoulder of sod was then placed adjacent to the asphalt road. All site restoration work was completed June 16, 1995.

2.10 Final Survey/As Built

On March 6, 1995, RA Smith, Inc. was contracted to compile a topographical drawing of the work area. This survey was completed and converted onto the computer-aided drafting (CAD) system. Figure 3 shows the as-built drawings.

2.11 Demobilization

On April 14, 1995, upon final acceptance, the entire crew, office facilities, and all equipment were demobilized.

A second demobilization occurred on June 16, 1995, once all soil was disposed of and site restoration work was completed.

3.0 Sampling and Analytical

Sampling and analytical results described in this section pertain only to samples collected and analytical results received during Phase III of this project. Sampling and analytical results pertaining to previous site work during Phases I and II are not fully addressed in this report. Phase II analytical results were used to prepare the Work Plan and QA/QC Plan for Phase III sampling activities. Sampling activities for Phase III began March 6, 1995, and continued periodically through March 28, 1995.

Three laboratories were used to perform all off-site sample analysis for this project. They were:

- Quanterra, Inc.
5815 Middlebrook Pike
Knoxville, TN 37921
Phone: (615) 588-6401

- Weston-Gulf Coast, Inc.
2417 Bond Street
University Park, IL 60466-3182
Phone: (708) 534-5200

- Industrial Environmental Analysis, Inc.
3000 Weston Parkway
Cary, NC 27513
Phone: (800) 444-9919

The laboratory project managers were Ken Mueller, Quanterra, Inc., Jane Huber, Weston-Gulf Coast, Inc., and Greg Hrabec, Industrial Environmental Analysis, Inc.

Quanterra, Inc. (Knoxville, Tennessee) was used for all TCLP sample analysis. Weston-Gulf Coast analyzed all short list metals and cyanide confirmation samples including duplicates, and Industrial Environmental Analysis, Inc. was used for all quality assurance (QA) split samples. Duplicate samples were collected at a rate of approximately ten percent of overall samples collected and split samples were collected at a rate of ten percent of duplicate samples.

3.1 Stockpiled Soil Samples

On March 6, 1995, prior to transporting stockpiled soil off site, six grab samples were collected and submitted to Quanterra Incorporated for hazard characterization. These samples were analyzed for full toxicity characteristic leaching procedure (TCLP), flash point/ignitability, pH, and reactivity. Analytical results of these samples were received, reviewed, and approved by IT's regulatory specialist, Scott Brady, and USACE personnel. These soil characterization samples were collected at a rate of one sample per 250 cu yd. of stockpiled soil, as required by the State of Ohio EPA. Results of sample OS005SL were above the regulatory limit for cadmium (D006), therefore the stockpiled soil is considered treatable hazardous for disposal purposes. Analytical results are presented in Appendix G.

3.2 Davy Creek and Wetlands; Soil Characterization Samples

On March 7, 1995, prior to excavation of Davy Creek and the surrounding affected wetlands, 22 grab soil samples were collected at a depth of zero to six inches and submitted to Quanterra Inc. for TCLP metals analysis (Method 1311). These soil characterization samples were collected at a rate of one sample per 250 cu yd of soil which was expected to be excavated from Davy Creek and the affected wetlands as required by the disposal facility. Analytical results indicated twenty samples were above non-treatable disposal limits. Therefore, all soil excavated was considered treatable hazardous for disposal purposes. Analytical results are presented in Appendix G. Site maps displaying sample areas are presented in Figures 2-1 and 2-2.

3.3 Preexcavation Soil Characterization Samples

On March 8, 1995, prior to excavation activities, 55 grab soil samples, collected at a depth of zero to six inches, were submitted to Weston-Gulf Coast, Inc. for cyanide analysis (Method 9010). Prior to Phase III sampling activities, samples had been collected during Phase II from these same areas and analyzed only for short list metals. Cyanide samples had to be collected in order to fully characterize these sample areas and to determine if sample areas were above appropriate ecological or human health levels. Cyanide results (160 milligrams per

kilogram [mg/kg]) for sample OS 214SL, at station 153, sample grid 5201 were above human health levels, this area will, therefore, require post excavation confirmation sampling. The remaining results were below appropriate ecological or human health levels. Analytical results are presented in Appendix G. Site maps displaying sample areas are presented in Figures 2-2 and 2-3.

3.4 Post Excavation Confirmation Soil Samples

The project sampling area can be divided into four main sections: the upstream section of Davy Creek, the central section of Davy Creek, the central Wetlands, and the downstream section of Davy Creek. The following is a discussion of post excavation sample collection and analytical results obtained during Phase III. Post excavation sampling activities began March 9, 1995, and continued periodically through March 28, 1995.

3.4.1 Upstream section of Davy Creek

This area extended from Lincoln Bridge to Station 127 (see Figures 2-2 and 2-3 for station and sample locations). During excavation operations, 20 grab soil samples were collected from this section and submitted to Weston-Gulf Coast, Inc. for cyanide (Method 9010), and short list metals; cadmium, chromium, copper, nickel, and zinc (Method 6010) analysis. Analytical results indicated all sample locations were below the ecological levels required for Davy Creek. Analytical results for cyanide were all non-detect (ND). Metals results were all ND for cadmium. Chromium results ranged from ND to 17.2 mg/kg for sample OS 308 at station 110, sample grid 5550. Copper results ranged from ND to 22.5 mg/kg for sample OS 308 at station 110, sample grid 5550. Analytical results for nickel ranged from ND to 32.1 mg/kg for sample OS 306 at station 108, sample grid 5553. Zinc results ranged from 4.7 mg/kg for sample OS 307 at station 108, sample grid 5552, to 30.3 mg/kg for sample OS 308 at station 110, sample grid 5550. Analytical results are presented in Appendix G and Table 3. Site maps displaying sampling locations are presented in Figures 2-2 and 2-3.

3.4.2 Central Section of Davy Creek

The Central section of Davy Creek extended from station 127 to station 148. During excavation operations, 25 grab soil samples were collected from this section of Davy Creek and submitted to Weston-Gulf Coast, Inc. for cyanide analysis (Method 9010), and short list metals; cadmium, chromium, copper, nickel, and zinc (Method 6010). Analysis indicated that all samples are below appropriate ecological or human health levels except for the following four samples:

Sample OS 516, at station 136, sample grid 5269, which was above ecological limits for nickel (61.4 mg/kg); sample OS 512 at station 134, sample grid 5287, which was above ecological limits for nickel (85.7 mg/kg); sample OS 325 at station 132, sample grid 5425, which was above ecological limits for nickel (122 mg/kg); and sample OS 324 at station 131, sample grid 5426, which was above ecological limits for nickel (134 mg/kg), and copper (154 mg/kg). Discussions between EPA and USACE representatives indicated that these levels, although above ecological target levels, were low enough to not be of a concern. Therefore, as directed by the EPA and USACE, no further sampling or excavation was undertaken at This area. Analytical results are presented in Appendix G and Table 3. Site maps displaying sample areas are presented in Figures 2-2 and 2-3.

3.4.3 Downstream Section of Davy Creek

The Central Davy Creek area extended from station 148 to station 189 at the western limits of the project boundary. During excavation operations, 88 grab soil samples were collected from this section of Davy Creek and affected wetlands and submitted to Weston-Gulf Coast, Inc. for cyanide analysis (Method 9010), and short list metals; cadmium, chromium, copper, nickel, and zinc (Method 6010). Analytical results indicated all sample locations were below the ecological levels required for Davy Creek and human health levels for the affected wetlands. Analytical results for cyanide were all ND. Metals analysis produced the following results: cadmium ranged from ND to 0.89 mg/kg for sample OS609 at station 154, chromium results ranged from ND to 22.5 mg/kg for sample OS620 at station 162, sample grid 5161; copper results ranged from 3.5 mg/kg for sample OS661 at station 175, sample grid 5152; nickel ranged from ND to 31.5 mg/kg for sample OS 624 at station 166, sample grid 5140; zinc results ranged from 7.2 mg/kg for sample OS 668 at station 176, sample grid 5076, to 44.3 mg/kg for sample OS 620 at station 162, sample grid 5161. Analytical results are presented in Appendix G and Table 3. Site maps displaying sampling locations are presented in Figures 2-2 and 2-3.

3.4.4 Central Wetlands

The Central Wetlands area extended from station 127 to station 148. The area then extends south to Elm Street and north to Davy Creek. One hundred and four discrete soil samples were collected from this area following excavation. All analytical results indicated sample areas were below human health levels required for the wetlands area. Analytical results for cyanide ranged from ND to 0.64 mg/kg for sample 681 at station 138, sample grid 5257; metals analysis produced the following results: cadmium ranged from ND to 43.3 mg/kg for sample OS516 at

station 136, sample grid 5269; chromium results ranged from ND to 257 mg/kg for sample OS554 at station 135, sample grid 5276; copper results ranged from ND to 28.5 mg/kg for sample OS506 at station 134, sample grid 5284; nickel ranged from ND to 54.1 mg/kg for sample OS 561 at station 136, sample grid 5266; zinc results ranged from 5.2 mg/kg for sample OS 560 at station 136, sample grid 5265, to 71.0 mg/kg for sample OS 516 at station 136, sample grid 5269. Analytical results are presented in Appendix G and Table 3. Site maps displaying sampling locations are presented in Figures 2-2 and 2-3.

3.4.5 Backfill Sample

A backfill sample was collected April 1, 1995 and sent to Weston Gulf-Coast for analysis. The sample was collected from Liesener Soils Inc., 1365 Spring Valley Road, Jackson, WI 53037. The sample was analyzed for VOCs/pH/SVOC, flashpoint/ignitability, pesticides/PCBs/herbicides, TAL metals/cyanide, and reactivity. Analytical results indicated the backfill was acceptable. Analytical results are presented in Appendix G.

3.4.6 Soil Staging Pad Asphalt Sample

A sample of the soil staging pad asphalt was collected and sent to Weston Gulf-Coast for metals and cyanide analysis. The discrete sample was collected from the southeast corner of the pad to a depth of three inches. Results of the sample indicated the asphalt could be disposed of in a non-hazardous landfill. Analytical results are presented in Appendix G.

4.0 Lessons Learned

The Oconomowoc Phase III project was well executed. Phase III activities were necessary due to the failure of hydraulic dredging performed during Phase II. Further studies involving creek sediments and vegetation may have eliminated the use of the hydraulic dredging method which would have saved considerable time and money.

The Ohio EPA temporarily halted material shipment because certain trucks were not properly sealed and lined. It is necessary to communicate to all concerned parties that proper procedures are required during loading, transport, and disposal of material. This will help ensure uninterrupted disposal operations.

5.0 Conclusions

Phase III site activities for the remediation of the Oconomowoc Electroplating Facility site, Ashippun, Wisconsin, began with the Notice to Proceed received March 1, 1995, and with site mobilization and work beginning March 6, 1995. All initial on-site work was completed, including final inspection, as of April 14, 1995. A second mobilization occurred on June 2, 1995, to dispose of the remaining soil and accomplish other tasks as directed by the USACE, and USEPA. Final site work was completed June 16, 1995.

All work was performed in a timely manner and all project objectives were met. Additional work was also performed at Fireman's Park. This included paving and the placing sod at designated areas. Local residents and officials were kept abreast of project status and were pleased with the final product.

All analytical results indicated that collected samples were below appropriate contamination levels with the exception of four samples at the central section of Davy Creek. These results were reviewed by the USACE and EPA officials, who determined that since the levels of these four samples were only slightly above desired levels, it would not be necessary to excavate further.

Upon final demobilization, the site disturbed areas had been brought back to original or better conditions.

The final result is a significant improvement from original site conditions. Local residents, and their surrounding environment all benefit from the project's success.