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Interim Measures Report

NSWC Crane, SWMU-16/16
Cast High Explosive/incinerator
Building 146
NSWC Crane, Indiana

Unit Identification Code: N00164
Contract No. N62467- N6247-93-D-1106

February, 1997

Southern Division
Naval Facilities Engineering Command
North Charleston, South Carolina
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INTERIM MEASURES REPORT
SWMU-16/16
CAST HIGH EXPLOSIVE/INCINERATOR BUILDING 146

VOLUNTARY INTERIM MEASURES
NSWC CRANE, INDIANA

February 1997

CONTRACT N62467-93-D-1106
DELIVERY ORDER #0009
STATEMENT OF WORK #007

Prepared for

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 Eagle Drive
P.O. Box 190010
North Charleston, South Carolina 29419-9010

Prepared by:

MORRISON KNUDSEN CORPORATION
2420 Mall Drive
Corporate Square 1 - Suite 211
North Charleston, South Carolina 29406

PREPARED/APPROVED BY:

_____ _____
Don Miller Date
MK Project Engineer

APPROVALS:

_____ _____
Robert Hlavacek Date
MK Program Manager

EXECUTIVE SUMMARY

Voluntary Interim Measures were conducted at SWMU-16/16, the Cast High Explosive/Incinerator Building 146 area, NSWC Crane, Crane, Indiana, in 1995 and 1996. The original objectives were to sample, remove, and dispose of sludge from the east and west sumps; clean the sumps; excavate and remove the slag/ash piles; sample the remaining soils; backfill; and restore the site. The work scope was later expanded to include removal of three above ground storage tanks (AST) and associated contaminated soils.

The sludge was removed from the east and west sumps and properly disposed of. The sumps were thoroughly cleaned using a high pressure low volume wash system and the decontamination fluid was sampled for verification of the sump walls and floor cleanliness. The slag/ash piles were excavated, containerized, and disposed of. Three ASTs, their supports, and the petroleum impacted soils were also removed and disposed of. Confirmation sampling was conducted in the slag/ash pile areas, the former AST areas, and other areas of excavation. Based upon the confirmation sample results, additional soil was excavated and disposed of. The additional excavation included locations outside of the fenced area of SWMU-16/16 where incinerator ash/slag was previously deposited.

A total of 476.4 tons of waste from the slag/ash pile excavations were transported off-site for treatment/disposal as a lead-contaminated waste. The east sump contained 22.8 tons of material which was transported off-site for disposal/treatment as a lead-contaminated waste. Approximately 150 tons of diesel contaminated soil was transported off-site for disposal to a licensed landfill as a special waste. Approximately 37 tons of sludge containing trichloroethene from the west sump was transported off-site to a licensed incinerator, and 1,925 gallons of water and wash water containing trichloroethene from the sump was also transported off-site for treatment.

Sample analysis results of the soil in the excavations indicates that the soil at SWMU-16/16 presently contains lead concentrations above the interim cleanup levels. However, the source of contamination has been removed, and, therefore, the IM has met the requirements and objectives of the work plan for SWMU-16/16. It is recommended that additional evaluation be performed to determine the potential risk to human health and the environment at SWMU-16/16. In addition, work beyond the scope of this Interim Measure is underway at SWMU-16/16 to investigate the source of trichloroethene-contaminated water and will be discussed in the Interim Measures Report for Delivery Order 0027.

The SWMU Acceptance and Turnover statement is dated July 12, 1996, and reflects the final inspection of SWMU-16/16 by Naval Surface Warfare Center (NSWC) personnel.

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ACRONYMS AND ABBREVIATIONS

AENI	American Environmental Network, Inc
CAAA	Crane Army Ammunition Activity
CEC	CompuChem Environmental Corporation
CFR	Code of Federal Regulations
COC	Chain of Custody
DRMO	Defense Reutilization and Marketing Office
HSWA	Hazardous and Solid Waste Amendments
IDEM	Indiana Department of Environmental Management
IM	Interim Measure
IMR	Interim Measures Report
MK	Morrison Knudsen Corporation
MS	Matrix Spike
MS/MD	Matrix Spike/Matrix Duplicate
NAVFACCENGCOM	Naval Facilities Engineering Command
NSWC	Naval Surface Warfare Center
QAPP	Quality Assurance Project Plan
QCP	Quality Control Plan
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facilities Investigation
SAP	Sampling and Analysis Plan
SWMU	Solid Waste Management Unit
USEPA	United States Environmental Protection Agency
mg/kg	milligram per kilogram
mg/l	milligram per liter
ug/kg	microgram per kilogram
ug/l	microgram per liter

1.0
INTRODUCTION

Morrison Knudsen Corporation (MK) was contracted by the Southern Division (SOUTHDIV), Naval Facilities Engineering Command (NAVFACENGCOM), under Contract #N62467-93-D-1106, Delivery Order #0009, Statement of Work #007, to remediate Solid Waste Management Units (SWMUs) at Naval Surface Warfare Center (NSWC) Crane, Crane, Indiana. This Interim Measures Report (IMR) summarizes the construction and environmental tasks associated with sampling, excavation and disposal of materials from SWMU-16/16, Cast High Explosive/Incinerator Building.

Promulgation of the United States Environmental Protection Agency's (USEPA's) regulatory program under the Resource Conservation and Recovery Act (RCRA) provided the impetus to identify and control environmental contamination from past practices at NSWC Crane. On December 23, 1989, the EPA issued the federal portion of the final RCRA Part B permit for NSWC Crane to the US Navy and issued the permit renewal for a period of five years on July 31, 1995. This permit contains both the Federal permit conditions and the State permit conditions which were issued separately by the State of Indiana RCRA program. It establishes the Hazardous and Solid Waste Amendment (HSWA) Corrective Action Requirements and Compliance Schedules for NSWC Crane, obligating the US Navy to perform RCRA Facility Investigations (RFIs) at 30 SWMUs, to conduct Corrective Measures Studies and to implement corrective measures if needed. Voluntary interim measures were performed at SWMU-16/16.

MK provided project management, construction management, scientific, environmental, health and safety oversight, and quality control oversight services for this project. MK's primary subcontractor, US Tech, provided excavation, removal and disposal, and backfilling/restoration services. American Environmental Network, Inc., (AENI) and CompuChem Environmental Corporation (CEC) provided analytical services under contract to MK.

MK prepared the following project documents which describe the procedures to be used in execution of the voluntary interim measure (IM) at SWMU-16/16:

- *Work Plan and Task-Specific Health and Safety Plans for SWMUs 16/16 and 24/00,* Revision B, as amended, dated August 18, 1995, (MK, 1995a).

- *General Project Plans for Interim Measures Cleanup, Revision C*, August 18, 1995, consisting of the following plans:
  - *Quality Control Plan*, Rev. C, August 18, 1995, (MK, 1995b)
  - *Quality Assurance Project Plan*, Rev. C, December 29, 1995, (MK, 1995c)
  - *Waste Management Plan*, Rev. C, August 18, 1995, (MK, 1995d)
  - *Sampling and Analysis Plan*, Rev. C, August 18, 1995, (MK, 1995e)
  - *Environmental Protection Plan*, Rev. C, August 18, 1995, (MK, 1995f)

The target cleanup levels for this IM were taken from "*RCRA Corrective Action Guidance Human Data Quality Levels for RFI Projects,*" June 18, 1994, (USEPA, 1994), as site-specific risk based cleanup levels have not been developed for NSWC Crane. The target cleanup levels are discussed in Section 3.1.

MK received approval of the Work Plan for SWMUs 16/16 and 24/00 on September 18, 1995. A copy of the Work Plan approval is provided in Appendix A. After the Work Plan was approved by the Navy and Regulators, the Navy issued a Technical Directive to add the removal of three above ground storage tanks (ASTs) and petroleum product contaminated soils to the interim measure. A copy of the technical directive correspondence is provided in Appendix B. A Work Plan Addendum was not prepared for the additional work.

2.0
SITE BACKGROUND

2.1 SITE DESCRIPTION

NSWC Crane consists of 62,463 acres located approximately 75 miles south of Indianapolis, Indiana, as shown in Figure 2-1. The site provides support for equipment, shipboard weapons systems, and ordnance. NSWC Crane also supports the Crane Army Ammunition Activity (CAAA), which is responsible for production and renovation of conventional ammunition, as well as storage, shipment, demilitarization and disposal of conventional ammunition.

The Cast High Explosive/Incinerator Building area is located in the north central part of NSWC as shown on Figure 2-2. Building 146, situated along Highway H-307, was the site for cast loading of explosives into projectiles, pressure washing of five-inch projectiles filled with explosives, and the demilitarization of small-arms ammunition by incineration.

2.1.1 High Pressure Washout Activities And Building Sumps

Prior to 1978, the generated waste water from the washout activities was discharged to a storm drain with release to a ditch and ultimate transport to Boggs Creek. Potential soil contaminants from loading and washout activities were TNT, RDX, HMX, Composition A, Composition B, and ammonium picrate (NUS, 1992). Two sumps, measuring 13 feet long by seven feet wide by seven feet deep each are located at the northeast and northwest corners of the building as shown in Figure 2-3. The tops are covered with wooden slats as shown in photographs 1 and 2 in Appendix C. These sumps are believed to have been used as settling basins fed by the discharge lines from the building floor drains receiving waste water from the washout activities.

2.1.2 Incineration Of Small-arms Ammunition

Beginning in approximately 1967, demilitarization of small-arms ammunition was accomplished by three incinerators located adjacent to Building 146. In 1988, the incinerators were disassembled and removed in preparation for new future incinerators. Incinerator ash/slag was previously stored in piles near Building 146; however, there is no known specific ash pile location. Ash was likely dispersed and blown to other areas, most notably to the southeast, south, southwest, and west of the incinerator bays (NUS, 1992). Based on visual observations of stained soil, migration of ash appears to also have occurred by way of the runoff drainage ways. Photographs 3 through 13 show the drainage ways, stained and barren soil surfaces, and ash/slag piles.

2.1.3 Aboveground Storage Tanks

Three aboveground storage tanks were present south of the incinerator bays. These tanks stored No. 2 fuel-oil used to fire the incinerators. The ASTs were two 1000-gallon and one 250-gallon diesel tanks and were supported on concrete saddles or metal supports. The ground surface in the vicinity of the tanks was covered with gravel. Waste oil was likely burned as fuel in the incinerators at Building 146 (NUS,1992). The surrounding surface soil and gravel was visibly stained as shown in photograph 14.

2.2 ENVIRONMENTAL SETTING

The topography of NSWC Crane consists of flat to gently rolling terrain dissected by numerous well-defined drainage channels. Surface elevation ranges from approximately 470 feet at the drain exiting the southern boundary of Crane to 860 feet on a ridge in the west-central portion of the facility. Ridge crests generally lie at elevations of 750 to 800 feet (NEESA, 1983). Building 146 occupies an upland area at NSWC Crane. The topography of the upland area is essentially level at an approximate elevation of 763 feet. The relatively level area in the vicinity of Building 146 is in sharp contrast to the steep slopes east, south and west of the building. Elevation changes on the adjacent slopes average 150 feet vertical difference per 1,000 feet in the horizontal direction. Bottom elevations in the ravines adjacent to the Building 146 area are approximately 600 feet (NUS, 1992).

The surface drainage at NSWC Crane has formed a dense, dendritic pattern throughout the installation. Four drainage basins have been identified at Crane. SWMU-16/16 is located in Basin IV which occupies the central portion of the facility as shown in Figure 2-4 (NEESA, 1983). Surface runoff from the Building

146 area descends the adjacent slopes to enter intermittent drainage paths in the bottom of ravines west and east of Building 146. These intermittent ravine drainage paths converge to a point south of Building 146 to form one of the more upstream fingers of Turkey Creek. Turkey Creek flows south-southwest to merge with Boggs Creek. Boggs Creek continues to flow south, eventually exiting the southern boundary of NSWC Crane. After exiting, Boggs Creek continues to flow south and flows into the east fork of the White River (NUS, 1992).

Surface drainage in the immediate area around Building 146 drains to the ravines to the west, south and east. One drainage ditch near the southwest corner of Building 146 collects drainage from the gravel-covered storage area along the west side of the building. This ditch collects and diverts surface drainage over the western slope (NUS, 1992). A second drainage ditch, which discharges near the southeast corner of the perimeter fence, runs east-west south of the gravel area as shown on Figure 2-5.

NSWC Crane is underlain by unconsolidated deposits of Quaternary (Pleistocene) age and residual soil derived from Pennsylvanian and Mississippian bedrock. The unconsolidated deposits are limited to the small floodplains and are composed of alluvial, colluvial, and paludal (marshland) silt, sand, and gravel; lacustrine clay, silt, and sand; and outwash plain gravel, sand, and silt. The remainder of NSWC Crane surficial deposits consist of residual clays and silt from the Pennsylvanian Raccoon Creek Group and Mississippian Stephensport and West Baden Groups, with small areas of Quaternary clay, silt, and sand (Lacustrine deposits). The bedrock units beneath the facility, primarily Raccoon Creek and Stephensport Groups, reportedly dip gently from the Cincinnati Arch to the Illinois Basin in the southwest (NEESA, 1983).

According to boring logs collected from the facility, the major soil type is a two to three-inch-thick surface layer of brown to tan organic clay loam underlain by clay intermixed with silts and sand. Occasionally a clay hardpan occurs between twenty-five and thirty-two- inches below the surface (NEESA, 1983).

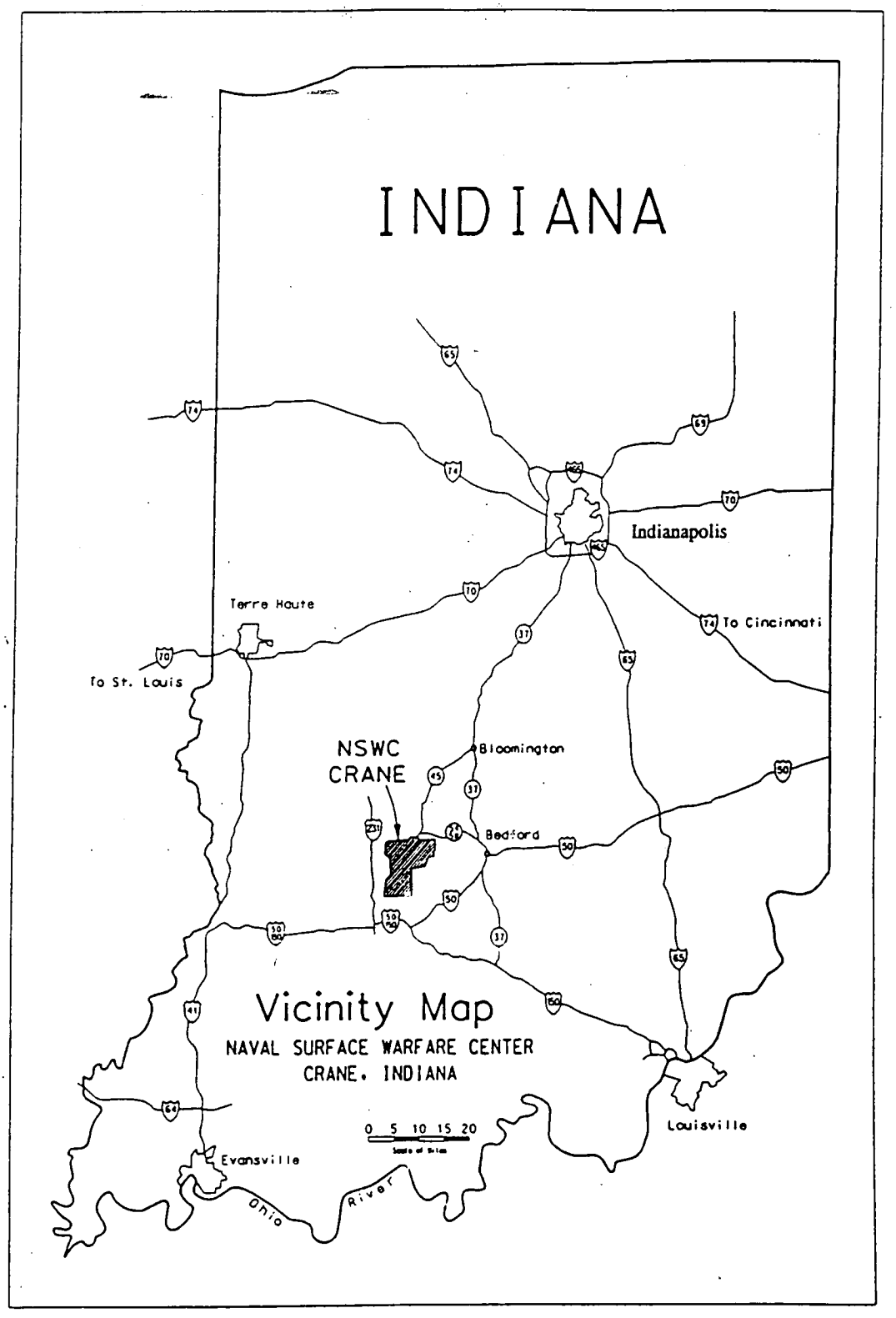
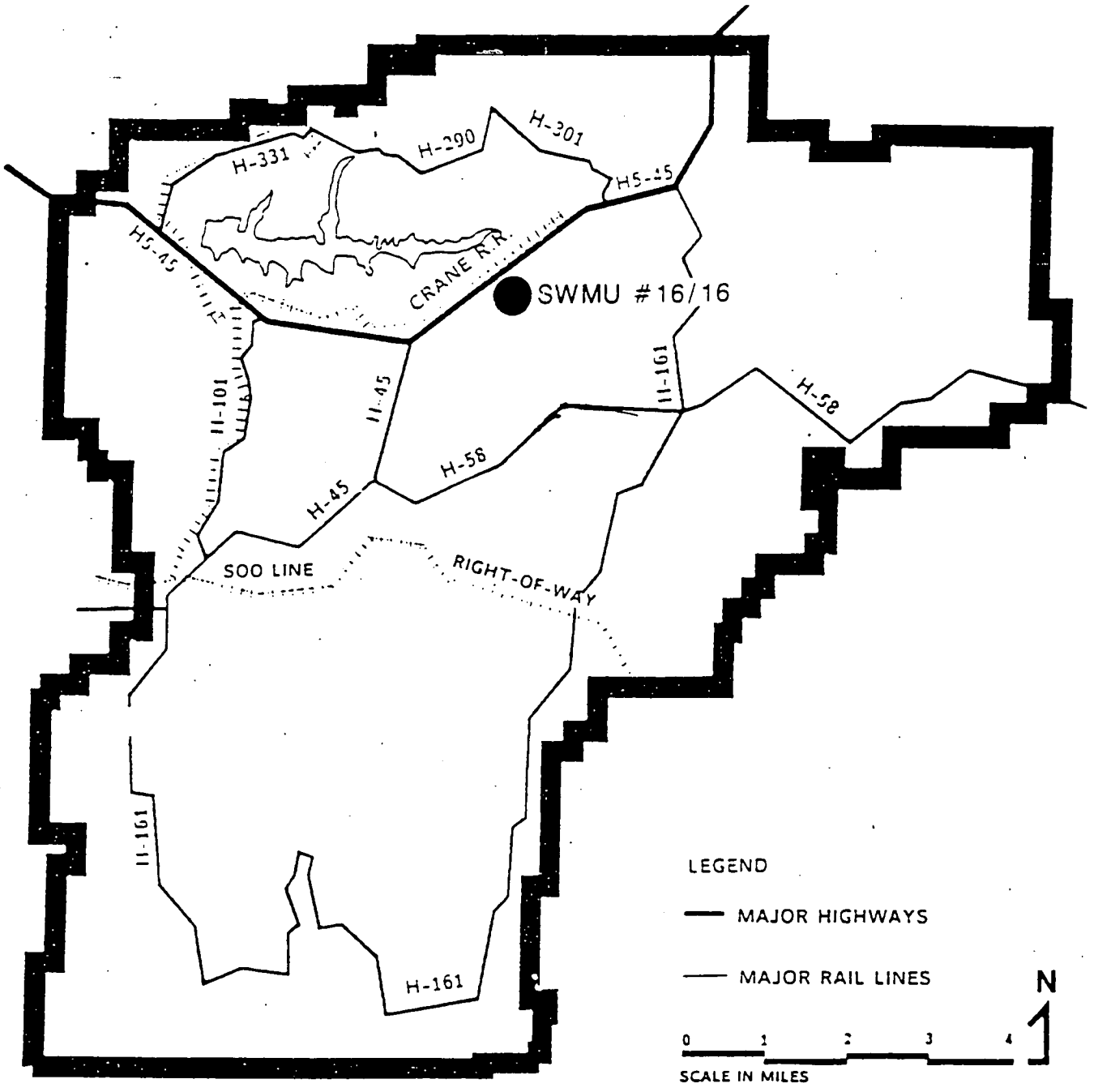
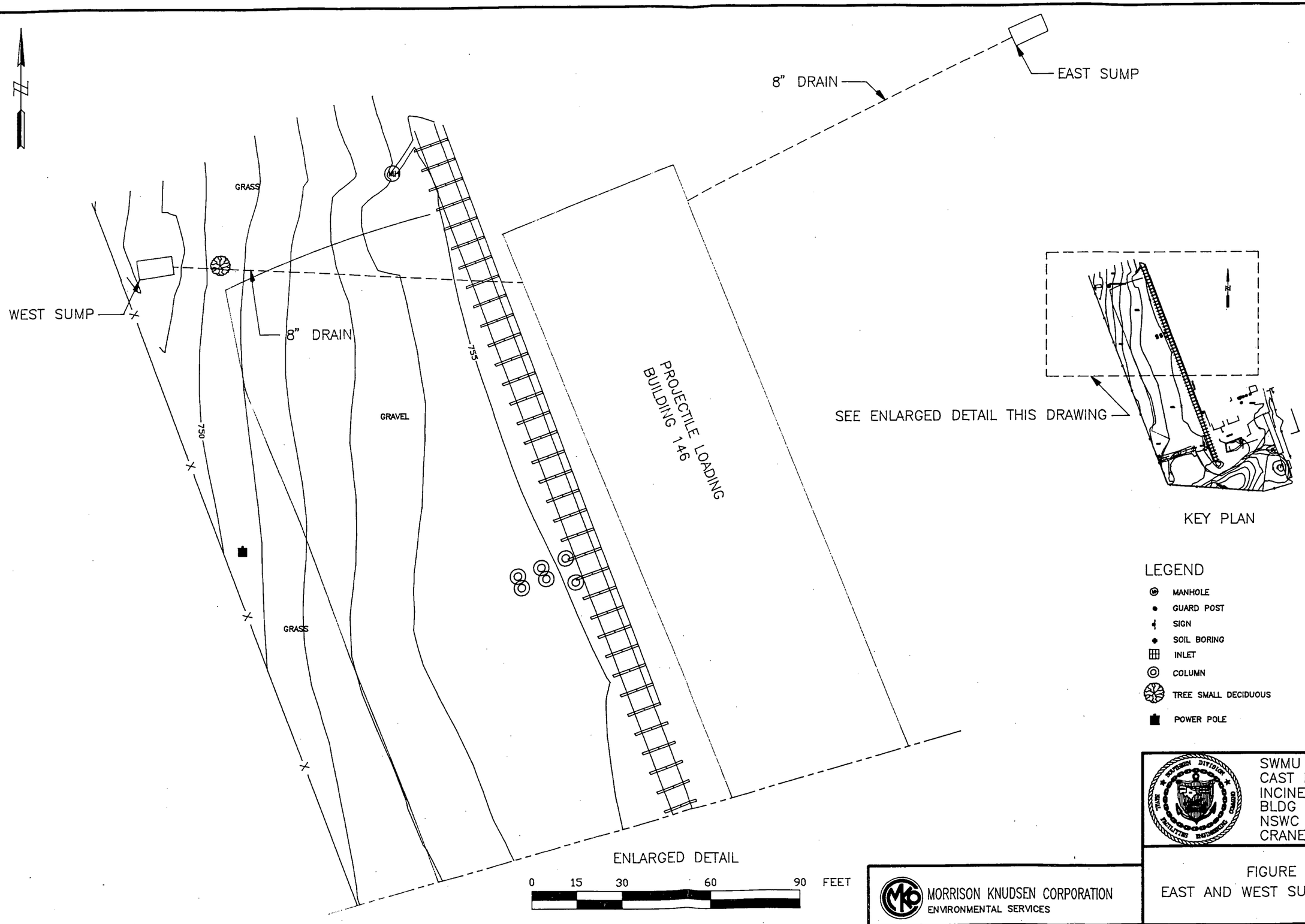


FIGURE 2-1
VICINITY MAP OF NSWC CRANE



SWMU #16/16: CAST HIGH EXPLOSIVE FILL/INCINERATOR BLDG. 146

FIGURE 2-2
LOCATION OF SOLID WASTE MANAGEMENT UNIT 16/16

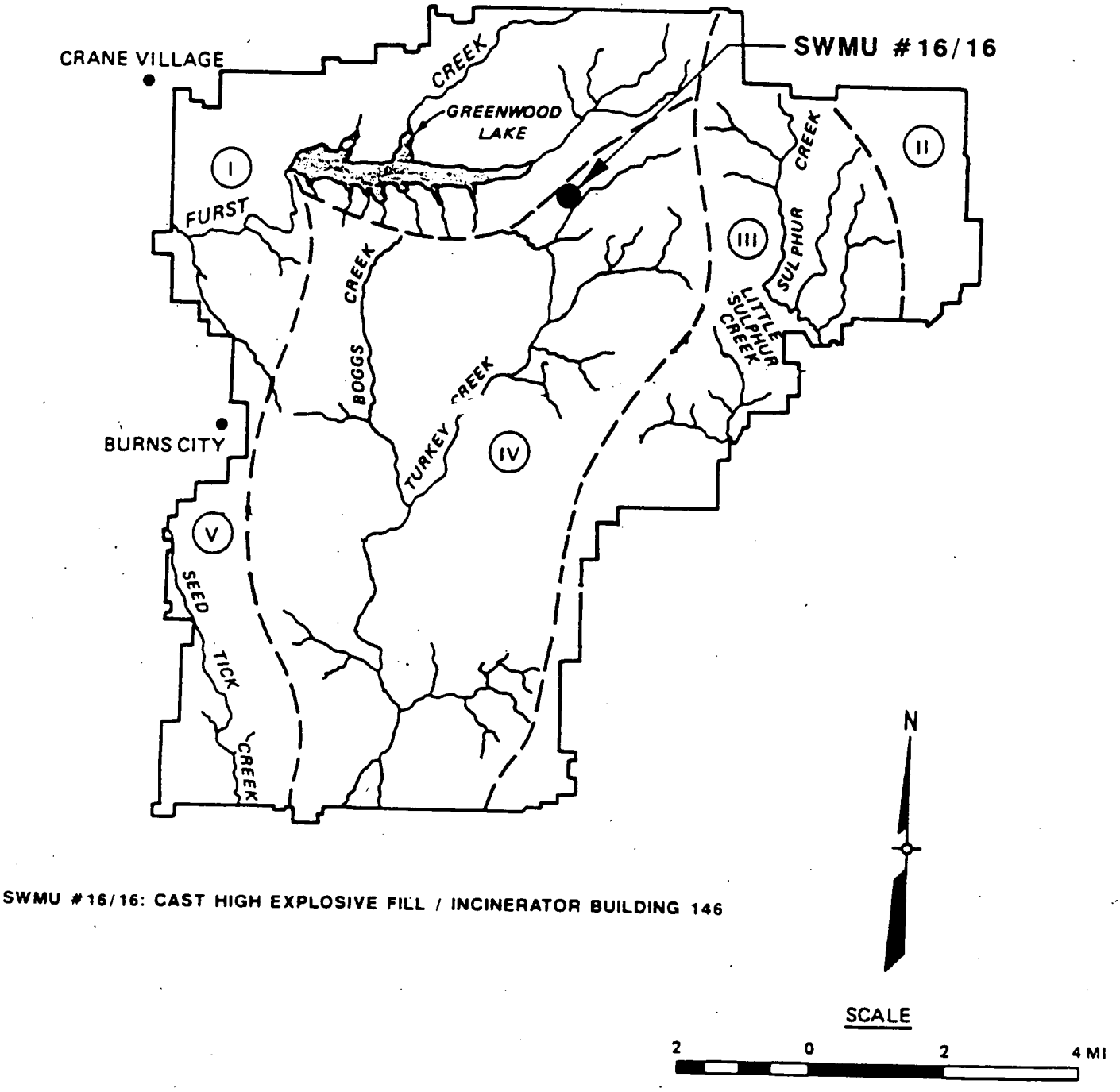


SWMU #16/16
CAST HIGH EXPLOSIVE
INCINERATION
BLDG 146 AREA
NSWC CRANE
CRANE, INDIANA

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES

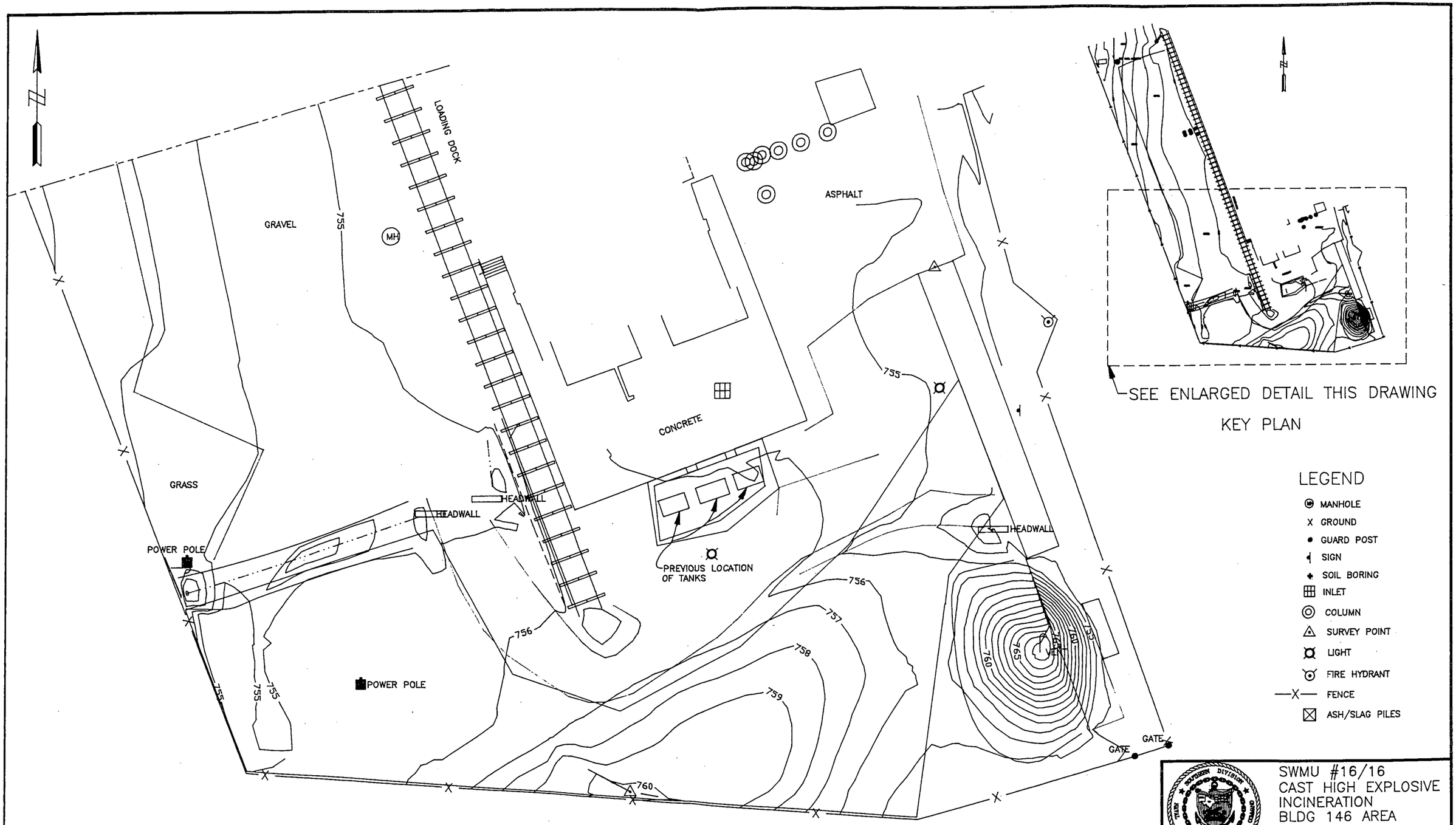
FIGURE 2-3
EAST AND WEST SUMP LOCATIONS

SOURCE: CRANE PWO Y & D DWG #591,926 | DWG DATE: 02/21/96 | DWG NAME: SWMU #16/1



SWMU #16/16: CAST HIGH EXPLOSIVE FILL / INCINERATOR BUILDING 146

FIGURE 2-4
NSWC CRANE SURFACE DRAINAGE BASIN MAP



SWMU #16/16
CAST HIGH EXPLOSIVE
INCINERATION
BLDG 146 AREA
NSWC CRANE
CRANE, INDIANA

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES

FIGURE 2-5
DRAINAGE PATTERNS

SOURCE: MSE CORPORATION, 1996.

DWG DATE: 12/06/96 | DWG NAME: SWMU #16/16

3.0
WORK EXECUTION

3.1 SITE CHARACTERIZATION

Prior to work being performed at SWMU-16/16, a walk-down of the entire area and recording of visual observations was performed. Characterization samples were collected from the sumps, ASTs and various slag and ash piles in order to determine contaminant concentrations and evaluate disposal options. Characterization samples were collected and analyzed based on analytical parameters specified in the Sampling and Analysis Plan (SAP). Table 1 of the SAP is provided in Appendix C and lists the analytical parameters for the various SWMUs with a short description of rationale. Table 5 of the SAP is also provided in Appendix D and lists the interim measures cleanup levels for soil analysis. Table 3-1, Sample Summary, identifies all samples collected during this IM, the analytical methods performed on the samples, and the purpose of the sampling. Table 3-2, Characterization Samples, presents all of the analytes that were detected during analysis. Analytical data is presented in Appendix D and is organized by sample number.

3.1.1 East Sump Characterization

One sample (16/16-001) was collected from the east sump in June 1995 and analyzed for Appendix IX metals by AENI. In July 1995, additional samples of the sump contents were collected and analyzed for TNT, RDX (16/16-005), and polychlorinated biphenols (PCBs) (16/16-009) by field test kits. The field screening results and laboratory analytical data are summarized in Table 3-2, and the field data sheets provided in Appendix D. Arsenic, antimony, barium, cadmium, cobalt, copper, lead, and zinc were all found to be above cleanup levels in sample 16/16-001, with the highest concentrations being lead at 47,000 mg/kg and zinc at 142,000 mg/kg. TNT was indicated at 0.5 - 1.5 mg/kg, while PCB and RDX were below the reporting limits of .5 mg/kg.

3.1.2 West Sump Characterization

One sample (16/16-002) was collected from the west sump in June 1995 and analyzed for Appendix IX metals by AENI. In July 1995, additional samples of the sump contents were collected and analyzed for TNT, RDX (16/16-006), and PCBs (16/16-010) by field test kits. The field screening results and laboratory analytical data are summarized in Table 3-2, and the field data sheets provided in Appendix D. Arsenic, antimony, barium, cadmium, cobalt, copper, lead, and zinc were all found to be above cleanup levels in sample 16/16-002, with the highest concentrations being lead at 44,800 mg/kg and zinc at 158,000 mg/kg. PCB, TNT and RDX were below the reporting limits of .5 mg/kg. Additional characterization samples were again collected based on the vapor indications which were observed during the initial activities of sludge removal. On October 16 and 17, 1995, a sample of the sludge, 16/16-042, was analyzed for TCLP metals of concern, TCLP volatile organic compounds (VOCs), and total explosives. A liquid sample, 16/00-043, was analyzed for VOCs, semi-volatile organic compounds (SVOCs), pesticides/herbicides, and explosives parameters. The liquid was subsequently resampled, 16/16-045, for metals concentrations on October 19, 1995. Trichloroethylene was identified in samples 16/00-042 and -043 as high as 2,600 mg/l with concentrations of metals below the cleanup levels. Sample 16/00-045 results also indicated concentrations of metals below the cleanup levels.

3.1.3 Slag/Ash Pile Characterization

Scattered remnants of small ash and slag piles were visible around the southeast, south, and southwest areas of Building 146. Small piles of ash and slag residue was observed adjacent to the southeast drainage ditch discharge both inside and outside of the fence perimeter. Areas south and southeast of Building 146 and the incinerator fuel storage tanks were observed to have been disturbed, with noticeably less vegetation than surrounding areas (NUS, 1992). Previous studies indicate that these areas had been used as incinerator ash stockpile sites and apparently were removed from the site along with potentially contaminated soil in the late 1970s. Nevertheless, cartridge fragments and small quantities of ash were observed throughout the area (NUS, 1992). The visibly stained surfaces, barren soil surfaces, and runoff drainage paths are shown in photographs 3 through 9 in Appendix C. Lead, barium, cadmium, chromium, and mercury were compounds of concern in the scattered residual ash and slag piles. Many of the piles also contained ammunition shell casings and lead bullets, as shown in photographs 10 through 13 in Appendix C.

In June 1995, composite samples were collected from slag/ash piles on the south and west sides of Bulilding 146. Both samples, 16/16-003 from the west side and 16/16-004 from the south side, were analyzed for Appendix IX metals. The samples were submitted to AENI for analysis. Arsenic, cobalt, copper, lead, and zinc were all detected above cleanup levels. The west side sample (16/16-003) had a total lead level of 79.8 mg/kg, while the south side sample (16/16-004) had a total lead analysis of 2,800 mg/kg. In July 1995, two additional sets of composites were collected and sampled for TNT, RDX (16/16-007 and 008), and PCBs (16/16-011 and 012) by field test kit. The PCB concentrations were below reporting limits on both samples 16/00-11 and -12. Sample 16/16-008 results indicated that RDX was detected at 0.5-1.5 mg/kg, with TNT concentrations below the reporting limits. Sample 16/16-007 results indicated that all explosives were below the detection limits. The field screening results and laboratory analytical data are summarized on Table 3-2, and the field data sheets provided in Appendix D.

Due to the wide spread of potential contamination from wind and runoff dispersion, eight additional characterization samples 16/16-013 to -020 were collected and analyzed for characterization parameters, including volatiles, explosives and metals. Various metals were detected above cleanup levels in all eight samples. Lead concentrations ranged from a low of 73.5 mg/kg to a high of 28,000 mg/kg. Explosives were all below detection limits in these samples, except sample 16/16-017 which had a 2,4-DNT level of 6100 ug/kg. The cleanup level for 2,4-DNT is 78,000 ug/kg, and thus the 2,4-DNT was not considered a contaminant of concern for sample 16/16-017. Volatiles were detected, but below method reporting limits for several of the samples. Volatiles were not considered contaminates of concern for these sample locations.

3.1.4 Above Ground Storage Tank Contents Characterization

The location of the fuel oil tanks are shown in Figure 2-5. On October 18, 1995, the sludge that remained in the bottom of the three fuel oil (FO) tanks was sampled and submitted to AENI for analysis of PCBs and pesticide/herbicide parameters. Sample 16/16-044 results indicated that Beta-BHC was detected, but with a quality flag. On February 8, 1996, the FO tanks sludge was resampled for disposal type parameters and submitted to CompuChem Environmental Corp (CEC) for analysis. The resample was labeled 16/00-044A and indicated that arsenic above the cleanup criteria level was present. Sample 16/00-044A results showed an arsenic level of 38.6 mg/l.

On October 13, 1995, the soils beneath the ASTs were also sampled (16/16-039) to determine whether they had been impacted over the years. Diesel fuel odor was observed in the soils during the sampling event. Sample 16/16-039 results indicate that polyaromatic hydrocarbons (PAHs) and pesticied/herbicdes were detected, but at levels near the lower detection limit on the instruments; however, the PAH levels exceeded the cleanup critieria. The laboratory analytical data are summarized on Table 3-2, and the data sheets are provided in Appendix D.

3.2 EXCAVATION AND REMOVAL

The work activities that were performed at SWMU-16/16 were performed in accordance with the approved Work Plan. Table 3-3 provides a summary of the waste manifests, while Table 3-4, Confirmation Samples, presents all of the analytes that were detected during analysis. Analytical data is presented in Appendix D and is organized by sample number.

3.2.1 East Sump

Small quantities of free liquid were collected with approximately five cubic yards of an absorbent wood fiber material (sawdust) and placed into a roll-off box. Approximately 20 cubic yards (22.8 tons) of sludge were removed from the east sump and placed into a roll-off box in preparation for disposal. Photographs 16 and 17 in Appendix C show the roll-off box being lined with plastic and the area between the box and sump being covered with plastic prior to sludge removal, thus preventing potential migration of contaminants. The loading of the roll-off box for disposal is shown in photographs 18, 19, and 20. The walls were pressure washed and visually inspected to determine cleanliness. The potentially contaminated wash water was collected in DOT approved fifty-five-gallon drums and sampled (16/16-040) and analyzed for confirmation parameters (volatile organics, pesticides, explosives and metals). All sample results were below cleanup levels.

3.2.2 West Sump

Sample 16/16-002 was analyzed for Appendix IX metals as discussed in Section 3.1.2. Table 3-2

provides the characterization sample results. The contaminated liquid was pumped out of the sump, sampled, and stored in DOT approved fifty-five-gallon drums prior to transport for disposal. Photographs 21, 22, and 23 show the sludge remaining after removal of the contaminated water.

The area was lined with plastic, as described in Section 3.2.1, in preparation for sludge removal activities. Upon initial sludge removal activities, a distinct odor (vinyl chloride) was apparent. Sludge removal activities ceased and additional samples were collected. The subsequent sample results (16/J0-042,-043, -045) indicated high concentrations of trichloroethene as discussed in Section 3.1.1. Personnel protective equipment was upgraded to level B for the remaining sludge removal activities.

A total of 36.7 tons of sludge was removed from the sump, placed into lined roll-off boxes, and sampled for waste characterization prior to disposal. After the sludge was removed, the sump walls were high pressure washed for cleaning. The decontamination water was collected, sampled, and stored in DOT approved fifty-five-gallon drums prior to transport for disposal. Results of samples collected from the sump wash water were used to determine cleanliness of the sump walls and floor. Rinse water sample 16/16-070 results indicated 18 mg/kg concentration of trichloroethene. This level exceeds the cleanup level of 14 mg/kg; however, no additional rinsing was performed due to the influent of contaminated liquid from the drain pipe.

A small amount of liquid from the drain pipe continued to flow into the sump. One sample (16/16-079) was collected from the drain pipe influent, and results indicated high levels of trichloroethene. Additional investigation activities to determine the source of the trichloroethene contamination are being performed under Delivery Order 0027 and are not discussed in this report. In addition, a skid-mounted water treatment system has been installed for treatment of the contaminated drain water until the trichloroethene source has been located and removed under the same Delivery Order.

3.2.3 Slag/Ash Piles

Beginning in September 1995, the slag/ash piles were excavated and collected in roll-off boxes for disposal. Various piles throughout the SWMU area were removed, including several that were beyond the fence boundary, north of the drainage ditch. Soil samples were collected from the excavation slag/ash pile areas. These samples were analyzed for the confirmation parameters of metals, volatile organic compounds, explosives, and pesticides. The initial six- to twelve-inch depth sample results (16/16-022 through -38 and 16/16-046 through -066) indicated that additional excavation was required, as lead levels were still above the cleanup criteria. Sample locations are identified on Figure 3-1. Subsequent excavation and sampling was performed until soil removal was discontinued per NSWC Crane direction after conferring with Southern Division. These samples were labeled 16/00-23A through -38A as their location was identical to the original samples 16/16-023 through -038, but at a depth of twelve to eighteen inches. Additional excavation and confirmation sampling continued in various areas inside as well as outside the fence perimeter. Samples 16/16-046 through -062 and -074 through -078 are the additional confirmation samples collected and are located on Figure 3-1. The subsequent sample analysis results have revealed that the soil at SWMU-16/16 presently contains levels of lead above the interim cleanup levels and may merit further consideration. However, the source of contamination has been removed, and therefore, the IM has met the requirements and objectives of the Work Plan for SWMU-16/16. Previous background and backfill material sample results have identified high levels of various metals which are shown in Table 3-5. Background lead is high, as shown on this table; however, SWMU-16/16 sample results indicate lead concentrations higher than normal background levels.

3.2.4 Above Ground Storage Tanks

Removal of three ASTs and associated piping, steel framing, and concrete foundations was added to the scope of the IM after the work plan had been approved. Removal activities began on October 18, 1995, with residual sludge from inside the ASTs being removed and placed into a DOT approved fifty-five gallon drum for disposal. The ASTs were cleaned, dismantled and transported to the NSWC DRMO for disposition. Based on the characterization sample results, (16/16-039), the visually-impacted soil and gravel underneath and around the ASTs was excavated, sampled and containerized for transportation. Nearly 150 tons of soil was excavated and and containerized for disposal. Confirmation samples 16/16/-071, -072, and -073 were collected and analyzed for VOCs and SVOCs. Results indicate residual PAHs remain in excess of the cleanup levels. Photographs 14 and 23 in Appendix C show the soil around the ASTs. The tank removal and excavation processes are shown in photographs 24 and 25 in Appendix C.

3.3 RECONSTRUCTION AND RESTORATION

Following review of confirmation sample results, the excavated area was backfilled with material from the NSWC Crane borrow pit located south of the on-site landfill. The on-site borrow pit was an approved source of backfill material based upon samples previously collected. Two samples (NSWC-BP\BF-003 and NSWC-BP\BF-004) were collected from the borrow pit, analyzed for Appendix IX compounds, and determined to be free of contaminants of concern. Other samples collected from virgin soil borrow sources confirmed that levels of arsenic, beryllium, lithium and cobalt above the established cleanup levels are naturally present in soils in the surrounding area (Samples NSWC-BIOF-001 through -014). Table 3-5 summarizes the background samples (BP/BF-05 and BP/BF-06) collected off-site as well as samples BIOF-001 through 014.

The backfill, including topsoil, was placed and compacted in one-foot increments or less until the site was restored to near original grade. The area was seeded, mulched and subsequently monitored to ensure establishment of adequate ground cover to prevent erosion. Adequate ground cover has been re-established, and the work was accepted by the US Navy on July 12, 1996. A copy of the SWMU Acceptance and Turnover Statement is included with the regulatory documents in Appendix A. Photographs 26 through 30, Appendix C, show the seeded and mulched areas and subsequent vegetation growth.

3.4 WASTE CHARACTERIZATION AND DISPOSAL

The results of the characterization samples were reviewed and additional samples were collected as necessary. The sample results were evaluated to determine whether the waste would be hazardous, special, or solid waste. The waste streams were evaluated and approvals received for disposal into appropriate facilities. Table 3-3, Waste Disposal Summary, provides details on the various waste streams with the final disposal site. Signed, completed return manifests and waste profiles are provided in Appendix E.

3.4.1 East Sump

The site characterization samples 16/00-001, -005, and -009 discussed in Section 3.1.1 were also used as the waste characterization samples. The samples were analyzed for "total" metals concentration with results indicating a lead concentration high enough to be above the land disposal restriction level of 500 mg/kg. A general indication of Toxicity Characteristic Leaching Procedure (TCLP) levels of metals in soils is approximated by dividing the total metal concentration by 20. Thus in the east sump, the total metals level for lead was 47,700 mg/kg, or a TCLP approximate equivalent of 2,385 mg/l (well above the regulatory level of 5 mg/l per 40 CFR 261), and, therefore, classified as a hazardous characteristic waste (D008) requiring treatment prior to disposal. PCBs were below reporting limits, but TNT was detected at 0.5-1.5 mg/kg, and RDX was below detection.

On October 10, 1995, twenty cubic yards (22.8 tons) of sludge and absorbent waste removed from the east sump were transported by Chemical Waste Management (CWM) to the CWM landfill, Adams Center in Fort Wayne, Indiana. This landfill is a licensed Hazardous Waste Landfill. The soils were stabilized to immobilize the lead in the waste which permits disposal in the landfill. The waste profile, CWM supplemental information form, and the hazardous waste manifest are provided in Appendix E.

3.4.2 West Sump

On November 7, 1995, during remediation activities, characterization samples were collected from the roll-off boxes used to containerize the sludge (16/16-067 and -068). These results were used to determine waste disposal classifications as well as treatment requirements, if necessary. Samples 16/16-067 and -068 were both analyzed for TCLP metals, volatiles, and disposal parameters of pH, flashpoint, and reactivity. The lead levels were at 89 mg/l TCLP and 173 mg/l TCLP, respectively. Trichloroethene was detected at 23mg/l and 80 mg/l TCLP in the same samples. These levels were above the toxicity characteristic levels of 5 mg/L lead and .5 mg/l trichloroethene and required disposal by incineration as a waste class D040 and D008, per 40 CFR 261. Three roll-off boxes containing 36.7 tons of sludge were transported on May 2, 1996, by Area Disposal to the Trade Waste Incinerator (TWI) in Sauget, Illinois.

The free liquid in the sump and decontamination fluids were collected in fifty-five gallon drums during the remediation activities. Thirty-five drums containing a total of 1925 gallons of trichloroethene-contaminated liquid (waste code D040) was transported by Tri-State Motor Transit Company on April 15, 1996, to Excel

TSD, Inc., in Memphis Tennessee, for disposal.

3.4 ? Slag/Ash Piles

The site characterization samples 16/00-003, -004, and -013 through -020 discussed in Section 3.1.2 where also used for waste characterization samples. Various metals were detected above cleanup levels in all ten samples. Lead concentrations ranged from a low of 73.5 mg/kg to a high of 28,000 mg/kg, which identified lead at a level above hazardous waste levels, as defined in 40 CRF 261. Using the general rule of TCLP levels at 1/20 of the total lead concentration, the soil was classified as a lead containing waste, code D008, and required stabilization prior to landfilling.

From October 12 through October 27, 1995, and on April 4, 1996, a total of 476.6 tons of lead-contaminated soil (twenty roll-off containers) with the hazardous waste classification of D008 was transported by Beelman Truck Company and Chemical Waste Management, Inc., to the CWM landfill, Adams Center in Fort Wayne, Indiana for stabilization and disposal.

3.4.4 Above Ground Storage Tanks

The ASTs had two waste streams associated with their removal. The first was the sludge inside the AST, and the second was the contaminated soils beneath them. On October 18, 1995, the ASTs themselves were dismantled and prepared for transport to the NSWC Crane Defense Reutilization and Marketing Office (DRMO) for disposition.

Based on sample results, the sludge inside of the ASTs contained arsenic above the hazardous waste level per 40 CFR 261, and, therefore, was classified waste code D004. The arsenic level was identified at 38.6 mg/kg (total) in sample 16/16-044A, as discussed in Section 3.1.4. On April 15, 1996, one fifty-five gallon drum of sludge was removed from the ASTs and transported by Tri-State Motor Transit Company to Excel TSD, Inc., in Memphis, Tennessee, for treatment and disposal through the fuels blending program, which is a form of recycling/reuse.

The soils and gravel beneath the ASTs were contaminated with petroleum products based on sample 16/16-039 results and were classified as a special waste. On February 7, 1996, 149.74 tons of diesel contaminated soil were transported by Tri Ax, Inc./Envirosolve to Southside Landfill in Indianapolis, Indiana, for disposal.

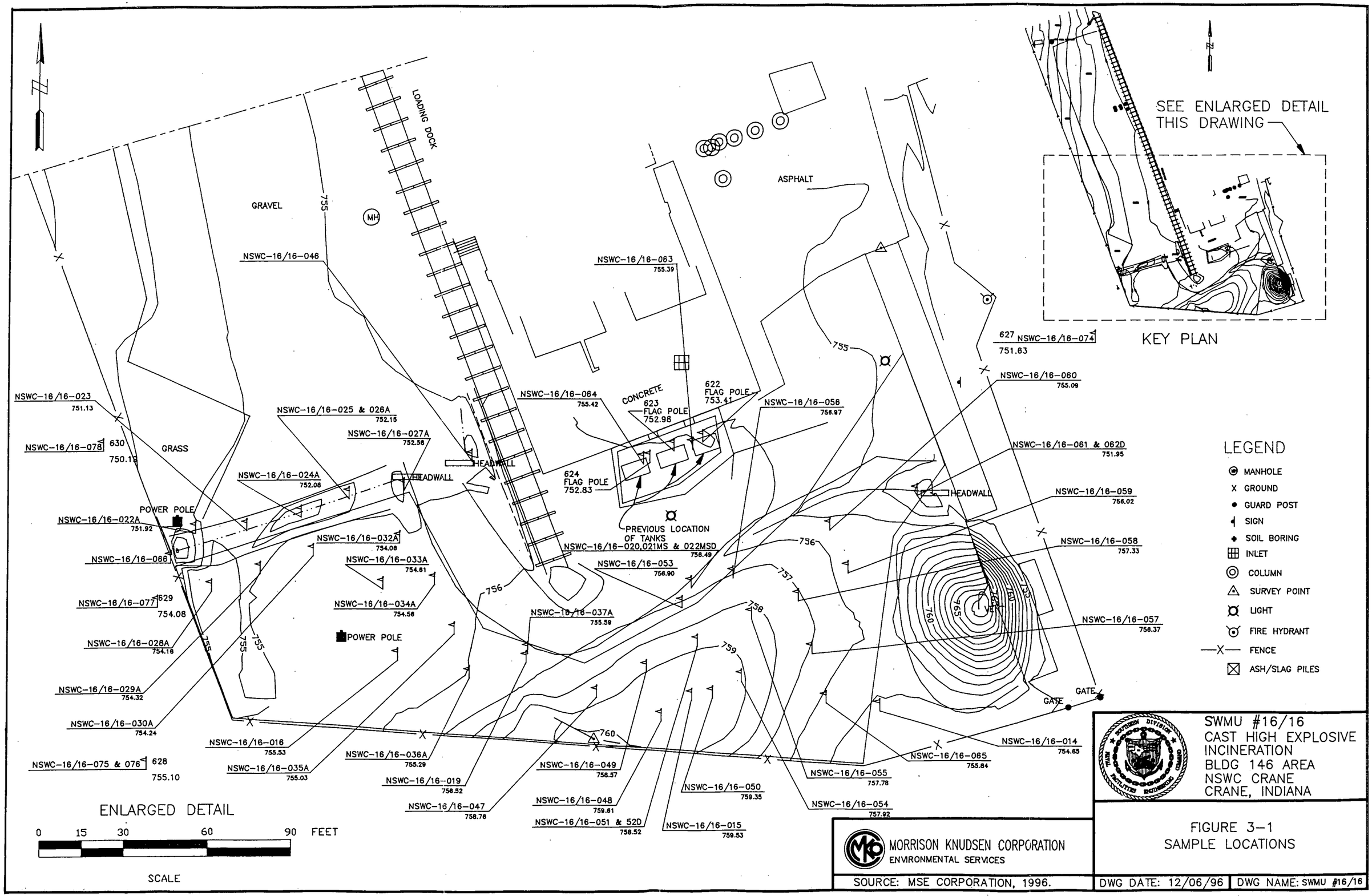

N
LOADING DOCK
GRAVEL
755
MH
NSWC-16/16-046
NSWC-16/16-063
755.39
ASPHALT
SEE ENLARGED DETAIL
THIS DRAWING
KEY PLAN
627 NSWC-16/16-074
751.63
NSWC-16/16-060
755.09
NSWC-16/16-023
751.13
NSWC-16/16-025 & 026A
752.15
NSWC-16/16-027A
752.58
NSWC-16/16-064
755.42
CONCRETE
623
FLAG POLE
752.98
622
FLAG POLE
753.41
NSWC-16/16-056
756.97
NSWC-16/16-078 630
750.18
GRASS
HEADWALL
624
FLAG POLE
752.83
NSWC-16/16-024A
752.08
HEADWALL
NSWC-16/16-061 & 062D
751.95
HEADWALL
NSWC-16/16-059
756.02
POWER POLE
NSWC-16/16-022A
751.92
PREVIOUS LOCATION
OF TANKS
NSWC-16/16-020,021MS & 022MSD
756.49
NSWC-16/16-032A
754.08
NSWC-16/16-058
757.33
NSWC-16/16-066
NSWC-16/16-033A
754.81
NSWC-16/16-053
756.90
756
757
758
759
760
765
NSWC-16/16-077 629
754.08
NSWC-16/16-034A
754.56
NSWC-16/16-037A
755.59
NSWC-16/16-057
756.37
NSWC-16/16-028A
754.16
POWER POLE
NSWC-16/16-029A
754.32
GATE
GATE
NSWC-16/16-030A
754.24
NSWC-16/16-016
755.53
NSWC-16/16-014
754.65
NSWC-16/16-075 & 076 628
755.10
NSWC-16/16-035A
755.03
NSWC-16/16-036A
755.29
NSWC-16/16-065
755.84
NSWC-16/16-049
758.57
NSWC-16/16-055
757.78
NSWC-16/16-019
756.52
NSWC-16/16-050
759.35
NSWC-16/16-047
758.76
NSWC-16/16-048
759.61
NSWC-16/16-054
757.92
NSWC-16/16-051 & 52D
758.52
NSWC-16/16-015
759.53
ENLARGED DETAIL
0 15 30 60 90 FEET
SCALE
LEGEND
MANHOLE
GROUND
GUARD POST
SIGN
SOIL BORING
INLET
COLUMN
SURVEY POINT
LIGHT
FIRE HYDRANT
FENCE
ASH/SLAG PILES
MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES
SWMU #16/16
CAST HIGH EXPLOSIVE
INCINERATION
BLDG 146 AREA
NSWC CRANE
CRANE, INDIANA
FIGURE 3-1
SAMPLE LOCATIONS
SOURCE: MSE CORPORATION, 1996.
DWG DATE: 12/06/96
DWG NAME: SWMU #16/16

TABLE 3-1
SAMPLE COLLECTION SUMMARY

Sample No.	Media	Type	Sample Date	Analysis	Location
16/16-001	SOIL	WASTE CHAR.	06/29/95	6010(APPENDIX IX)METALS	E Sump
16/16-002	SOIL	WASTE CHAR.	06/29/95	6010(APPENDIX IX)METALS	W Sump
16/16-003	SOIL	WASTE CHAR.	06/29/95	6010(APPENDIX IX)METALS	W side surface composite
16/16-004	SOIL	WASTE CHAR.	06/29/95	APPENDIX IX	S Side surface composite
16/16-005	SOIL	TNT/RDX	07/12/95	FIELD SCREENING	E Sump
16/16-006	SOIL	TNT/RDX	07/13/95	FIELD SCREENING	W Sump
16/16-007	SOIL	TNT/RDX	07/13/95	FIELD SCREENING	W side surface composite
16/16-008	SOIL	TNT/RDX	07/13/95	FIELD SCREENING	S Side surface composite
16/16-009	SOIL	PCB	07/13/95	FIELD SCREENING	E Sump
16/16-010	SOIL	PCB	07/13/95	FIELD SCREENING	W Sump
16/16-011	SOIL	PCB	07/13/95	FIELD SCREENING	W side surface composite
16/16-012	SOIL	PCB	07/13/95	FIELD SCREENING	S Side surface composite
16/16-013	SOIL	WASTE CHAR.	08/30/95	8240,8010,8330,6010A,7471	E Side Culvert surface soil
16/16-014	SOIL	WASTE CHAR.	08/30/95	8240,8010,8330,6010A,7471	South side east
16/16-015	SOIL	WASTE CHAR.	08/30/95	8240,8010,8330,6010A,7471	South side south
16/16-016	SOIL	WASTE CHAR.	08/30/95	8240,8010,8330,6010A,7471	South side west
16/16-017	SOIL	WASTE CHAR.	08/30/95	8240,8010,8330,6010A,7471	West side ditch
16/16-018	SOIL	WASTE CHAR. D	08/30/95	8240,8010,8330,6010A,7471	West side ditch
16/16-019	SOIL	WASTE CHAR.	08/30/95	8240,8010,8330,6010A,7471	North side west
16/16-020	SOIL	WASTE CHAR.	08/30/95	8240,8010,8330,6010A,7471	North side center
16/16-021	SOIL	WASTE CHAR. M	08/30/95	8240,8010,8330,6010A,7471	North side center
16/16-RB8	LIQUID	EQUIP. RINSATE	10/11/95	8240,8330,200SERIES	taken w samples 22-38
16/16-022	SOIL	CONFIRMATORY	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-023	SOIL	CONFIRMATORY	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-024	SOIL	CONFIRMATORY	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-025	SOIL	CONFIRMATORY	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-026	SOIL	CONFIRMATORY D	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-027	SOIL	CONFIRMATORY	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-028	SOIL	CONFIRMATORY	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-029	SOIL	CONFIRMATORY	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-030	SOIL	CONFIRMATORY	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-031	SOIL	CONFIRMATORY	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-032	SOIL	CONFIRMATORY	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-033	SOIL	CONFIRMATORY	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-034	SOIL	CONFIRMATORY	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-035	SOIL	CONFIRMATORY	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-036	SOIL	CONFIRMATORY	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-037	SOIL	CONFIRMATORY	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-038	SOIL	CONFIRMATORY D	10/13/95	APPENDIX IX,8330,8260*	6" to 1' below surface
16/16-039	SOIL	WASTE CHAR.	10/13/95	8020,8270,8080	FO Tk surface soil
16/16-040	LIQUID	CONFIRMATORY	10/13/95	8260*,8080,6010,7470,8330,353.3	E Sump rinse water
16/16-TB5	LIQUID	TRIP BLANK	10/13/95	8240	taken w samples 39 & 40
16/16-041	SOIL	PCB	10/13/95	FIELD SCREENING	
16/16-042	SLUDG	WASTE CHAR.	10/16/95	RCRA REQUIRMENTS	South Sump
16/16-043	LIQUID	WASTE CHAR.	10/17/95	RCRA REQUIRMENTS	Sump South 16/16
16/16-044	SLUDG	WASTE CHAR.	10/18/95	8080	F O TK Sludge
16/16-045	LIQUID	WASTE CHAR.	10/19/95	6010A, 7470	South Sump/ replaces 43
16/16-RB10	LIQUID	EQUIP. RINSATE	10/19/95	6010A,7470,8260*,353.3,8330	taken w samples 46-62
16/16-046	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface
16/16-047	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface
16/16-048	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface
16/16-049	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface
16/16-050	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface
16/16-051	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface
16/16-052	SOIL	CONFIRMATORY D	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface
16/16-053	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface

TABLE 3-1
SAMPLE COLLECTION SUMMARY

Sample No.	Media	Type	Sample Date	Analysis	Location
16/16-054	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below s[illegible]e
16/16-055	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below s[illegible]e
16/16-056	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below s[illegible]ce
16/16-057	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface
16/16-058	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface
16/16-059	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface
16/16-060	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface
16/16-061	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface
16/16-062	SOIL	CONFIRMATORY D	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface
16/16-063	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8020,8270,8260*,8080	under FO tanks
16/16-064	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8020,8270,8260*,8080	under FO tanks
16/16-065	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface
16/16-066	SOIL	CONFIRMATORY	10/19/95	6010,8330,7471,8260*,8080	E Side, 6" to 1' below surface
16/16-RB11	LIQUID	EQUIP. RINSATE	10/25/95	8260*,8330,6010,7470,353.3	taken w samples 23A-38A
16/16-23A	SOIL	CONFIRMATORY	10/25/95	8260*,8080,7471,8330	Resample, 1' to 18" down
16/16-24A	SOIL	CONFIRMATORY	10/25/95	8260*,8080,7471,8330	Resample, 1' to 18" down
16/16-25A	SOIL	CONFIRMATORY	10/25/95	8260*,8080,7471,8330	Resample, 1' to 18" down
16/16-26A	SOIL	CONFIRMATORY D	10/25/95	8260*,8080,7471,8330	Resample, 1' to 18" down
16/16-27A	SOIL	CONFIRMATORY	10/25/95	8260*,8080,7471,8330	Resample, 1' to 18" down
16/16-28A	SOIL	CONFIRMATORY	10/25/95	8260*,8080,7471,8330	Resample, 1' to 18" down
16/16-29A	SOIL	CONFIRMATORY	10/25/95	8260*,8080,7471,8330	Resample, 1' to 18" down
16/16-30A	SOIL	CONFIRMATORY	10/25/95	8260*,8080,7471,8330	Resample, 1' to 18" down
16/16-32A	SOIL	CONFIRMATORY	10/25/95	8260*,8080,7471,8330	Resample, 1' to 18" down
16/16-33A	SOIL	CONFIRMATORY	10/25/95	8260*,8080,7471,8330	Resample, 1' to 18" down
16/16-34A	SOIL	CONFIRMATORY	10/25/95	8260*,8080,7471,8330	Resample, 1' to 18" down
16/16-35A	SOIL	CONFIRMATORY	10/25/95	8260*,8080,7471,8330	Resample, 1' to 18" down
16/16-36A	SOIL	CONFIRMATORY	10/25/95	8260*,8080,7471,8330	Resample, 1' to 18" down
16/16-37A	SOIL	CONFIRMATORY	10/25/95	8260*,8080,7471,8330	Resample, 1' to 18" dow[illegible]
16/16-38A	SOIL	CONFIRMATORY D	10/25/95	8260*,8080,7471,8330	Resample, 1' to 18" do[illegible]
16/16-067	SOIL	WASTE CHAR.	11/07/95	RCRA/TCLP	Roll-off II from west s[illegible]
16/16-068	SOIL	WASTE CHAR.	11/07/95	RCRA/TCLP	Roll-off II from west sump
16/16-069	LIQUID	WASTE CHAR.	12/19/95	8240	West sump
16/16-070	LIQUID	CONFIRMATORY M	02/06/96	APPENDIX IX	WS Rinse H20
16/16-071	SOIL	CONFIRMATORY	02/07/96	8310/8020	Under FO Tks
16/16-072	SOIL	CONFIRMATORY M	02/07/96	8310/8020	Under FO Tks
16/16-073	SOIL	CONFIRMATORY	02/07/96	8310/8020	Under FO Tks
16/16-RB13	LIQUID	EQUIP. RINSATE	02/07/96	APPENDIX IX	taken w samples 70-78
16/16-074	SOIL	CONFIRMATORY	02/07/96	APPENDIX IX	Outside fence east
16/16-075	SOIL	CONFIRMATORY	02/07/96	APPENDIX IX	Outside fence SSW
16/16-076	SOIL	CONFIRMATORY D	02/07/96	APPENDIX IX	Outside fence SSW
16/16-077	SOIL	CONFIRMATORY	02/07/96	APPENDIX IX	Outside fence W
16/16-078	SOIL	CONFIRMATORY	02/07/96	APPENDIX IX	Outside fence NW
16/16-TB09	LIQUID	TRIP BLANK	02/08/96	8240	taken w samples 70-78
16/16-TB10	LIQUID	TRIP BLANK	02/08/96	8240	taken w samples 70-78
16/16-TB11	LIQUID	TRIP BLANK	02/08/96	8240	taken w samples 70-78
16/16-079	LIQUID	WASTE CHAR.	02/08/96	8240	Drummed Sumpwater
16/16-080	LIQUID	WASTE CHAR.	02/08/96	8240	Drummed Sumpwater
16/16-081	LIQUID	WASTE CHAR.	02/08/96	8240	Drummed Sumpwater
16/16-082	LIQUID	WASTE CHAR.	02/08/96	8240	Drummed Sumpwater
16/16-083	LIQUID	WASTE CHAR.	02/08/96	8240	Drummed Rinsewater
16/16-084	LIQUID	WASTE CHAR.	02/08/96	8240	Drummed Rinsewater
16/16-TB12	LIQUID	WASTE CHAR.	02/08/96	8240	Taken w/ Drummed material
16/16-44A	SOIL	WASTE CHAR.	02/08/96	RCRA/TCLP	FO Tank Sludge

* Method 8240 originally requested on chain of custody. Lab performed volatiles by method 8260 with verbal approval.

TABLE 3-2
SWMU 16/16 Characterization Samples
Analytical Results Summary

COMPOUND	SAMPLE #	16/16-001	Q	16/16-002	Q	16/16-003	Q	16/16-004	Q	16/16-005	Q	16/16-006	Q	16/16-007	Q	16/16-008	Q
	SAMPLE DATE:	6/29/95		6/29/95		6/29/95		6/29/95		7/13/95		7/13/95		7/13/95		7/13/95	
	TYPE:	SOIL		SOIL		SOIL		SOIL		**Field screen**		**Field screen**		**Field screen**		**Field screen**	
	LOCATION:	E Sump		W Sump		W Side		S Side		E Sump		W Sump		West Side		South Side	
	CLEANUP LEVEL ug/kg	ug/kg		ug/kg		ug/kg		ug/kg		(16/16-001)		(16/16-002)		(16/16-003)		(16/16-004)	
METALS																	
Antimony	31,000	408,000		548,000			U	20,700		--		--		--		--	
Arsenic	970	18,900		36,300		1,700		24,200		--		--		--		--	
Barium	5,500,000	8,160,000		11,100,000		70,200		4,150,000		--		--		--		--	
Beryllium	400		U	650		230		300		--		--		--		--	
Cadmium	39,000	74,200		200,000			U	5,300		--		--		--		--	
Chromium	940,000	92,200		142,000		7,700		92,400		--		--		--		--	
Cobalt	100	2,600		6,600			U	7,500		--		--		--		--	
Copper	2,900,000	10,800,000		13,100,000		50,000		13,800,000		--		--		--		--	
Lead	500,000	47,700,000		44,800,000		79,800		2,800,000		--		--		--		--	
Mercury	23,000	3,500		13,300			U	420		--		--		--		--	
Nickel	1,600,000	58,500		104,000		3,100		155,000		--		--		--		--	
Selenium	390,000		U	1,300			U		U	--		--		--		--	
Silver	390,000	2,100		6,900			U		U	--		--		--		--	
Thallium	NA		U		U		U	6,600		--		--		--		--	
Vanadium	550,000		U		U	5,900			U	--		--		--		--	
Zinc	23,000,000	142,000,000		158,000,000		124,000		280,000,000		--		--		--		--	
Tin	47,000,000	117,000		170,000			U	303,000		--		--		--		--	
Lithium		--		--		--		--		--		--		--		--	
EXPLOSIVES AND TOTAL PCBs																	
HMX		--		--		--		--		--		--		--		--	
TNT		--		--		--		--		0.5 - 1.5 ppm		< 0.5 ppm		< 0.5 ppm		< 0.5 ppm	
RDX		--		--		--		--		< 0.5 ppm		< 0.5 ppm		< 0.5 ppm		0.5 - 1.5 ppm	
PCB		--		--		--		--		--		--		--		--	
2,4-DNT	78,000	--		--		--		--		--		--		--		--	
VOLATILE ORGANICS																	
Benzene	2,700	--		--		--		--		--		--		--		--	
Chlorobenzene	300,000	--		--		--		--		--		--		--		--	
1,1-Dichloroethene	70	--		--		--		--		--		--		--		--	
cis-1,2-Dichloroethene		--		--		--		--		--		--		--		--	
trans-1,2-Dichloroethene	620,000	--		--		--		--		--		--		--		--	
Ethylbenzene	58,000	--		--		--		--		--		--		--		--	
Methylene Chloride	22,000	--		--		--		--		--		--		--		--	
Toluene	280,000	--		--		--		--		--		--		--		--	
1,1,1-Trichloroethane	300,000	--		--		--		--		--		--		--		--	
1,1,2-Trichloroethane	2,900	--		--		--		--		--		--		--		--	
Trichloroethene	14,000	--		--		--		--		--		--		--		--	
Vinyl Chloride	9.7	--		--		--		--		--		--		--		--	
Total Xylene	99,000	--		--		--		--		--		--		--		--	
Tertachloroethene	22,000	--		--		--		--		--		--		--		--	
PAHs																	
Anthracene	1,900	--		--		--		--		--		--		--		--	
Phenanthrene	660	--		--		--		--		--		--		--		--	
Pyrene	1,200,000	--		--		--		--		--		--		--		--	
4-Methylphenol		--		--		--		--		--		--		--		--	
2,4-Dinitrotoluene	78,000	--		--		--		--		--		--		--		--	
PESTICIDES/HERBICIDES																	
Aldrin	50	--		--		--		--		--		--		--		--	
beta-BHC	4.02	--		--		--		--		--		--		--		--	
Heptachlor	190	--		--		--		--		--		--		--		--	
Heptachlor Epoxide	94	--		--		--		--		--		--		--		--	
2,4-D	390,000	--		--		--		--		--		--		--		--	
Silvex	110	--		--		--		--		--		--		--		--	
OTHER																	
Corrosivity (as pH)		--		--		--		--		--		--		--		--	
Flashpoint		--		--		--		--		--		--		--		--	
Reactive Cyanide		--		--		--		--		--		--		--		--	
Reactive Sulfide		--		--		--		--		--		--		--		--	
Paint Filter		--		--		--		--		--		--		--		--	

TABLE 3-2
SWMU 16/16 Characterization Samples
Analytical Results Summary

COMPOUND	SAMPLE #	16/16-009	Q	16/16-010	Q	16/16-011	Q	16/16-012	Q	16/16-013	Q	16/16-014	Q	16/16-015	Q	16/16-016	Q
	SAMPLE DATE:	7/13/95		7/13/95		7/13/95		7/13/95		8/30/95		8/30/95		8/30/95		8/30/95	
	TYPE:	**Field screen**		**Field screen**		**Field screen**		**Field screen**		SOIL		SOIL		SOIL		SOIL	
	LOCATION:	E Sump		W Sump		West Side		South Side		E Side Culvert		S Side East		S Side South		S Side West	
	CLEANUP LEVEL ug/kg	(16/16-001)		(16/16-002)		(16/16-003)		(16/16-004)		ug/kg		ug/kg		ug/kg		ug/kg	
METALS																	
Antimony	31,000	--		--		--		--		32,200	N		U	12,100	N	173,000	N
Arsenic	970	--		--		--		--		3,600			U	1,300		4,300	
Barium	5,500,000	--		--		--		--		1,130,000	N*	85,400	N*	409,000	N	1,690,000	N*
Beryllium	400	--		--		--		--		690		690		490		430	
Cadmium	39,000	--		--		--		--		7,600	N	1100	N	2,900	N	24,700	N
Chromium	940,000	--		--		--		--		27,600	N	13,600	N	11,800	N	19,000	N
Cobalt	100	--		--		--		--		4,900		5,500		4,600		3,900	
Copper	2,900,000	--		--		--		--		1,130,000	*	35,900	*	231,000	*	7,030,000	*
Lead	500,000	--		--		--		--		2,360,000	*	73,500	*	937,000	*	28,000,000	*
Mercury	23,000	--		--		--		--		310			U		U	150	
Nickel	1,600,000	--		--		--		--		22,400	*	88,900	*	151,000	*	66,900	*
Selenium	390,000	--		--		--		--			U		U		U		U
Silver	390,000	--		--		--		--			U		U		U	2,700	
Thallium	NA	--		--		--		--			U		U		U		U
Vanadium	550,000	--		--		--		--		17,600		11,500		9,500		13,300	
Zinc	23,000,000	--		--		--		--		10,800,000	*	286,000	*	2,550,000	*	10,100,000	*
Tin	47,000,000	--		--		--		--			U		U		U	34,200	
Lithium		--		--		--		--			U		U		U		U
EXPLOSIVES AND TOTAL PCBs																	
HMX		--		--		--		--			U		U		U		U
TNT		--		--		--		--			U		U		U		U
RDX		--		--		--		--			U		U		U		U
PCB		< 0.5 ppm		< 0.5 ppm		< 0.5 ppm		< 0.5 ppm			U		U		U		U
2,4-DNT	78,000	--		--		--		--			U		U		U		U
VOLATILE ORGANICS																	
Benzene	2,700	--		--		--		--		--		--		--		--	
Chlorobenzene	300,000	--		--		--		--		--		--		--		--	
1,1-Dichloroethene	70	--		--		--		--		--		--		--		--	
cis-1,2-Dichloroethene		--		--		--		--		--		--		--		--	
trans-1,2-Dichloroethene	620,000	--		--		--		--		--		--		--		--	
Ethylbenzene	58,000	--		--		--		--		--		--		--		--	
Methylene Chloride	22,000	--		--		--		--		--		--		--		--	
Toluene	280,000	--		--		--		--		--		--		--		--	
1,1,1-Trichloroethane	300,000	--		--		--		--		--		--		--		--	
1,1,2-Trichloroethane	2,900	--		--		--		--		--		--		--		--	
Trichloroethene	14,000	--		--		--		--			U		U		U	2.3	J
Vinyl Chloride	9.7	--		--		--		--		--		--		--		--	
Total Xylene	99,000	--		--		--		--		--		--		--		--	
Tertachloroethene	22,000	--		--		--		--			U		U		U		U
PAHs																	
Anthracene	1,900	--		--		--		--		--		--		--		--	
Phenanthrene	660	--		--		--		--		--		--		--		--	
Pyrene	1,200,000	--		--		--		--		--		--		--		--	
4-Methylphenol		--		--		--		--		--		--		--		--	
2,4-Dinitrotoluene	78,000	--		--		--		--		--		--		--		--	
PESTICIDES/HERBICIDES																	
Aldrin	50	--		--		--		--		--		--		--		--	
beta-BHC	4.02	--		--		--		--		--		--		--		--	
Heptachlor	190	--		--		--		--		--		--		--		--	
Heptachlor Epoxide	94	--		--		--		--		--		--		--		--	
2,4-D	390,000	--		--		--		--		--		--		--		--	
Silvex	110	--		--		--		--		--		--		--		--	
OTHER																	
Corrosivity (as pH)		--		--		--		--		--		--		--		--	
Flashpoint		--		--		--		--		--		--		--		--	
Reactive Cyanide		--		--		--		--		--		--		--		--	
Reactive Sulfide		--		--		--		--		--		--		--		--	
Paint Filter		--		--		--		--		--		--		--		--	

TABLE 3-2
SWMU 16/16 Characterization Samples
Analytical Results Summary

COMPOUND	SAMPLE #	16/16-017	Q	16/16-018	Q	16/16-019	Q	16/16-020	Q	16/16-039	Q	16/16-042	Q	16/16-043	Q
	SAMPLE DATE:	8/30/95		8/30/95		8/30/95		8/30/95		10/13/95		10/16/95		10/17/95	
	TYPE:	SOIL		SOIL		SOIL		SOIL		SOIL		Sludge		Liquid (ug/L)	
	LOCATION:	W Side Ditch		W Side Ditch		N Side West		N Side Center		Under FO Tk.		W. Sump		W. Sump	
	CLEANUP LEVEL ug/kg	ug/kg		ug/kg		ug/kg		ug/kg		ug/kg					
METALS												TCLP metals (ug/L)			
Antimony	31,000	401,000	N	183,000	N	61,600	N	6500	N	--		--		--	
Arsenic	970	27,800		27,500		2,000		1,700		--			U	--	
Barium	5,500,000	7,370,000	N*	4,520,000	N*	1,700,000	N*	191,000	N*	--		756		--	
Beryllium	400	140		120		550		620		--		--		--	
Cadmium	39,000	31,600	N	23,100	N	2900	N	3600	N	--			U	--	
Chromium	940,000	142,000	N	124,000	N	21,000	N	12,100	N	--			U	--	
Cobalt	100	2,100		4,300		7,300		7,400		--		--		--	
Copper	2,900,000	142,000,000	*	67,600,000	*	2,520,000	*	8,740,000	*	--		--		--	
Lead	500,000	20,000,000	*	17,700,000	*	922,000	*	857,000	*	--		1390		--	
Mercury	23,000	90		120		650			U	--			U	--	
Nickel	1,600,000	361,000	*	213,000	*	21,700	*	19,100	*	--		--		--	
Selenium	390,000	7,700	N		U		U		U	--			U	--	
Silver	390,000	8,500		4,900			U		U	--			U	--	
Thallium	NA		U		U		U		U	--		--		--	
Vanadium	550,000	3,900		4,600		11,800		10,800		--		--		--	
Zinc	23,000,000	156,000,000	*	115,000,000	*	16,200,000	*	6,910,000	*	--		--		--	
Tin	47,000,000	107,000		99,700			U		U	--		--		--	
Lithium			U		U		U		U	--		--		--	
EXPLOSIVES AND TOTAL PCBs												total expl. (ug/kg)		total expl. (ug/L)	
HMX			U		U		U		U	--		26,000			U
TNT			U		U		U		U	--		9,500		870,000	
RDX			U		U		U		U	--		42,000			U
PCB			U		U		U		U	--		--		--	
2,4-DNT	78,000	6100			U		U		U	--			U		U
VOLATILE ORGANICS												TCLP VOCs (ug/L)		TOTAL VOCs (ug/L)	
Benzene	2,700	--		--		--		--			U		U		U
Chlorobenzene	300,000	--		--		--		--		--			U		U
1,1-Dichloroethene	70	--		--		--		--		--			U		U
cis-1,2-Dichloroethene		--		--		--		--		--		--		--	
trans-1,2-Dichloroethene	620,000	--		--		--		--		--		--		--	
Ethylbenzene	58,000	--		--		--		--			U	--		--	
Methylene Chloride	22,000	--		--		--		--		--		--		--	
Toluene	280,000	--		--		--		--			U	--		--	
1,1,1-Trichloroethane	300,000	--		--		--		--		--		--		--	
1,1,2-Trichloroethane	2,900	--		--		--		--		--		--		--	
Trichloroethene	14,000	1.8	J	2.3	J		U		U	--		18,000	D	2,600,000	
Vinyl Chloride	9.7	--		--		--		--		--		450	JD		U
Total Xylene	99,000	--		--		--		--			U	--		--	
Tertachloroethene	22,000		U		U		U		U	--			U		U
PAHs												TCLP SVOCs (ug/L)		TOTAL SVOCs (ug/L)	
Anthracene	1,900	--		--		--		--		4,900	JD	--		--	
Phenanthrene	660	--		--		--		--		16,000	JD	--		--	
Pyrene	1,200,000	--		--		--		--		3900	JD	--		--	
4-Methylphenol		--		--		--		--		--			U	45	D
2,4-Dinitrotoluene	78,000	--		--		--		--		--			U	160	D
PESTICIDES/HERBICIDES												TCLP pest/herb (ug/L)		TOTAL pest/herb (ug/L	
Aldrin	50	--		--		--		--		230	P	--		--	
beta-BHC	4.02	--		--		--		--		230	P	--		--	
Heptachlor	190	--		--		--		--		110	P		U		U
Heptachlor Epoxide	94	--		--		--		--		78	P		U		U
2,4-D	390,000	--		--		--		--		--			U		U
Silvex	110	--		--		--		--		--			U		U
OTHER															
Corrosivity (as pH)		--		--		--		--		--		9.2		8.5	
Flashpoint		--		--		--		--		--		> 203		> 203	
Reactive Cyanide		--		--		--		--		--		< 2		<20	U
Reactive Sulfide		--		--		--		--		--		80		<1000	U
Paint Filter		--		--		--		--		--		No free liquid		--	

TABLE 3-2
SWMU 16/16 Characterization Samples
Analytical Results Summary

COMPOUND	SAMPLE #	16/16-044	Q	16/16-045	Q	16/16-067	Q	16/16-068	Q	16/16-069	Q	16/16-079	Q	16/16-080	Q	16/16-081	Q
	SAMPLE DATE:	10/18/95		10/19/95		11/7/95		11/7/95		12/19/95		2/8/96		2/8/96		2/8/96	
	TYPE:	Sludge		Liquid (ug/L)		SOIL/leach		SOIL/Leach		Liquid		Liquid		Liquid		Liquid	
	LOCATION:	F O Tks		Sump		W smp r/o II		W smp r/o II		W sump		DR Sump H20		DR Sump H20		DR Sump H20	
	CLEANUP LEVEL ug/kg	ug/kg		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
METALS																	
Antimony	31,000	--		215		--		--		--		--		--		--	
Arsenic	970	--			U		U		U	--		--		--		--	
Barium	5,500,000	--		1420		4,300		3230		--		--		--		--	
Beryllium	400	--			U	--		--		--		--		--		--	
Cadmium	39,000	--		4.9		172		274		--		--		--		--	
Chromium	940,000	--		185			U		U	--		--		--		--	
Cobalt	100	--			U	--		--		--		--		--		--	
Copper	2,900,000	--		2430		--		--		--		--		--		--	
Lead	500,000	--		1420		89,200		173,000		--		--		--		--	
Mercury	23,000	--		0.47			U		U	--		--		--		--	
Nickel	1,600,000	--			U	--		--		--		--		--		--	
Selenium	390,000	--			U		U		U	--		--		--		--	
Silver	390,000	--			U		U		U	--		--		--		--	
Thallium	NA	--			U	--		--		--		--		--		--	
Vanadium	550,000	--			U	--		--		--		--		--		--	
Zinc	23,000,000	--		4940		--		--		--		--		--		--	
Tin	47,000,000	--			U	--		--		--		--		--		--	
Lithium		--		--		--		--		--		--		--		--	
EXPLOSIVES AND TOTAL PCBs																	
HMX		--		--		--		--		--		--		--		--	
TNT		--		--		--		--		--		--		--		--	
RDX		--		--		--		--		--		--		--		--	
PCB		--		--		--		--		--		--		--		--	
2,4-DNT	78,000	--		--		--		--		--		--		--		--	
VOLATILE ORGANICS																	
Benzene	2,700	--		--		--	U	--	UD		U		U		U		U
Chlorobenzene	300,000	--		--		--	U	--	U	--		--		--		--	
1,1-Dichloroethene	70	--		--		--	U	--	U	--		--		--		--	
cis-1,2-Dichloroethene		--		--		--		--		110			U		U		U
trans-1,2-Dichloroethene	620,000	--		--		--		--		7.3			U		U		U
Ethylbenzene	58,000	--		--		--		--			U		U		U		U
Methylene Chloride	22,000	--		--		--		--			U		U		U		
Toluene	280,000	--		--		--		--			U		U		U		
1,1,1-Trichloroethane	300,000	--		--		--		--		7.8			U		U		U
1,1,2-Trichloroethane	2,900	--		--		--		--		4.9	J		U		U		U
Trichloroethene	14,000	--		--		23,000	E	80,000	E	5100	D	360,000		63,000		82,000	
Vinyl Chloride	9.7	--		--		--	U	--	U	6.9	J		U		U		U
Total Xylene	99,000	--		--		--		--		--		--		--			U
Tertachloroethene	22,000	--		--		--	U	--	UD		U		U		U		U
PAHs																	
Anthracene	1,900	--		--		--		--		--		--		--		--	
Phenanthrene	660	--		--		--		--		--		--		--		--	
Pyrene	1,200,000	--		--		--		--		--		--		--		--	
4-Methylphenol		--		--		--		--		--		--		--		--	
2,4-Dinitrotoluene	78,000	--		--		--		--		--		--		--		--	
PESTICIDES/HERBICIDES																	
Aldrin	50		U	--		--		--		--		--		--		--	
beta-BHC	4.02	2300	P	--		--		--		--		--		--		--	
Heptachlor	190		U	--		--		--		--		--		--		--	
Heptachlor Epoxide	94		U	--		--		--		--		--		--		--	
2,4-D	390,000	--		--		--		--		--		--		--		--	
Silvex	110	--		--		--		--		--		--		--		--	
OTHER																	
Corrosivity (as pH)		--		--		8.4		8.5		--		--		--		--	
Flashpoint		--		--		> 203		> 203		--		--		--		--	
Reactive Cyanide		--		--		< 2 mg/kg		<2 mg/kg		--		--		--		--	
Reactive Sulfide		--		--		64 mg/kg		< 40 mg/kg		--		--		--		--	
Paint Filter		--		--		No free liq.		No free liq.		--		--		--		--	

TABLE 3-2
SWMU 16/16 Characterization Samples
Analytical Results Summary

COMPOUND	SAMPLE #	16/16-082	Q	TB-12	Q	16/16-044A	Q	16/16-083	Q	16/16-084	Q
	SAMPLE DATE:	2/8/96		2/8/96		2/8/96		2/8/96		2/8/96	
	TYPE:	Liquid		Liquid		SOIL		Liquid		Liquid	
	LOCATION:	DR Sump H20		w/dr matl		FO Tk Sludge		DR Rinse H20		DR Rinse H20	
	CLEANUP LEVEL ug/kg	ug/L		ug/L		ug/kg		ug/L		ug/L	
METALS											
Antimony	31,000	--		--		--		--		--	
Arsenic	970	--		--		38,600		--		--	
Barium	5,500,000	--		--		100	B	--		--	
Beryllium	400	--		--		--		--		--	
Cadmium	39,000	--		--		6.7		--		--	
Chromium	940,000	--		--		8.4	B	--		--	
Cobalt	100	--		--		--		--		--	
Copper	2,900,000	--		--		--		--		--	
Lead	500,000	--		--		114		--		--	
Mercury	23,000	--		--			U	--		--	
Nickel	1,600,000	--		--		--		--		--	
Selenium	390,000	--		--		15.9		--		--	
Silver	390,000	--		--			U	--		--	
Thallium	NA	--		--		--		--		--	
Vanadium	550,000	--		--		--		--		--	
Zinc	23,000,000	--		--		--		--		--	
Tin	47,000,000	--		--		--		--		--	
Lithium		--		--		--		--		--	
EXPLOSIVES AND TOTAL PCBs											
HMX		--		--		--		--		--	
TNT		--		--		--		--		--	
RDX		--		--		--		--		--	
PCB		--		--		--		--		--	
2,4-DNT	78,000	--		--		--		--		--	
VOLATILE ORGANICS											
Benzene	2,700		U		U		U		U		U
Chlorobenzene	300,000	--			U	7	J		U		U
1,1-Dichloroethene	70	--			U	6	J		U		U
cis-1,2-Dichloroethene			U	--		--		--		--	
trans-1,2-Dichloroethene	620,000		U		U	--		--		--	
Ethylbenzene	58,000		U		U	--			U		U
Methylene Chloride	22,000		U	1	JB	--		8200	JB		U
Toluene	280,000	3,600	J		U	--			U	260	J
1,1,1-Trichloroethane	300,000		U		U	--			U		U
1,1,2-Trichloroethane	2,900		U		U	--			U	1,400	
Trichloroethene	14,000	120,000	E		U	6	J	770,000		250,000	E
Vinyl Chloride	9.7		U		U		U		U		U
Total Xylene	99,000	1,200	J		U	--			U		U
Tertachloroethene	22,000		U		U	7	J		U		U
PAHs											
Anthracene	1,900	--		--		--		--		--	
Phenanthrene	660	--		--		--		--		--	
Pyrene	1,200,000	--		--		--		--		--	
4-Methylphenol		--		--		--		--		--	
2,4-Dinitrotoluene	78,000	--		--		--		--		--	
PESTICIDES/HERBICIDES											
Aldrin	50	--		--		--		--		--	
beta-BHC	4.02	--		--		--		--		--	
Heptachlor	190	--		--			U	--		--	
Heptachlor Epoxide	94	--		--			U	--		--	
2,4-D	390,000	--		--			U	--		--	
Silvex	110	--		--			U	--		--	
OTHER											
Corrosivity (as pH)		--		--		6.00		--		--	
Flashpoint		--		--		AUL		--		--	
Reactive Cyanide		--		--		BRL		--		--	
Reactive Sulfide		--		--		BRL		--		--	
Paint Filter		--		--		Free liq. - yes		--		--	

TABLE 3-3
SWMU 16/16 WASTE DISPOSAL SUMMARY

TYPE	SITE AREA	GENERATION DATE	DISPOSAL DATE	DESTINATION	D. METHOD	MANIFEST NUMBER		WEIGHT (POUNDS)	CLASS	HAZ CODE	TYPE
SLUDGE	E. SUMP	10-Oct-95	10-Oct-95	CWM ADAMS	STABILIZATION	1078097	x	45660	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	12-Oct-95	12-Oct-95	CWM ADAMS	STABILIZATION	1078081	x	47120	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	12-Oct-95	12-Oct-95	CWM ADAMS	STABILIZATION	1078082	x	49480	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	12-Oct-95	12-Oct-95	CWM ADAMS	STABILIZATION	1078084	x	49220	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	12-Oct-95	12-Oct-95	CWM ADAMS	STABILIZATION	1078085	x	49320	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	12-Oct-95	12-Oct-95	CWM ADAMS	STABILIZATION	1078086	x	52380	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	12-Oct-95	12-Oct-95	CWM ADAMS	STABILIZATION	1078087	x	49920	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	12-Oct-95	12-Oct-95	CWM ADAMS	STABILIZATION	1078088	x	50100	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	12-Oct-95	12-Oct-95	CWM ADAMS	STABILIZATION	1078089	x	50260	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	12-Oct-95	13-Oct-95	CWM ADAMS	STABILIZATION	1078091	x	50060	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	12-Oct-95	13-Oct-95	CWM ADAMS	STABILIZATION	1078096	x	49440	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	12-Oct-95	12-Oct-95	CWM ADAMS	STABILIZATION	1078098	x	47040	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	13-Oct-95	13-Oct-95	CWM ADAMS	STABILIZATION	1077352	x	35900	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	25-Oct-95	25-Oct-95	CWM ADAMS	STABILIZATION	1078092	x	47160	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	25-Oct-95	25-Oct-95	CWM ADAMS	STABILIZATION	1078093	x	49600	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	25-Oct-95	26-Oct-95	CWM ADAMS	STABILIZATION	1078094	x	51300	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	25-Oct-95	26-Oct-95	CWM ADAMS	STABILIZATION	1078095	x	50080	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	27-Oct-95	27-Oct-95	CWM ADAMS	STABILIZATION	1077487	x	49660	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	27-Oct-95	27-Oct-95	CWM ADAMS	STABILIZATION	1077488	x	47840	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	27-Oct-95	27-Oct-95	CWM ADAMS	STABILIZATION	1078083	x	47820	HAZ	DOO8	LEAD SOILS
SOIL	GENERAL	04-Apr-96	04-Apr-96	CWM ADAMS	STABILIZATION	1161812	x	29480	HAZ	DOO8	LEAD SOILS
						POUNDS		998840	499.42	TONS	

TABLE 3-3
SWMU 16/16 WASTE DISPOSAL SUMMARY

TYPE	SITE AREA	GENERATION DATE	DISPOSAL DATE	DESTINATION	D. METHOD	MANIFEST NUMBER		WEIGHT (POUNDS)	CLASS	HAZ CODE	TYPE
SOIL	ASTs	07-Feb-96	07-Feb-96	SOUTHSIDE	LANDFILL	12667	x	40200	NON-HAZ	NA	DIESEL SOIL
SOIL	ASTs	07-Feb-96	07-Feb-96	SOUTHSIDE	LANDFILL	12662	x	37540	NON-HAZ	NA	DIESEL SOIL
SOIL	ASTs	07-Feb-96	07-Feb-96	SOUTHSIDE	LANDFILL	12666	x	38680	NON-HAZ	NA	DIESEL SOIL
SOIL	ASTs	07-Feb-96	07-Feb-96	SOUTHSIDE	LANDFILL	12660	x	40300	NON-HAZ	NA	DIESEL SOIL
SOIL	ASTs	07-Feb-96	07-Feb-96	SOUTHSIDE	LANDFILL	12664	x	39880	NON-HAZ	NA	DIESEL SOIL
SOIL	ASTs	07-Feb-96	07-Feb-96	SOUTHSIDE	LANDFILL	unknown	x	39080	NON-HAZ	NA	DIESEL SOIL
SOIL	ASTs	07-Feb-96	07-Feb-96	SOUTHSIDE	LANDFILL	12702	x	40560	NON-HAZ	NA	DIESEL SOIL
SOIL	ASTs	07-Feb-96	07-Feb-96	SOUTHSIDE	LANDFILL	12701	x	23240	NON-HAZ	NA	DIESEL SOIL
						POUNDS		299480	149.74	TONS	
								(gallons)			
LIQ	W. SUMP	15-Apr-96	15-Apr-96	EXCEL	TREAT	1089776	x	1925	HAZ	DO40	TCE WATER
LIQ	ASTs	15-Apr-96	15-Apr-96	EXCEL	TREAT	1089776	x	55	HAZ	D004	FO SLUDGE
SLUDGE	W. SUMP	02-May-96	02-May-96	TWI	ICIN	IL 7204033	x	29180	HAZ	DOO8, D040	TCE SLUDGE
SLUDGE	W. SUMP	02-May-96	02-May-96	TWI	ICIN	IL 7204034	x	24860	HAZ	DOO8, D040	TCE SLUDGE
SLUDGE	W. SUMP	02-May-96	02-May-96	TWI	ICIN	IL 7204035	x	19360	HAZ	DOO8, D040	TCE SLUDGE
						POUNDS		73400	36.7	TONS	

TABLE 3-4

SWMU 16/16 Confirmation Samples Analytical Results Summary

COMPOUND	SAMPLE #	16/16-022		16/16-023		16/16-024		16/16-025		16/16-026		16/16-027		16/16-028		16/16-029		16/16-030		16/16-031		16/16-032	
	SAMPLE DATE:	10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95	
	TYPE:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	LOCATION:	SS		SS		SS		SS		SS		SS		SS		SS		SS		SS		SS	
	CLEANUP LEVEL ug/kg	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q
VOLATILE ORGANICS																							
Acetone	9,200,000	18	J		U		U		U		U	12	J		U		U		U	14	J	13	J
2-Butanone	5,200,000		U		U		U		U		U		U		U		U		U		U		U
Chloroform	960		U		U		U		U		U		U		U		U		U		U		U
m+p-xylene	99,000		U		U		U		U		U		U		U		U		U		U		U
Methylene chloride	22,000	14		22		18		7.9		12		13		7.8			U	8.8		8.3			U
o-xylene	99,000		U		U		U		U		U		U		U		U		U		U		U
Toluene	280,000		U		U		U		U		U		U		U		U		U		U		U
Tetrachloroethene	14,000	8.2		13		22		7.6		8.7		6.1		3.1	J	12		31		5.6			U
Trichloroethene	14,000		U		U		U		U		U		U		U		U		U		U		U
Benzene	2,700.000		U		U		U		U		U		U		U		U		U		U		U
Ethylbenzene	58,000		U		U		U		U		U		U		U		U		U		U		U
Total Xylenes	99,000		U		U		U		U		U		U		U		U		U		U		U
Bromodichloromethane	2,900		U		U		U		U		U		U		U		U		U		U		U
1,2-Dibromo-3-chloropropane	610		U		U		U		U		U		U		U		U		U		U		U
SEMIVOLATILE ORGANICS																							
Anthracene	1,900	--		--		--		--		--		--		--		--		--		--		--	
Acenaphthylene	660	--		--		--		--		--		--		--		--		--		--		--	
Acenaphthene	36,000	--		--		--		--		--		--		--		--		--		--		--	
Benzo(a)anthracene	660	--		--		--		--		--		--		--		--		--		--		--	
Benzo(b)fluoranthene	660	--		--		--		--		--		--		--		--		--		--		--	
Benzo(k)fluoranthene	660	--		--		--		--		--		--		--		--		--		--		--	
Benzo(a)pyrene	660	--		--		--		--		--		--		--		--		--		--		--	
Benzo(g,h,i)perylene	660	--		--		--		--		--		--		--		--		--		--		--	
bis(2-ethylhexyl) Phthalate	61,000	--		--		--		--		--		--		--		--		--		--		--	
Chrysene	800	--		--		--		--		--		--		--		--		--		--		--	
Dibenzo(a,h) anthracene	120	--		--		--		--		--		--		--		--		--		--		--	
2,4-Dinitotoluene	78,000	--		--		--		--		--		--		--		--		--		--		--	
Fluoranthene	1,600,000	--		--		--		--		--		--		--		--		--		--		--	
Fluorene	28,000	--		--		--		--		--		--		--		--		--		--		--	
Indeno(1,2,3-cd) pyrene	1,200	--		--		--		--		--		--		--		--		--		--		--	
2-Methylnapthalene	660	--		--		--		--		--		--		--		--		--		--		--	
Naphthalene	80,000	--		--		--		--		--		--		--		--		--		--		--	
Phenanthrene	660	--		--		--		--		--		--		--		--		--		--		--	
Pyrene	1,200,000	--		--		--		--		--		--		--		--		--		--		--	
EXPLOSIVES																							
2,4-DNT	78,000		U		U		U		U	210,000			U		U		U		U		U		U
2,6-DNT	1,300		U		U		U		U		U		U		U		U		U		U		U

TABLE 3-4
SWMU 16/16 Confirmation Samples Analytical Results Summary

COMPOUND	SAMPLE #	16/16-022		16/16-023		16/16-024		16/16-025		16/16-026		16/16-027		16/16-028		16/16-029		16/16-030		16/16-031		16/16-032	
	SAMPLE DATE:	10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95	
	TYPE:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	LOCATION:	SS		SS		SS		SS		SS		SS		SS		SS		SS		SS		SS	
	CLEANUP LEVEL ug/kg	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q
PESTICIDES																							
Aldrin	50		U		U		U		U		U		U		U		U		U		U		U
Alpha-BHC	2.01		U		U		U		U		U		U		U		U		U		U		U
Beta-BHC	4.02		U		U		U		U		U		U		U		U		U		U		U
Gamma-BHC (Lindane)	2.68		U		U		U		U		U		U		U		U		U		U		U
4,4'-DDD	3,500		U		U		U		U		U		U		U		U		U		U		U
4,4'-DDE	2,500		U		U		U		U		U		U		U		U		U		U		U
4,4'-DDT	8		U		U		U		U		U		U		U		U		U		U		U
Dieldrin	53		U		U		U		U		U		U		U		U		U		U		U
Endosulfan I	2,000		U		U		U		U		U		U		U		U		U		U		U
Endosulfan II	2,000		U		U		U		U		U		U		U		U		U		U		U
Endosulfan sulfate	44.2		U		U		U		U		U		U		U		U		U		U		U
Endrin	12,000		U		U		U		U		U		U		U		U		U		U		U
Endrin Aldehyde	15.4		U		U		U		U		U		U		U		U		U		U		U
Heptachlor	190		U		U		U		U		U		U		U		U		U		U		U
Heptachlor epoxide	94		U		U		U		U		U		U		U		U		U		U		U
Methoxychlor	200,000		U		U		U		U		U		U		U		U		U		U		U
ORGANOPHOSPHOROUS PESTICIDES																							
Sulfotepp		–		–		–		–		–		–		–		–		–		--		--	
Famphur		–		–		–		–		–		–		–		–		–		--		--	
HERBICIDES																							
2,4,5-T	390,000	–		–		–		–		–		–		–		–		–		--		--	
METALS																							
Antimony	31,000		U	146,000		140,000		669,000		432,000		165,000		24,000		8,600		75,500			U	8,400	
Arsenic	970	11,500	N	9,300	N	8,000	N	16,200	N	11,200	N	6,600	N	5,600	N	3,100	N	8,300	N	1,700	N	1,600	N
Barium	5,500,000	187,000		5,140,000		4,550,000		8,200,000		6,880,000		7,170,000		715,000		187,000		3,020,000		67,300		236,000	
Beryllium	400	720		430		390		230		260		330		290			U	520		650		700	
Cadmium	39,000	8000		52,600		52,100		38,100		162,000		37,800		7,700		1,100		16,200			U	3,800	
Chromium	940,000	29,300	N	33,100	N	30,000	N	60,900	N	46,000	N	28,900	N	19,700	N	9,200	N	32,100	N	23,100	N	15,900	N
Cobalt	100	11,200		2,000		5,400			U	1,500		9,100		5,000		5,300		3,100		4,000		6,300	
Copper	2,900,000	48,500	*	12,200,000	*	5,650,000	*	51,300,000	*	9,260,000	*	9,760,000	*	2,530,000	*	179,000	*	2,150,000	*	29,400	*	461,000	*
Lead	500,000	83,000		19,000,000		24,600,000		56,600,000		33,900,000		29,300		2,240,000		531,000		7,070,000		101,000		1,410,000	
Mercury	23,000		U	1,300		580		410		830		520		130			U	2,700			U		U
Nickel	1,600,000	16,100	N	41,600	N	37,100,000	N	93,200	N	59,900	N	56,500	N	14,900	N	9,100	N	19,500	N	12,400	N	18,500	N
Selenium	390,000		U		U		U		U		U		U		U		U		U		U		U
Silver	390,000		U	1,300		860		2,100		3,000		1,300			U		U		U		U		U
Thallium			U		U		U		U		U		U		U		U		U		U		U
Tin	47,000,000		U	34,000		27,100		65,600		63,800		24,500			U		U		U		U	89,300	
Vanadium	550,000	52,200		21,700		11,400		7,500		9,500		8,100		22,100		13,100		39,600		22,700		12,500	
Zinc	23,000,000	937,000	E	20,100,000	E	18,700,000	E	47,800,000	E	35,300,000	E	17,500,000	E	4,720,000	E	1,390,000	E	10,000,000	E	97,600	E	1,120,000	E
Lithium		18,000			U		U		U		U		U		U		U	14,000		10,800		13,000	

TAB. 3-4

SWMU 16/16 Confirmation Samples Analytical Results Summary

COMPOUND	SAMPLE #	16/16-033		16/16-034		16/16-035		16/16-036		16/16-037		16/16-038		16/16-040		16/16-046		16/16-047		16/16-048		16/16-049		16/16-050	
	SAMPLE DATE:	10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95	
	TYPE:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		LIQUID (ug/L)		SOIL		SOIL		SOIL		SOIL		SOIL	
	LOCATION:	SS		SS		SS		SS		SS		SS		East Sump		SS		SS		SS		SS		SS	
	CLEANUP LEVEL ug/kg	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q
VOLATILE ORGANICS																									
Acetone	9,200,000	14	J		U		U		U		U		U		U		U		U		U		U		U
2-Butanone	5,200,000		U		U		U		U		U		U		U		U		U		U		U		U
Chloroform	960		U		U		U		U		U		U	20			U		U		U		U		U
m+p-xylene	99,000		U		U		U		U		U		U	3.10	J		U		U		U		U		U
Methylene chloride	22,000		U		U	4.3	J	12		5.7		6.6		5.7	B		U		U		U		U	9.4	B
o-xylene	99,000		U		U		U		U		U		U	1.80	J		U		U		U		U		U
Toluene	280,000		U		U		U	19			U		U	4.40	J		U		U	8.9			U		U
Tetrachloroethene	14,000		U		U	9		18		11		15			U	5.4	U	2.4	J	4	J	2.7	J	6.7	
Trichloroethene	14,000		U		U		U	2.4	J		U		U	20			U		U		U		U		U
Benzene	2,700.000		U		U		U		U		U		U		U		U		U		U		U		U
Ethylbenzene	58,000		U		U		U		U		U		U		U		U		U		U		U		U
Total Xylenes	99,000		U		U		U		U		U		U		U		U		U		U		U		U
Bromodichloromethane	2,900		U		U		U		U		U		U		U		U		U		U		U		U
1,2-Dibromo-3-chloropropane	610		U	35		2.8	J		U		U	1.8	J	3.4			U		U		U		U		U
SEMIVOLATILE ORGANICS																									
Anthracene	1,900	--		--		--		--		--		--		--		--		--		--		--		--	
Acenaphthylene	660	--		--		--		--		--		--		--		--		--		--		--		--	
Acenaphthene	36,000	--		--		--		--		--		--		--		--		--		--		--		--	
Benzo(a)anthracene	660	--		--		--		--		--		--		--		--		--		--		--		--	
Benzo(b)fluoranthene	660	--		--		--		--		--		--		--		--		--		--		--		--	
Benzo(k)fluoranthene	660	--		--		--		--		--		--		--		--		--		--		--		--	
Benzo(a)pyrene	660	--		--		--		--		--		--		--		--		--		--		--		--	
Benzo(g,h,i)perylene	660	--		--		--		--		--		--		--		--		--		--		--		--	
bis(2-ethylhexyl) Phthalate	61,000	--		--		--		--		--		--		--		--		--		--		--		--	
Chrysene	800	--		--		--		--		--		--		--		--		--		--		--		--	
Dibenzo(a,h) anthracene	120	--		--		--		--		--		--		--		--		--		--		--		--	
2,4-Dinitotoluene	78,000	--		--		--		--		--		--		--		--		--		--		--		--	
Fluoranthene	1,600,000	--		--		--		--		--		--		--		--		--		--		--		--	
Fluorene	28,000	--		--		--		--		--		--		--		--		--		--		--		--	
Indeno(1,2,3-cd) pyrene	1,200	--		--		--		--		--		--		--		--		--		--		--		--	
2-Methylnapthalene	660	--		--		--		--		--		--		--		--		--		--		--		--	
Naphthalene	80,000	--		--		--		--		--		--		--		--		--		--		--		--	
Phenanthrene	660	--		--		--		--		--		--		--		--		--		--		--		--	
Pyrene	1,200,000	--		--		--		--		--		--		--		--		--		--		--		--	
EXPLOSIVES																									
2,4-DNT	78,000		U		U		U		U		U		U		U		U		U		U		U		U
2,6-DNT	1,300		U		U		U		U		U		U		U		U		U		U		U		U

TABLE 3-4
SWMU 16/16 Confirmation Samples Analytical Results Summary

COMPOUND	SAMPLE #	16/16-033		16/16-034		16/16-035		16/16-036		16/16-037		16/16-038		16/16-040		16/16-046		16/16-047		16/16-048		16/16-049		16/16-050	
	SAMPLE DATE:	10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/13/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95	
	TYPE:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		LIQUID (ug/L)		SOIL		SOIL		SOIL		SOIL		SOIL	
	LOCATION:	SS		SS		SS		SS		SS		SS		East Sump		SS		SS		SS		SS		SS	
	CLEANUP LEVEL ug/kg	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q
PESTICIDES																									
Aldrin	50		U		U		U		U		U		U		U		U		U		U		U		U
Alpha-BHC	2.01		U		U		U		U		U		U		U		U		U		U		U		U
Beta-BHC	4.02		U		U		U		U		U		U		U		U		U		U		U		U
Gamma-BHC (Lindane)	2.68		U		U		U		U		U		U		U		U		U		U		U		U
4,4'-DDD	3,500		U		U		U		U		U		U		U		U		U		U		U		U
4,4'-DDE	2,500		U		U		U		U		U		U		U		U		U		U		U		U
4,4'-DDT	8		U		U		U		U		U		U		U		U		U		U		U		U
Dieldrin	53		U		U		U		U		U		U		U		U		U		U		U		U
Endosulfan I	2,000		U		U		U		U		U		U		U		U		U		U		U		U
Endosulfan II	2,000		U		U		U		U		U		U		U		U		U		U		U		U
Endosulfan sulfate	44.2		U		U		U		U		U		U		U		U		U		U		U		U
Endrin	12,000		U		U		U		U		U		U		U		U		U		U		U		U
Endrin Aldehyde	15.4		U		U		U		U		U		U		U		U		U		U		U		U
Heptachlor	190		U		U		U		U		U		U		U		U		U		U		U		U
Heptachlor epoxide	94		U		U		U		U		U		U		U		U		U		U		U		U
Methoxychlor	200,000		U		U		U		U		U		U		U		U		U		U		U		U
ORGANOPHOSPHOROUS PESTICIDES																									
Sulfotepp		--		--		--		--		--		--		--		--		--		--		--		--	
Famphur		--		--		--		--		--		--		--		--		--		--		--		--	
HERBICIDES																									
2,4,5-T	390,000	--		--		--		--		--		--		--		--		--		--		--		--	
METALS																									
Antimony	31,000	6,000		7,200		26,800		102,000		22,600		24,800		39		67,400	N		U	11,500	N	12,000	N	4,700	N
Arsenic	970	1,400	N	1,200	N	6,600	N	6,500	N	6,500	N	3,200	N		U	4,400	N*		U	950	N*	1,400	N*		U
Barium	5,500,000	992,000		1,470,000		2,740,000		2,360,000		1,850,000		1,120,000		728		2,580,000		30,000		181,000		246,000		154,000	
Beryllium	400	300		790		560		380		430		370			U	660	N	400	N	390	N	480	N	470	N
Cadmium	39,000	1,100		1,900		3,300		10,500		7,200		5,300		9.1		46,100	N		U	1,700	N	1,000	N	1,000	N
Chromium	940,000	12,300	N	21,900	N	104,000	N	24,400	N	29,600	N	25,500	N	11.1		32,100	N	6,800	N	9,500	N	11,700	N	10,600	N
Cobalt	100		U	15,400		6,500		3,700		7,000		7,600			U	6,400	N	1,300	N	3,100	N	5,000	N	2,800	N
Copper	2,900,000	921,000	*	3,980,000	*	1,920,000	*	4,320,000	*	2,910,000	*	3,620,000	*	277		2,980,000	N	14,000	N	272,000	N	338,000	N	103,000	N
Lead	500,000	562,000		1,160,000		2,100,000		8,240,000		4,050,000		2,330,000		1,280		8,650,000	N	38,700	N	629,000	N	2,710,000	N	467,000	N
Mercury	23,000		U		U	100		140			U	220		0.67		580	N		U		U		U		U
Nickel	1,600,000	7,500	N	31,100	N	19,300	N	34,400	N	33,100	N	24,900	N		U	33,200	N	4,600	N	7,600	N	10,900	N	7,400	N
Selenium	390,000		U		U		U		U		U		U		U		U		U		U		U		U
Silver	390,000		U		U		U		U		U		U		U		U		U		U		U		U
Thallium			U		U		U		U		U		U		U		U		U		U		U		U
Tin	47,000,000		U		U		U		U		U		U		U	29,900			U		U		U		U
Vanadium	550,000	9,800		13,600		16,400		20,200		13,500		10,900			U	10,200	N	4,600	N	8,700	N	10,400	N	10,700	N
Zinc	23,000,000	4,690,000	E	6,940,000	E	10,700,000	E	15,000,000	E	15,900,000	E	12,100,000	E	2,320		12,700,000	N	78,400	N	1,550,000	N	563,000	N	903,000	N
Lithium			U		U		U		U		U		U	--		11,300			U		U		U		U

TAB[illegible] 3-4

SWMU 16/16 Confirmation Samples Analytical Results Summary

COMPOUND	SAMPLE #	16/16-051		16/16-052		16/16-053		16/16-054		16/16-055		16/16-056		16/16-057		16/16-058		16/16-059		16/16-060		16/16-061		16/16-062	
	SAMPLE DATE:	10/19/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95	
	TYPE:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	LOCATION:	SS		SS		East Side		SS		SS		SS		SS		SS		SS		SS		SS		SS	
	CLEANUP LEVEL ug/kg	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q
VOLATILE ORGANICS																									
Acetone	9,200,000		U		U		U		U		U		U		U		U		U		U		U		U
2-Butanone	5,200,000		U		U		U		U		U		U		U		U		U		U		U		U
Chloroform	960		U		U		U		U		U		U		U		U		U		U		U		U
m+p-xylene	99,000		U		U		U		U		U		U		U		U		U		U		U		U
Methylene chloride	22,000	5.4		6.4		2.2	J	8.8	B		U	8	B	19	B	23	B	21	B	15	B	22	B	29	B
o-xylene	99,000		U		U		U		U		U		U		U		U		U		U		U		U
Toluene	280,000		U		U		U		U		U		U	3.7	J		U		U		U		U		U
Tetrachloroethene	14,000	8.1		7.1			U	4.9	J		U		U	30		10		12		4.3	J	5.6			U
Trichloroethene	14,000		U		U		U		U		U		U		U		U		U		U		U		U
Benzene	2,700,000		U		U		U		U		U		U		U		U		U		U		U		U
Ethylbenzene	58,000		U		U		U		U		U		U		U		U		U		U		U		U
Total Xylenes	99,000		U		U		U		U		U		U		U		U		U		U		U		U
Bromodichloromethane	2,900		U		U		U		U		U		U		U		U		U		U		U		U
1,2-Dibromo-3-chloropropane	610		U		U		U		U		U		U		U		U		U		U		U		U
SEMIVOLATILE ORGANICS																									
Anthracene	1,900	--		--		--		--		--		--		--		--		--		--		--		--	
Acenaphthylene	660	--		--		--		--		--		--		--		--		--		--		--		--	
Acenaphthene	36,000	--		--		--		--		--		--		--		--		--		--		--		--	
Benzo(a)anthracene	660	--		--		--		--		--		--		--		--		--		--		--		--	
Benzo(b)fluoranthene	660	--		--		--		--		--		--		--		--		--		--		--		--	
Benzo(k)fluoranthene	660	--		--		--		--		--		--		--		--		--		--		--		--	
Benzo(a)pyrene	660	--		--		--		--		--		--		--		--		--		--		--		--	
Benzo(g,h,i)perylene	660	--		--		--		--		--		--		--		--		--		--		--		--	
bis(2-ethylhexyl) Phthalate	61,000	--		--		--		--		--		--		--		--		--		--		--		--	
Chrysene	800	--		--		--		--		--		--		--		--		--		--		--		--	
Dibenzo(a,h) anthracene	120	--		--		--		--		--		--		--		--		--		--		--		--	
2,4-Dinitotoluene	78,000	--		--		--		--		--		--		--		--		--		--		--		--	
Fluoranthene	1,600,000	--		--		--		--		--		--		--		--		--		--		--		--	
Fluorene	28,000	--		--		--		--		--		--		--		--		--		--		--		--	
Indeno(1,2,3-cd) pyrene	1,200	--		--		--		--		--		--		--		--		--		--		--		--	
2-Methylnapthalene	660	--		--		--		--		--		--		--		--		--		--		--		--	
Naphthalene	80,000	--		--		--		--		--		--		--		--		--		--		--		--	
Phenanthrene	660	--		--		--		--		--		--		--		--		--		--		--		--	
Pyrene	1,200,000	--		--		--		--		--		--		--		--		--		--		--		--	
EXPLOSIVES																									
2,4-DNT	78,000		U		U		U		U		U		U		U		U		U		U		U		U
2,6-DNT	1,300		U		U		U		U		U		U		U		U		U		U		U		U

TABLE 3-4
SWMU 16/16 Confirmation Samples Analytical Results Summary

COMPOUND	SAMPLE #	16/16-051		16/16-052		16/16-053		16/16-054		16/16-055		16/16-056		16/16-057		16/16-058		16/16-059		16/16-060		16/16-061		16/16-062	
	SAMPLE DATE:	10/19/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95		10/19/95	
	TYPE:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	LOCATION:	SS		SS		East Side		SS		SS		SS		SS		SS		SS		SS		SS		SS	
	CLEANUP LEVEL ug/kg	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q
PESTICIDES																									
Aldrin	50		U		U		U		U		U		U		U		U		U		U		U		U
Alpha-BHC	2.01		U		U		U		U		U		U		U		U		U		U		U		U
Beta-BHC	4.02		U		U		U		U		U		U		U		U		U		U		U		U
Gamma-BHC (Lindane)	2.68		U		U		U		U		U		U		U		U		U		U		U		U
4,4'-DDD	3,500		U		U		U		U		U		U		U		U		U		U		U		U
4,4'-DDE	2,500		U		U		U		U		U		U		U		U		U		U		U		U
4,4'-DDT	8		U		U		U		U		U		U		U		U		U		U		U		U
Dieldrin	53		U		U		U		U		U		U		U		U		U		U		U		U
Endosulfan I	2,000		U		U		U		U		U		U		U		U		U		U		U		U
Endosulfan II	2,000		U		U		U		U		U		U		U		U		U		U		U		U
Endosulfan sulfate	44.2		U		U		U		U		U		U		U		U		U		U		U		U
Endrin	12,000		U		U		U		U		U		U		U		U		U		U		U		U
Endrin Aldehyde	15.4		U		U		U		U		U		U		U		U		U		U		U		U
Heptachlor	190		U		U		U		U		U		U		U		U		U		U		U		U
Heptachlor epoxide	94		U		U		U		U		U		U		U		U		U		U		U		U
Methoxychlor	200,000		U		U		U		U		U		U		U		U		U		U		U		U
ORGANOPHOSPHOROUS PESTICIDES																									
Sulfotepp		--		--		--		--		--		--		--		--		--		--		--		--	
Famphur		--		--		--		--		--		--		--		--		--		--		--		--	
HERBICIDES																									
2,4,5-T	390,000	--		--		--		--		--		--		--		--		--		--		--		--	
METALS																									
Antimony	31,000	5,500	N	11,800	N		U	6,600	N		U	16,000	N	12,400	N	8,800	N	19,500	N	10,700	N	8,400	N		U
Arsenic	970	2,000	N*	1,800	N		U	1,300	N*		U	1,500	N*	2,900	N*	3,900	N*	3,300	N*	1,900	N*	1,100	N*	1,800	N*
Barium	5,500,000	303,000		266,000		130,000		184,000		70,000		743,000		336,000		359,000		569,000		540,000		350,000		85,200	
Beryllium	400	410	N	360	N	600	N	400	N	370	N	650	N	410	N	390	N	230	N	400	N	680	N	600	N
Cadmium	39,000	2,200	N	1,900	N	550	N	1,300	N	9,300	N	10,600	N	2,700	N	2,500	N	4,100	N	3,400	N	1,800	N		U
Chromium	940,000	10,900	N	15,600	N	14,800	N	9,700	N	7,600	N	15,300	N	11,800	N	14,800	N	10,700	N	15,700	N	17,500	N	17,800	N
Cobalt	100	4,800	N	4,700	N	18,800	N	3,900	N	3,900	N	7,300	N	4,600	N	4,400	N	4,500	N	3,900	N	4,200	N	450	N
Copper	2,900,000	402,000	N	350,000	N	104,000	N	201,000	N	37,000	N	549,000	N	318,000	N	340,000	N	570,000	N	783,000	N	285,000	N	38,500	N
Lead	500,000	1,040,000	N	819,000	N	341,000	N	612,000	N	235,000	N	2,980,000	N	888,000	N	821,000	N	1,280,000	N	738,000	N	867,000	N	856,000	N
Mercury	23,000		U		U		U		U		U		U	120	N		U	--		--			U		U
Nickel	1,600,000	10,800	N	12,600	N	11,600	N	8,900	N	6,800	N	14,600	N	9,900	N	10,600	N	9,800	N	13,800	N	14,500	N	13,100	N
Selenium	390,000		U		U		U		U		U		U		U		U		U		U		U		U
Silver	390,000		U		U		U		U		U		U		U		U		U		U		U		U
Thallium			U		U		U		U		U		U		U		U		U		U		U		U
Tin	47,000,000		U		U		U		U	91,800			U		U		U		U		U		U		U
Vanadium	550,000	10,200	N	10,900	N	12,600	N	8,500	N	6,200	N	12,000	N	11,700	N	17,300	N	11,700	N	10,900	N	14,700	N	12,000	N
Zinc	23,000,000	2,860,000	N	2,640,000	N	690,000	N	1,590,000	N	290,000	N	4,090,000	N	2,810,000	N	3,070,000	N	5,730,000	N	6,350,000	N	2,350,000	N	358,000	N
Lithium			U		U	11,200			U		U		U		U		U		U		U	12,100			U

TABLE 3-4

SWMU 16/16 Confirmation Samples Analytical Results Summary

COMPOUND	SAMPLE #	16/16-063		16/16-064		16/16-065		16/16-066		16/16-23A		16/16-24A		16/16-25A		16/16-26A		16/16-27A		16/16-28A		16/16-29A		16/16-30A	
	SAMPLE DATE:	10/19/95		10/19/95		10/19/95		10/19/95		10/25/95		10/25/95		10/25/95		10/25/95		10/25/95		10/25/95		10/251995		10/25/95	
	TYPE:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	LOCATION:	SS		SS		SS		SS		SS		SS		SS		SS		SS		SS		SS		SS	
	CLEANUP LEVEL ug/kg	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q
VOLATILE ORGANICS																									
Acetone	9,200,000	96	JD	110	JD		U	19	J	37	JB	38	JB	11	JB	27	JB	22	JB	13	JB	27	JB	28	JB
2-Butanone	5,200,000		U		U		U		U	18	JB	23	JB	5.4	JB	15	JB	15	JB	9.8	JB	24	JB	13	JB
Chloroform	960		U		U		U		U		U		U		U		U		U		U		U		U
m+p-xylene	99,000		U		U		U		U		U	2.5	J		U		U		U	2.3	J	5.2	J	5.2	J
Methylene chloride	22,000	110	BD	110	BD	24	B	27	B	26	B	24	B	19	B	19	B	18	B	21	B	25	B	36	B
o-xylene	99,000		U		U		U		U		U		U		U		U		U		U		U		U
Toluene	280,000		U	5.4		2.1	J		U		U		U	2.5	J		U		U		U		U		U
Tetrachloroethene	14,000		U		U	14		8.4			U	4.7	J		U		U		U		U	4.5	J		U
Trichloroethene	14,000		U		U		U		U		U		U		U		U		U		U		U		U
Benzene	2,700,000		U	1.4			U		U		U		U		U		U		U		U		U		U
Ethylbenzene	58,000	39		4			U		U		U		U		U		U		U		U		U		U
Total Xylenes	99,000	510		73			U		U		U		U		U		U		U		U		U		U
Bromodichloromethane	2,900		U		U		U		U		U		U		U		U		U		U		U		U
1,2-Dibromp-3-chloropropane	610		U		U		U		U		U		U		U		U		U		U		U		U
SEMIVOLATILE ORGANICS																									
Anthracene	1,900		U		U	--		--		--		--		--		--		--		--		--		--	
Acenaphthylene	660		U		U	--		--		--		--		--		--		--		--		--		--	
Acenaphthene	36,000		U		U	--		--		--		--		--		--		--		--		--		--	
Benzo(a)anthracene	660		U		U	--		--		--		--		--		--		--		--		--		--	
Benzo(b)fluoranthene	660		U		U	--		--		--		--		--		--		--		--		--		--	
Benzo(k)fluoranthene	660		U		U	--		--		--		--		--		--		--		--		--		--	
Benzo(a)pyrene	660		U		U	--		--		--		--		--		--		--		--		--		--	
Benzo(g,h,i)perylene	660		U		U	--		--		--		--		--		--		--		--		--		--	
bis(2-ethylhexyl) Phthalate	61,000	--		--		--		--		--		--		--		--		--		--		--		--	
Chrysene	800		U		U	--		--		--		--		--		--		--		--		--		--	
Dibenzo(a,h) anthracene	120		U		U	--		--		--		--		--		--		--		--		--		--	
2,4-Dinitotoluene	78,000	--		--		--		--		--		--		--		--		--		--		--		--	
Fluoranthene	1,600,000		U		U	--		--		--		--		--		--		--		--		--		--	
Fluorene	28,000	200	J	600		--		--		--		--		--		--		--		--		--		--	
Indeno(1,2,3-cd) pyrene	1,200		U		U	--		--		--		--		--		--		--		--		--		--	
2-Methylnapthalene	660	160	J	260	J	--		--		--		--		--		--		--		--		--		--	
Naphthalene	80,000		U		U	--		--		--		--		--		--		--		--		--		--	
Phenanthrene	660	420		1,100		--		--		--		--		--		--		--		--		--		--	
Pyrene	1,200,000		U		U	--		--		--		--		--		--		--		--		--		--	
EXPLOSIVES																									
2,4-DNT	78,000		U		U		U		U		U		U		U		U		U		U		U		U
2,6-DNT	1,300		U		U		U		U		U		U		U		U		U		U		U		U

TABLE 3-4
SWMU 16/16 Confirmation Samples Analytical Results Summary

COMPOUND	SAMPLE #	16/16-063		16/16-064		16/16-065		16/16-066		16/16-23A		16/16-24A		16/16-25A		16/16-26A		16/16-27A		16/16-28A		16/16-29A		16/16-30A	
	SAMPLE DATE:	10/19/95		10/19/95		10/19/95		10/19/95		10/25/95		10/25/95		10/25/95		10/25/95		10/25/95		10/25/95		10/251995		10/25/95	
	TYPE:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	LOCATION:	SS		SS		SS		SS		SS		SS		SS		SS		SS		SS		SS		SS	
	CLEANUP LEVEL ug/kg	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q
PESTICIDES																									
Aldrin	50		U		U		U		U		U		U		U		U		U		U		U		U
Alpha-BHC	2.01		U		U		U		U		U		U		U		U		U		U		U		U
Beta-BHC	4.02		U		U		U		U		U		U		U		U		U		U		U		U
Gamma-BHC (Lindane)	2.68		U		U		U		U		U		U		U		U		U		U		U		U
4,4'-DDD	3,500		U		U		U		U		U		U		U	4.1			U		U		U		U
4,4'-DDE	2,500		U		U		U		U		U		U		U		U		U		U		U		U
4,4'-DDT	8		U		U		U		U	5.4	P		U		U		U		U		U		U		U
Dieldrin	53		U		U		U		U		U		U		U		U		U	12	P		U		U
Endosulfan I	2,000		U		U		U		U		U		U		U		U		U		U		U		U
Endosulfan II	2,000		U		U		U		U		U		U		U		U		U		U		U		U
Endosulfan sulfate	44.2		U		U		U		U		U		U		U		U		U		U		U		U
Endrin	12,000		U		U		U		U		U		U		U		U		U	5.5			U		U
Endrin Aldehyde	15.4		U		U		U		U		U		U		U		U		U		U		U		U
Heptachlor	190		U		U		U		U		U		U		U		U		U	2.3	P		U		U
Heptachlor epoxide	94		U		U		U		U		U		U		U		U		U		U		U		U
Methoxychlor	200,000		U		U		U		U		U		U		U		U		U		U		U		U
ORGANOPHOSPHOROUS PESTICIDES																									
Sulfotepp		--		--		--		--		--		--		--		--		--		--		--		--	
Famphur		--		--		--		--		--		--		--		--		--		--		--		--	
HERBICIDES																									
2,4,5-T	390,000	--		--		--		--		--		--		--		--		--		--		--		--	
METALS																									
Antimony	31,000		U		U	19,900	N		U	--		--		--		--		--		--		--		--	
Arsenic	970	41,300	N*		U	2,600	N*	12,400	N*	--		--		--		--		--		--		--		--	
Barium	5,500,000	142,000		99,900		569,000		200,000		--		--		--		--		--		--		--		--	
Beryllium	400	1,600	N	1,100	N	500	N	740	N	--		--		--		--		--		--		--		--	
Cadmium	39,000		U		U	4,500	N	1,200	N	--		--		--		--		--		--		--		--	
Chromium	940,000	24,000	N	14,600	N	17,100	N	33,000	N	--		--		--		--		--		--		--		--	
Cobalt	100	33,400	N	14,600	N	5,800	N	720	N	--		--		--		--		--		--		--		--	
Copper	2,900,000	27,100	N	26,300	N	515,000	N	23,900	N	--		--		--		--		--		--		--		--	
Lead	500,000	11,100	N	69,100	N	2,270,000	N	20,300	N	--		--		--		--		--		--		--		--	
Mercury	23,000		U		U	150	N		U		U	140		100		130			U		U		U		U
Nickel	1,600,000	56,400	N	25,000	N	13,400	N	19,300	N	--		--		--		--		--		--		--		--	
Selenium	390,000		U		U		U		U	--		--		--		--		--		--		--		--	
Silver	390,000		U		U		U		U	--		--		--		--		--		--		--		--	
Thallium			U		U		U		U	--		--		--		--		--		--		--		--	
Tin	47,000,000		U		U		U		U	--		--		--		--		--		--		--		--	
Vanadium	550,000	18,700	N	16,700	N	16,100	N	61,500	N	--		--		--		--		--		--		--		--	
Zinc	23,000,000	165,000	N	185,000	N	4,830,000	N	87,400	N	--		--		--		--		--		--		--		--	
Lithium		12,000			U		U	19,800			U		U		U		U		U		U		U		U

TAB[illegible]3-4

SWMU 16/16 Confirmation Samples Analytical Results Summary

COMPOUND	SAMPLE #	16/16-32A		16/16-33A		16/16-34A		16/16-35A		16/16-36A		16/16-37A		16/16-38A		16/16-70		16/16-71		16/16-72		16/16-73	
	SAMPLE DATE:	10/25/95		10/25/95		10/25/95		10/25/95		10/25/95		10/25/95		10/25/95		2/6/96		2/7/96		2/7/96		2/7/96	
	TYPE:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		LIQUID		SOIL		SOIL		SOIL	
	LOCATION:	SS		SS		SS		SS		SS		SS		SS									
	CLEANUP LEVEL ug/kg	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q
VOLATILE ORGANICS																							
Acetone	9,200,000	19	JB	26	JB	28	JB	61	JB	28	JB	30	JB	33	JB		U	--		--		--	
2-Butanone	5,200,000	11	JB	10	JB	16	JB	24	JB	14	JB	13	JB	19	JB		U	--		--		--	
Chloroform	960		U		U		U		U		U		U		U		U	--		--		--	
m+p-xylene	99,000	9.9		11			U		U		U		U		U	--		--		--		--	
Methylene chloride	22,000	16	B	22	B	18	B	21	B	15	B	18	B	14	B	140	JB	--		--		--	
o-xylene	99,000	3.6	J	3.5	J		U		U		U		U		U	--		--		--		--	
Toluene	280,000		U	3.2	J		U		U		U		U		U	110	J		U		U		U
Tetrachloroethene	14,000		U		U		U		U		U		U		U		U	--		--		--	
Trichloroethene	14,000		U		U		U		U		U		U		U	18,000		--		--		--	
Benzene	2,700,000		U		U		U		U		U		U		U		U		U		U		U
Ethylbenzene	58,000		U		U		U		U		U		U		U		U	2	J	3	J		U
Total Xylenes	99,000		U		U		U		U		U		U		U		U	9	J	7	J	9	J
Bromodichloromethane	2,900		U		U		U		U		U		U		U		U	--		--		--	
1,2-Dibromo-3-chloropropane	610		U		U		U		U		U	2.6	J		U		U	--		--		--	
SEMIVOLATILE ORGANICS																							
Anthracene	1,900	--		--		--		--		--		--		--			U		U		U		U
Acenaphthylene	660	--		--		--		--		--		--		--			U	250	C	160	C	200	C
Acenaphthene	36,000	--		--		--		--		--		--		--			U	460	C	200	C	370	C
Benzo(a)anthracene	660	--		--		--		--		--		--		--			U	29		25	C	220	C
Benzo(b)fluoranthene	660	--		--		--		--		--		--		--			U	15	J	24	C	270	C
Benzo(k)fluoranthene	660	--		--		--		--		--		--		--			U	7.4	J	10	JC	100	C
Benzo(a)pyrene	660	--		--		--		--		--		--		--		--		12	BJ	17	BJ	260	BC
Benzo(g,h,i)perylene	660	--		--		--		--		--		--		--			U	6.8	BJ		U	89	BC
bis(2-ethylhexyl) Phthalate	61,000	--		--		--		--		--		--		--		2	J	--		--		--	
Chrysene	800	--		--		--		--		--		--		--			U	110	C	80	C	270	C
Dibenzo(a,h) anthracene	120	--		--		--		--		--		--		--			U		U		U	24	BC
2,4-Dinitotoluene	78,000	--		--		--		--		--		--		--		1	J	--		--		--	
Fluoranthene	1,600,000	--		--		--		--		--		--		--			U	400	C	200	C	920	C
Fluorene	28,000	--		--		--		--		--		--		--			U	1,400	C	740	C	1,100	C
Indeno(1,2,3-cd) pyrene	1,200	--		--		--		--		--		--		--			U		U		U	140	C
2-Methylnapthalene	660	--		--		--		--		--		--		--			U	--		--		--	
Naphthalene	80,000	--		--		--		--		--		--		--		2	J	780	C	220	C	340	C
Phenanthrene	660	--		--		--		--		--		--		--			U	3,600	C	1,900	C	3,100	C
Pyrene	1,200,000	--		--		--		--		--		--		--		1	J	840	C	410	C	1,200	C
EXPLOSIVES																							
2,4-DNT	78,000		U		U		U		U		U		U		U	--		--		--		--	
2,6-DNT	1,300		U		U		U		U		U		U		U	--		--		--		--	

TABLE 3-4
SWMU 16/16 Confirmation Samples Analytical Results Summary

COMPOUND	SAMPLE #	16/16-32A		16/16-33A		16/16-34A		16/16-35A		16/16-36A		16/16-37A		16/16-38A		16/16-70		16/16-71		16/16-72		16/16-73	
	SAMPLE DATE:	10/25/95		10/25/95		10/25/95		10/25/95		10/25/95		10/25/95		10/25/95		2/6/98		2/7/96		2/7/96		2/7/96	
	TYPE:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		LIQUID		SOIL		SOIL		SOIL	
	LOCATION:	SS		SS		SS		SS		SS		SS		SS									
	CLEANUP LEVEL ug/kg	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q
PESTICIDES																							
Aldrin	50		U		U		U		U		U		U		U		U	–		–		--	
Alpha-BHC	2.01		U		U		U		U		U		U		U	0.0012	JP	–		–		--	
Beta-BHC	4.02		U		U		U		U		U		U		U		U	–		–		--	
Gamma-BHC (Lindane)	2.68		U		U		U		U		U		U		U		U	–		–		--	
4,4'-DDD	3,500		U		U		U		U		U		U		U		U	–		–		--	
4,4'-DDE	2,500		U		U		U		U		U		U		U		U	–		–		--	
4,4'-DDT	8		U		U		U		U		U		U		U		U	–		–		--	
Dieldrin	53		U		U		U		U		U		U		U		U	–		–		--	
Endosulfan I	2,000		U		U		U		U		U		U		U		U	–		–		--	
Endosulfan II	2,000		U		U		U		U		U		U		U		U	–		–		--	
Endosulfan sulfate	44.2		U		U		U		U		U		U		U		U	–		–		--	
Endrin	12,000		U		U		U		U		U		U		U	0.0028	JP	–		–		--	
Endrin Aldehyde	15.4		U		U		U		U		U		U		U	0.012	JP	–		–		--	
Heptachlor	190		U		U		U		U		U		U		U	0.016	JPB	–		–		--	
Heptachlor epoxide	94		U		U		U		U		U		U		U		U	–		–		--	
Methoxychlor	200,000		U		U		U		U		U		U		U	0.0078	JPB	–		–		--	
ORGANOPHOSPHOROUS PESTICIDES																							
Sulfotepp		--		--		--		--		--		--		--		0.030	JB	–		–		--	
Famphur		--		--		--		--		--		--		--		0.025	J	–		–		--	
HERBICIDES																							
2,4,5-T	390,000	--		--		--		--		--		--		--		0.057	JP	–		–		--	
METALS																							
Antimony	31,000	–		–		–		–		–		–		–		4.1	B	–		–		--	
Arsenic	970	–		–		–		–		–		–		–			U	–		–		--	
Barium	5,500,000	–		–		–		–		–		–		–		182	B	–		–		--	
Beryllium	400	–		–		–		–		–		–		–		0.34	B	–		–		--	
Cadmium	39,000	–		–		–		–		–		–		–			U	–		–		--	
Chromium	940,000	–		–		–		–		–		–		–		25.3		–		–		--	
Cobalt	100	–		–		–		–		–		–		–			U	–		–		--	
Copper	2,900,000	–		–		–		–		–		–		–		43.2		–		–		--	
Lead	500,000	–		–		–		–		–		–		–		202		–		–		--	
Mercury	23,000		U		U		U		U		U		U		U		U	–		–		--	
Nickel	1,600,000	–		–		–		–		–		–		–		1.9	B	–		–		--	
Selenium	390,000	–		–		–		–		–		–		–			U	–		–		--	
Silver	390,000	–		–		–		–		–		–		–			U	–		–		--	
Thallium		–		–		–		–		–		–		–			U	–		–		--	
Tin	47,000,000	–		–		–		–		–		–		–			U	–		–		--	
Vanadium	550,000	–		–		–		–		–		–		–			U	–		–		--	
Zinc	23,000,000	–		–		–		–		–		–		–		581		–		–		--	
Lithium		16,300	N		U		U		U		U		U		U	--		–		–		--	

TABLE 3-4
SWMU 16/16 Confirmation Samples Analytical Results Summary

COMPOUND	SAMPLE #	16/16-74		16/16-75		16/16-76		16/16-77		16/16-78	
	SAMPLE DATE:	2/7/96		2/7/96		2/7/96		2/7/96		2/7/96	
	TYPE:	SOIL		SOIL		SOIL		SOIL		SOIL	
	LOCATION:										
	CLEANUP LEVEL ug/kg	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q
VOLATILE ORGANICS											
Acetone	9,200,000		U		U		U		U		U
2-Butanone	5,200,000		U		U		U		U		U
Chloroform	960		U		U		U		U		U
m+p-xylene	99,000	--		--		--		--		--	
Methylene chloride	22,000	6	JB	3	JB	2	JB	5	JB	4	JB
o-xylene	99,000	--		--		--		--		--	
Toluene	280,000		U		U		U		U		U
Tetrachloroethene	14,000		U		U		U		U		U
Trichloroethene	14,000		U		U		U		U		U
Benzene	2,700.000		U		U		U		U		U
Ethylbenzene	58,000		U		U		U		U		U
Total Xylenes	99,000		U		U		U		U		U
Bromodichloromethane	2,900		U		U		U		U		U
1,2-Dibromo-3-chloropropane	610		U		U		U		U		U
SEMIVOLATILE ORGANICS											
Anthracene	1,900	--		--		--		--		--	
Acenaphthylene	660	--		--		--		--		--	
Acenaphthene	36,000	--		--		--		--		--	
Benzo(a)anthracene	660	--		--		--		--		--	
Benzo(b)fluoranthene	660	--		--		--		--		--	
Benzo(k)fluoranthene	660	--		--		--		--		--	
Benzo(a)pyrene	660	--		--		--		--		--	
Benzo(g,h,i)perylene	660	--		--		--		--		--	
bis(2-ethylhexyl) Phthalate	61,000	--		--		--		--		--	
Chrysene	800	--		--		--		--		--	
Dibenzo(a,h) anthracene	120	--		--		--		--		--	
2,4-Dinitotoluene	78,000	--		--		--		--		--	
Fluoranthene	1,600,000	--		--		--		--		--	
Fluorene	28,000	--		--		--		--		--	
Indeno(1,2,3-cd) pyrene	1,200	--		--		--		--		--	
2-Methylnapthalene	660	--		--		--		--		--	
Naphthalene	80,000	--		--		--		--		--	
Phenanthrene	660	--		--		--		--		--	
Pyrene	1,200,000	--		--		--		--		--	
EXPLOSIVES											
2,4-DNT	78,000	35			U		U		U		U
2,6-DNT	1,300	1.1	P		U		U		U		U

TABLE 3-4
SWMU 16/16 Confirmation Samples Analytical Results Summary

COMPOUND	SAMPLE #	16/16-74		16/16-75		16/16-76		16/16-77		16/16-78	
	SAMPLE DATE:	2/7/96		2/7/96		2/7/96		2/7/96		2/7/96	
	TYPE:	SOIL		SOIL		SOIL		SOIL		SOIL	
	LOCATION:										
	CLEANUP LEVEL ug/kg	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q	ug/kg	Q
PESTICIDES											
Aldrin	50	0.34	JP		U		U		U		U
Alpha-BHC	2.01		U		U		U		U		U
Beta-BHC	4.02		U		U		U		U		U
Gamma-BHC (Lindane)	2.68	0.11	JP		U		U	0.11	JP		U
4,4'-DDD	3,500	8.9		0.3	JP	0.14	JP	0.42	JP	0.19	JP
4,4'-DDE	2,500	0.53	JP		U	0.11	JP		U	0.21	JP
4,4'-DDT	8	7	P	0.2	JP		U		U		U
Dieldrin	53	0.24	JP	0.16	JP		U		U	0.22	JP
Endosulfan I	2,000	0.94	BJP	0.16	PB	0.077	JPB	0.18	JBP		U
Endosulfan II	2,000	2.3	JP		U		U	0.31	JP		U
Endosulfan sulfate	44.2	2.1	JP		U		U		U		U
Endrin	12,000	1.2	JP		U		U		U	0.14	J
Endrin Aldehyde	15.4	25	P	0.2	JP		U	0.95	JP		U
Heptachlor	190	0.43	JP		U		U	0.24	JP		U
Heptachlor epoxide	94	0.57	JP		U		U	0.092	JP		U
Methoxychlor	200,000	1.5	JP		U		U	0.98	J		U
ORGANOPHOSPHOROUS PESTICIDES											
Sulfotepp		--		--		--		--		--	
Famphur		--		--		--		--		--	
HERBICIDES											
2,4,5-T	390,000	--		--		--		--		--	
METALS											
Antimony	31,000	109,000	BN*	306	BN*	1,610	BN*	55,300	N*	1,440	BN*
Arsenic	970	7,520		3,720		3,340		40,000		11,800	
Barium	5,500,000	6,900,000	E	208,000	E	274,000	E	1,120,000	E	312,000	E
Beryllium	400	364	B	497	B	542	B	394	B	623	B
Cadmium	39,000	145,000	E	25	UE	128	BE		UE		UE
Chromium	940,000	30,700	E	13,000	E	13,600	E	17,700	E	22,100	E
Cobalt	100	3,750	B	4,350	B	5,160	B	3,430	B	8,700	
Copper	2,900,000	5,170,000	E	24,200	E	500,000	E	3,980,000	E	32,400	E
Lead	500,000	15,300,000	E	22,800	E	174,000	E	14,900,000	E	73,800	E
Mercury	23,000	--		--		--		--		--	
Nickel	1,600,000	25,800	E	9,540	E	11,000	E	11,700	E	14,600	E
Selenium	390,000	760	B	474	B	624	B	319	B	1,070	
Silver	390,000	1,290	B		U		U	457	B		U
Thallium			U		U		U		U		U
Tin	47,000,000	58,400	E	2,520	BE	3,220	BE	2,650	BE	2,120	BE
Vanadium	550,000	9,850	E	18,100	EP	18,100	E	26,100	E	37,300	E
Zinc	23,000,000	48,700,000	E	478,000	E	1,880,000	E	2,450,000	E	123,000	E
Lithium		--		--		--		--		--	

Notes:

1. Qualifiers
   - J: Estimated below reporting limit.
   - U: Below Detection limit
   - B: (for organic analyses) Analyte also found in in corresponding blank samples(s)
   - P: Value from quantitation and confirmation columns differed by more than 25%. Data flagged were the lower of the two values.
   - N: Spike recoveries outside of QC limits
   - E: Exceeded range of calibration curve
   - D: Value from secondary dilution run
2. -- Not analyzed

TABLE 3-5
BACKGROUND AND BORROW PIT ANALYTICAL RESULTS SUMMARY

Interim Measures			Arsenic	Barium	Beryllium	Chromium	Cobalt	Copper	Lead	Lithium	Nickel	Vanadium	Zinc
Cleanup Level (ug/kg)			970	5500000	400	940000	100	2900000	500000	1600	1600000	550000	23000000
NSWC-BP/BF-001	3/16/95		**9400**	62400	**570**	15800	**3900**	15300	13800	**12800**	10000	31200	395
NSWC-BP/BF-002	3/16/95		**9000**	65100	**560**	16900	**4600**	16100	14900	**11700**	10800	30800	41900
NSWC-BP/BF-003	10/12/95		**7800**	92100	**740**	22100	**8600**	15100	14200	**14900**	14500	39000	40800
NSWC-BP/BF-004	10/12/95		**6300**	83900	**810**	22800	**7000**	13900	13700	**14700**	13500	38200	40100
NSWC-BP/BF-005	10/27/95		**1900**	20600	NR	4600	**2400**	4300	3500	NR	6200	7300	16000
NSWC-BP/BF-006	10/27/95		**1800**	26700	NR	5600	**3200**	4800	3900	NR	6600	8600	17700
NSWC-BIOF001	3/7/96		**9200**	86300	**627**	17700	**9200**	14600	15900	**7440**	11100	30200	34000
NSWC-BIOF002	3/7/96		**6210**	82000	**557**	11100	**10700**	9190	16200	**4690**	8540	20100	24300
NSWC-BIOF003	3/7/96		**8200**	61200	**417**	15900	**10800**	9910	13500	**6960**	9500	27100	27000
NSWC-BIOF004	3/7/96		**4950**	123000	**729**	10400	**9890**	10300	16700	**4730**	9860	18300	27000
NSWC-BIOF005	3/7/96		**7430**	105000	**602**	12100	**8690**	10900	16300	**5820**	9050	24100	29700
NSWC-BIOF006	3/7/96		**5880**	89200	**642**	11300	**10300**	10400	16500	**5100**	9410	20900	25800
NSWC-BIOF007	3/7/96		**11400**	58300	**546**	17700	**6370**	15400	16400	**8730**	10900	32000	35700
NSWC-BIOF008	3/7/96		**6130**	91900	**648**	11400	**11100**	10400	17000	**6220**	10500	22300	29900
NSWC-BIOF009	3/7/96		**2960**	83500	**540**	9490	**4860**	10500	13200	**6030**	8990	17200	39700
NSWC-BIOF010	3/7/96		**5260**	46700	**478**	12400	**8080**	7120	13700	**4430**	7240	20900	20600
NSWC-BIOF011	3/7/96		**6870**	73000	**542**	38300	**9180**	16000	15200	**45200**	193000	24200	38700
NSWC-BIOF012	3/7/96		**6730**	54600	**459**	17600	**12600**	11200	14500	**7940**	21100	23500	31300
NSWC-BIOF013	3/7/96		**2880**	51600	**454**	9360	**7820**	8510	7380	**5580**	10600	14200	25300
NSWC-BIOF014	3/7/96		**2580**	62700	**623**	9480	**12100**	10400	7720	**6520**	17900	13200	36100

Notes:

1. Outlined results in **BOLD** indicate a sample level above the Interim Measures Cleanup Level.
2. NR = Not Requested
3. Analytical results are for metals only. No other analytes were present at levels near or above Interim Measures Cleanup Levels Criteria.

4.0
SAMPLING, ANALYSIS AND QUALITY CONTROL

4.1 SAMPLING PROCEDURES

All sample collection activities were performed in accordance with the SAP for Interim Measures Cleanup. Chain-of-Custody (COC) procedures and records were maintained for each sample shipment sent to the laboratory for analysis (Appendix D). Samples were collected and preserved per the SAP in order to maintain the sample integrity. Equipment rinse blanks, field duplicates and trip blanks were collected and submitted to the laboratory in order to assist in evaluating field and analytical precision, accuracy, representativeness, and comparability. The laboratory performed method blank, sample matrix spike, sample matrix spike duplicate, sample duplicate, surrogate and standard matrix spike analyses in order to evaluate laboratory accuracy and precision.

4.2 SAMPLE COLLECTION

During this interim measure, samples were collected for site characterization, waste characterization and classification, confirmation of meeting cleanup criteria, and/or for documentation of existing conditions at the time of source removal.

4.2.1 Characterization Sampling

Characterization samples were collected from both sumps, the ASTs, soils under the ASTs, and the various excavations of the slag/ash piles. Samples submitted to an off-site laboratory were labeled, placed in a cooler, and preserved with ice. Characterization sample results are summarized in Table 3-2. Appendix D contains all sample data by sample number.

4.2.2 Confirmation

After excavation activities were completed, confirmation samples were collected from all of the areas. These samples were analyzed for Appendix IX parameters listed in the SAP or parameters more specific to the known contamination. In the east and west sumps, samples were collected from the wash/rinse water to determine completion of work. In the area of the slag/ash pile excavations, a 25-foot grid was placed over the area, and the number of samples collected was selected as the cube root of the number of grid intersections. Figure 3-1 shows the location of each sample collected. Soil confirmation samples were collected using either a stainless steel core sampler lined with a brass sleeve that was hand driven into undisturbed soil or a stainless steel trowel. Samples were submitted to an off-site laboratory and were marked, placed in a cooler, and preserved with ice to prior to shipment to maintain sample integrity. Confirmation sample results are summarized on Table 3-4. Appendix D contains all sample data by sample number.

4.3 SAMPLE ANALYSES

Site characterization samples were analyzed for various compounds depending on location and previous knowledge of site activities at these locations. Disposal characterization samples collected to determine the method of disposal were analyzed for RCRA Toxicity characteristics referencing *Test Methods for Evaluating Solid Waste, SW 846, USEPA, 1986,* (SW 846). Analytical parameters and results are provided in Appendix D. Confirmatory sampling and analysis for the Appendix IX constituents was to ensure complete removal of all contaminated material. The analytical methods employed for this SWMU were in accordance with the SAP and SW 846 methodologies. The analytical methods used for analyses associated with these interim measures activities are presented in Table 3-1 and in Appendix D.

4.4 DATA QUALITY CONTROL

Seventy-six soil, three sludge, and twelve liquid samples collected from NSWC Crane SWMU-16/16 were analyzed for nitrate, pesticides/PCB's, RCRA characteristics, metals, organophosphorus pesticides, semi-volatiles, volatiles, herbicides, dioxins, and/or explosives.

4.4.1 Field Quality Control

Field quality control samples were collected during all phases of the work at SWMU-16/16. Results of the

field duplicate samples are summarized in Tables 3-2 for characterization samples, and 3-4 for confirmation samples, along with the sample results. Trip blanks, equipment rinsates, and field duplicate analytical results from characterization and confirmation sampling events were evaluated to identify potential sources of error introduced during sampling. The equipment rinsate was collected by flushing decontaminated sampling equipment with deionized water (from the facility), collecting the rinse water and submitting it for analysis. Results were used to evaluate the effectiveness of decontamination procedures in preventing sample cross-contamination. No target compounds were detected above reporting limits in the rinsate blanks, except methylene chloride. This confirms that cross-contamination of the samples through sample equipment was not a potential concern. Methylene chloride was detected in 16/16-RB11. However, the methylene chloride concentration in this rinse blank was similar to the level found in the corresponding laboratory method blank and is likely attributable to laboratory background levels.

Trip blanks were submitted and sample results were evaluated to identify any cross-contamination that may have occurred during storage and shipping of the samples to the analytical laboratory. Trip blanks were received in sealed sample containers from the laboratory and were not opened at the site. Methylene chloride was detected, at low levels, in most trip blanks. These levels were similar to the levels found in the corresponding laboratory method blanks and are likely attributable to laboratory background levels.

Duplicate samples were collected from sample locations during all rounds of sampling events. Samples 16/16-018, 16/16-026, 16/16-038, 16/16-052, 16/16-062, 16/16-26A, 16/16-38A, and 16/16-076 are all identified as being field duplicate samples of field samples 16/16-017, -025, -037, -051, -061, -025A, -037A and -075, respectively. Precision criteria for duplicate samples was established in the QAPP. These precision criteria do not apply when values for analytes are estimated below the reporting limits. Criteria was met for the majority of the field duplicate samples, with the exception of several metals for samples 16/16-017 and 16/16-018. These two samples replicated well with respect to metals results meeting the cleanup levels. Overall, field duplicate precision is determined to be acceptable.

4.4.2 Laboratory Quality Control

Laboratory analytical data was evaluated by the assessment of precision, accuracy, representativeness, comparability, and completeness. Precision is a measure of the reproducibility of measurements under a given set of conditions. Laboratory duplicates, matrix spikes, and matrix spike duplicates were used to determine the precision of the analytical process.

Accuracy is a measure of the bias in a measurement system and is defined as the closeness of the reported value to the true value. The accuracy of a measurement system was assessed by evaluating the results of quality control samples such as matrix spikes, analytical surrogates, and laboratory control spikes.

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness in the laboratory is ensured by using the proper analytical procedures, meeting sample holding times, and analyzing and assessing field duplicate samples.

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Analytical data are considered to be comparable when similar sampling and analytical methods are used and documented per the QAPP.

Laboratory completeness is a measure of the number of valid measurements obtained from all measurements taken in the project and can be compared to the number that was expected to be obtained under normal sampling and analytical conditions.

Data has been reviewed to determine whether data quality objectives were met for the sampling and analytical programs. Method blanks were free of target compounds above the reporting limits. Sample surrogate recoveries fell within acceptable ranges to meet the project data quality objectives, although surrogates spiked for pesticide analyses exhibited variable recoveries. In these instances, the column used for quantitation showed acceptable surrogate recoveries. In all cases, sample results have been flagged as necessary.

The majority of laboratory control spikes had acceptable recoveries with the following exceptions. One standard spike analyzed for pesticides had a high recovery (219%) for 4,4-DDE. Another standard spike

analyzed for explosives had a high recovery (155%)for HMX. In both cases, the corresponding field samples had no hits for the respective analytes, and the reported results are considered acceptable. Laboratory control spike and standard spike duplicates had acceptable results for precision, when analyzed.

The sample matrix spikes and matrix spike duplicates (MS/MSD) had acceptable accuracy and precision with few exceptions. The MS and MSD of sample NSWC 16/16-38A were analyzed for volatile organic compounds and had high recoveries for 1,1-dichloroethane (DCA). The corresponding field samples had no hits for DCA, and the reported results are considered acceptable.

The MS and MSD performed on sample NSWC 16/16-071 and analyzed for pesticides had low recoveries for endosulfan I, dieldrin, endosulfan II, endrin, and 4,4-DDD, which ranged from 0 to 32%. The corresponding laboratory control spike had acceptable recoveries for these analytes, and matrix interferences are contributing to the low recovery. Only one of these analytes was detected at a level above its reporting limit. NSWC 16/16-074 had 4,4-DDD at 8.9 ug/kg, and the cleanup level for this compound is over 300 times greater than this amount. No other sample in this lot (NSWC 16/16-070, -074, -075, -076, -077, -078) contained hits greater than the reporting limits, and cleanup levels for these compounds are 35 to 4000 times greater than the corresponding reporting limits. The MS and MSD performed on sample NSWC 16/16-070 were analyzed for pesticides and had 0% recoveries for Aldrin, due to masking by a large peak which was eluting near Aldrin's retention time. This interfering peak was also present in the corresponding field samples NSWC 16/16-RB13 and -070. Data has been correctly reported for these samples and is considered acceptable.

MS/MSD recoveries for several metals were slightly low, but in all cases the post-digest spike recoveries were acceptable and data was flagged appropriately. Antimony recoveries ranged from 12% to 157% in several analytical batches. Chromium in one batch had MS and MSD recoveries at 0% and 24%, respectively; however, the sample concentration in the corresponding unspiked sample was three times greater than the spike amount. The cleanup criterion for chromium is 9 to 102 times greater than sample concentrations found in corresponding samples. In one quality control batch, the cadmium recovery was 50% for the MSD sample. Nickel had one low MSD recovery at 51%. The cleanup criterion for nickel is 17 to 213 times greater than sample concentrations found in corresponding samples. Thallium recovered low in three of the seven metals batches, with MS/MSD recoveries ranging from 0%-66% in these three runs. There were no thallium hits above reporting limits for any of the corresponding field samples, and no cleanup criterion has been established for this analyte.

Data quality objectives for accuracy, precision, comparability, and completeness were outlined in the QAPP. Overall, the data quality objectives for this project have been met, and data is determined to be acceptable.

A number of samples, summarized in Table 4-1, had analytes with reporting limits that exceeded the cleanup levels specified in Appendix D. In these cases, there were no hits for the target analytes and the practical quantitation limit has been reported per the USEPA guidance document.

TABLE 4-1

ANALYTES WITH REPORTING LIMITS EXCEEDING THE INTERIM MEASURES CLEANUP LEVELS

SAMPLE #		16/16-003	16/16-022	16/16-023	16/16-024	16/16-025	16/16-026	16/16-027	16/16-028	16/16-029	16/16-030	16/16-031	16/16-032	16/16-033	16/16-034	16/16-035	16/16-036
SAMPLE DATE		6/29/95	10/13/95	10/13/95	10/13/95	10/13/95	10/13/95	10/13/95	10/13/95	10/13/95	10/13/95	10/13/95	10/13/95	10/13/95	10/13/95	10/13/95	10/13/95
TYPE		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
COMPOUND	CLEANUP LEVEL ug/kg																
1,2-Dibromoethane	19																
2-Hexanone	50			65	57	57	57	58	56	52	57	55	55	54	54	54	55
2-Methylnaphthalene	660																
3-Chloropropene	5			6.5	5.7	5.7	5.7	5.8	5.6	5.2	5.7	5.5	5.5	5.4	5.4	5.4	5.5
4,4'-DDT	8			21 *	18 *	18 *	19 *	39 *	19 *		19 *					18 *	
Acenaphthylene	660																
Acrylonitrile	260			1300	1100	1100	1100	1200	1100	1000	1100	1100	1100	1100	1100	1100	1100
Aldrin	50																
alpha-BHC	2.01		2.1	11 *	9.1 *	9.2 *	9.4 *	19 *	9.3 *	3.3 *	9.4 *					8.9 *	
Anthracene	1900																
Aroclor 1016	110			210 *	180 *	180 *	190 *	390 *	190 *		190 *					180 *	
Aroclor 1221	110			420 *	370 *	370 *	380 *	770 *	370 *	130 *	380 *					360 *	140 *
Aroclor 1232	110			210 *	180 *	180 *	190 *	390 *	190 *		190 *					180 *	
Aroclor 1242	110			210 *	180 *	180 *	190 *	390 *	190 *		190 *					180 *	
Aroclor 1248	110			210 *	180 *	180 *	190 *	390 *	190 *		190 *					180 *	
Aroclor 1254	110			210 *	180 *	180 *	190 *	390 *	190 *		190 *					180 *	
Aroclor 1260	110			210 *	180 *	180 *	190 *	390 *	190 *		190 *					180 *	
Arsenic	970																
Benzo(a)anthracene	660																
Benzo(a)pyrene	660																
benzo(b)fluoranthene	660																
Benzo(g,h,i)perylene	660																
Benzo(k)fluoranthene	660																
Beryllium	400																
beta-BHC	4.02			11 *	9.1 *	9.2 *	9.4 *	19 *	9.3 *		9.4 *					8.9 *	
Chlordane	660																
Chlorobenzilate	3200																
Chloroprene	5			6.5	5.7	5.7	5.7	5.8	5.6	5.2	5.7	5.5	5.5	5.4	5.4	5.4	5.5
Chrysene	800																
Cobalt	100	1200				1200								1100			
delta-BHC	6.03			11 *	9.1 *	9.2 *	9.4 *	19 *	9.3 *		9.4 *					8.9 *	
Diallate	14000																
Dibenzo(a,h)anthracene	120																
Dibenzofuran	660																
Dieldrin	53																
Endosulfan Sulfate	44.2																
Endrin Aldehyde	15.4			21 *	18 *	18 *	19 *	39 *	19 *		19 *					18 *	
Ethyl cyanide	100																
gamma-BHC (Lindane)	2.68		4.2	21 *	18 *	18 *	19 *	39 *	19 *	6.6 *	19 *	3.6	3.6	3.6	3.6	18 *	7.2 *
Heptachlor	190																
Heptachlor Epoxide	94																
Indeno(1,2,3-c-d)pyrene	1200																
Iodomethane	5			6.5	5.7	5.7	5.7	5.8	5.6	5.2	5.7	5.5	5.5	5.4	5.4	5.4	5.5
Kepone	47			212 *	183 *	185 *	188 *	386 *	185 *	66 *	188 *					178 *	72 *
Pentachloroethane	10																
Phenanthrene	660																
Toxaphene	770			1100 *	910 *	920 *	940 *	1900 *	930 *		940 *					890 *	
trans-1,4-Dichloro-2-butene	15			33	29	29	29	29	28	26	29	27	28	27	27	27	27

* denotes reporting limits increased due to dilutions

TABLE 4-1
ANALYTES WITH REPORTING LIMITS EXCEEDING THE INTERIM MEASURES CLEANUP LEVELS

SAMPLE #		16/16-037	16/16-038	16/16-039	16/16-044	16/16-045	16/16-061	16/16-062	16/16-063	16/16-064	16/16-065	16/16-066	16/16-23A	16/16-24A	16/16-25A	16/16-26A	16/16-27A
SAMPLE DATE		10/13/95	10/13/95	10/13/95	10/18/95	10/19/95	10/19/95	10/19/95	10/19/95	10/19/95	10/19/95	10/19/95	10/25/95	10/25/95	10/25/95	10/25/95	10/25/95
TYPE		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
COMPOUND	CLEANUP LEVEL ug/kg																
1,2-Dibromoethane	19								29	29							
2-Hexanone	50	53	53				55	66	290	290	52	63	71	62	61	60	63
2-Methylnaphthalene	660			20000 *													
3-Chloropropene	5	5.3	5.3				5.5	6.6	29	29	5.2	6.3	7.1	6.2	6.1	6	6.3
4,4'-DDT	8	34 *	34 *	66 *							350 *						
Acenaphthylene	660			20000 *													
Acrylonitrile	260	1100	1100					1300	5900	5900	1000	1300	1400	1200	1200	1200	1300
Aldrin	50				450						170 *						
alpha-BHC	2.01	17 *	17 *	33 *	450			2.2			170 *						
Anthracene	1900			4900 *													
Aroclor 1016	110	340 *	340 *	660 *	9100						3500 *						
Aroclor 1221	110	690 *	690 *	1300 *	18000						6900 *						
Aroclor 1232	110	340 *	340 *	660 *	9100						3500 *						
Aroclor 1242	110	340 *	340 *	660 *	9100						3500 *						
Aroclor 1248	110	340 *	340 *	660 *	9100						3500 *						
Aroclor 1254	110	340 *	340 *	660 *	9100						3500 *						
Aroclor 1260	110	340 *	340 *	660 *	9100												
Arsenic	970					8000											
Benzo(a)anthracene	660			20000 *													
Benzo(a)pyrene	660			20000 *													
benzo(b)fluoranthene	660			20000 *													
Benzo(g,h,i)perylene	660			20000 *													
Benzo(k)fluoranthene	660			20000 *													
Beryllium	400					2000											
beta-BHC	4.02	17 *	17 *	33 *	450						170 *						
Chlordane	660				9100						3500 *						
Chlorobenzilate	3200				18182						6949 *						
Chloroprene	5	5.3	5.3				5.5	6.6	29	29	5.2	6.3	7.1	6.2	6.1	6	6.3
Chrysene	800			20000 *													
Cobalt	100					11000											
delta-BHC	6.03	17 *	17 *	33 *	450						170 *						
Diallate	14000				90909						34747 *						
Dibenzo(a,h)anthracene	120			20000 *					390	390							
Dibenzofuran	660			20000 *													
Dieldrin	53			66 *	910						350 *						
Endosulfan Sulfate	44.2			66 *	910						350 *						
Endrin Aldehyde	15.4	34 *	34 *	66 *	910						350 *						
Ethyl cyanide	100																
gamma-BHC (Lindane)	2.68	34 *	34 *	66 *	910		3.6	4.4	3.8	3.8	350 *	4.2	4.7	4	4	3.9	4.1
Heptachlor	190				450												
Heptachlor Epoxide	94				450						170 *						
Indeno(1,2,3-c-d)pyrene	1200			20000 *													
Iodomethane	5	5.3	5.3					6.6	29	29	5.2	6.3	7.1	6.2	6.1	6	6.3
Kepone	47	345 *	345 *	661 *	9091						3475 *	42	47				
Pentachloroethane	10								29	29							
Phenanthrene	660			16000*													
Toxaphene	770	1700 *	1700 *	3300 *	45000						17000 *						
trans-1,4-Dichloro-2-butene	15	27	27				27	33	150	150	26	32	36	31	30	30	31

* denotes reporting limits increased due to dilutions

TABLE 4-1
ANALYTES WITH REPORTING LIMITS EXCEEDING THE INTERIM MEASURES CLEANUP LEVELS

SAMPLE #		16/16-037	16/16-038	16/16-039	16/16-044	16/16-045	16/16-061	16/16-062	16/16-063	16/16-064	16/16-065	16/16-066	16/16-23A	16/16-24A	16/16-25A	16/16-26A	16/16-27A
SAMPLE DATE		10/13/95	10/13/95	10/13/95	10/18/95	10/19/95	10/19/95	10/19/95	10/19/95	10/19/95	10/19/95	10/19/95	10/25/95	10/25/95	10/25/95	10/25/95	10/25/95
TYPE		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
COMPOUND	CLEANUP LEVEL ug/kg																
1,2-Dibromoethane	19								29	29							
2-Hexanone	50	53	53				55	66	290	290	52	63	71	62	61	60	63
2-Methylnaphthalene	660			20000 *													
3-Chloropropene	5	5.3	5.3				5.5	6.6	29	29	5.2	6.3	7.1	6.2	6.1	6	6.3
4,4'-DDT	8	34 *	34 *	66 *							350 *						
Acenaphthylene	660			20000 *													
Acrylonitrile	260	1100	1100					1300	5900	5900	1000	1300	1400	1200	1200	1200	1300
Aldrin	50				450						170 *						
alpha-BHC	2.01	17 *	17 *	33 *	450			2.2			170 *						
Anthracene	1900			4900 *													
Aroclor 1016	110	340 *	340 *	660 *	9100						3500 *						
Aroclor 1221	110	690 *	690 *	1300 *	18000						6900 *						
Aroclor 1232	110	340 *	340 *	660 *	9100						3500 *						
Aroclor 1242	110	340 *	340 *	660 *	9100						3500 *						
Aroclor 1248	110	340 *	340 *	660 *	9100						3500 *						
Aroclor 1254	110	340 *	340 *	660 *	9100						3500 *						
Aroclor 1260	110	340 *	340 *	660 *	9100						3500 *						
Arsenic	970					8000											
Benzo(a)anthracene	660			20000 *													
Benzo(a)pyrene	660			20000 *													
benzo(b)fluoranthene	660			20000 *													
Benzo(g,h,i)perylene	660			20000 *													
Benzo(k)fluoranthene	660			20000 *													
Beryllium	400					2000											
beta-BHC	4.02	17 *	17 *	33 *	450						170 *						
Chlordane	660				9100						3500 *						
Chlorobenzilate	3200				18182						6949 *						
Chloroprene	5	5.3	5.3				5.5	6.6	29	29	5.2	6.3	7.1	6.2	6.1	6	6.3
Chrysene	800			20000 *													
Cobalt	100					11000											
delta-BHC	6.03	17 *	17 *	33 *	450						170 *						
Diallate	14000				90909						34747 *						
Dibenzo(a,h)anthracene	120			20000 *					390	390							
Dibenzofuran	660			20000 *													
Dieldrin	53			66 *	910						350 *						
Endosulfan Sulfate	44.2			66 *	910						350 *						
Endrin Aldehyde	15.4	34 *	34 *	66 *	910						350 *						
Ethyl cyanide	100																
gamma-BHC (Lindane)	2.68	34 *	34 *	66 *	910		3.6	4.4	3.8	3.8	350 *	4.2	4.7	4	4	3.9	4.1
Heptachlor	190				450												
Heptachlor Epoxide	94				450						170 *						
Indeno(1,2,3-c-d)pyrene	1200			20000 *													
Iodomethane	5	5.3	5.3					6.6	29	29	5.2	6.3	7.1	6.2	6.1	6	6.3
Kepone	47	345 *	345 *	661 *	9091						3475 *	42	47				
Pentachloroethane	10								29	29							
Phenanthrene	660			16000*													
Toxaphene	770	1700 *	1700 *	3300 *	45000						17000 *						
trans-1,4-Dichloro-2-butene	15	27	27				27	33	150	150	26	32	36	31	30	30	31

5.0
SUMMARY AND CONCLUSIONS

MK collected characterization samples from the various areas included in the SWMU-16/16 IM to determine disposal options. The results indicated that the slag/ash piles and sludge in the east sump were considered hazardous waste because of lead contamination and required stabilization before landfilling. The soils underneath the ASTs were classified as a special (petroleum) waste, while the sludge inside of the ASTs was treated. The liquids and sludges from the west sump were contaminated with trichloroethene at a level that required treatment and disposal. The sludges were solidified and then incinerated. A copy of the Certificate of Destruction is located in Appendix E.

MK excavated the material from the east sump, transported it to the hazardous waste landfill for treatment, and conducted visual and rinsate sampling in the sump. The slag and ash piles were excavated and sent to the hazardous landfill for treatment and disposal. Confirmation sampling was conducted on a grid pattern in the area of the excavation. Additional soils were removed after the first set of sample results was received.

Sample analysis results have revealed that the soil at SWMU-16/16 presently contains levels of lead above the interim cleanup levels and may merit further consideration. However, the source of contamination has been removed, and, therefore, the IM has met the requirements and objectives of the Work Plan for SWMU-16/16. It is recommended that additional evaluation be performed to determine the potential risk to human health and the environment at SWMU-16/16. In addition work beyond the scope of this Interim Measure is underway at SWMU-16/16 for trichloroethene-contaminated groundwater and will be discussed in the Interim Measures Report for Delivery Order 0027.

Based on the work performed at SWMU-16/16, the confirmation sample results, and the acceptance of the physical work by the ROICC and NSWC Crane personnel, it is recommended that this site be considered as meeting the requirements and objectives of the Interim Measures Cleanup Activities.

6.0
REFERENCES

Morrison Knudsen Corporation, (MK) 1995a. *Work Plan and Site Specific Health and Safety Plan for Interim Measures Cleanup at Solid Waste Management Units #16/16 and 24/00,* Revision B, as amended, dated August 18, 1995.

Morrison Knudsen Corporation, (MK) 1995b. *Quality Control Plan for Interim Measures Cleanup, NSWC Crane, Crane, Indiana,* Revision C, August 18, 1995.

Morrison Knudsen Corporation, (MK) 1995c. *Quality Assurance Project Plan for RCRA Corrective Action Interim Measures Cleanup, NSWC Crane, Crane, Indiana,* Revision C, December 29, 1995.

Morrison Knudsen Corporation, (MK) 1995d. *Waste Management Plan for Interim Measures Cleanup, NSWC Crane, Crane, Indiana,* Revision C, August 18, 1995.

Morrison Knudsen Corporation, (MK) 1995e. *Sampling and Analysis Plan for Interim Measures Cleanup, NSWC Crane, Crane, Indiana,* Revision C, August 18, 1995.

Morrison Knudsen Corporation, (MK) 1995f. *Environmental Protection Plan Interim Measures Cleanup, NSWC Crane, Crane, Indiana,* Revision C, August 18, 1995.

Morrison Knudsen Corporation, (MK) 1996a. *Interim Measure Report, SWMU 23/00 Battery Shop, Naval Surface Warfare Center Crane, Crane, Indiana,* Draft, September 1996.

Morrison Knudsen Corporation, (MK) 1996b. *Interim Measure Report, SWMU 24/00 Sludge Beds A and B, Naval Surface Warfare Center Crane, Crane, Indiana*, Draft, November 1996.

Morrison Knudsen Corporation, (MK) 1996c. *Interim Measure Report, SWMU 25/07 Dump Sites A and B, Naval Surface Warfare Center Crane, Crane, Indiana*, Draft, September 1996.

Halliburton NUS, (NUS) 1992, *RCRA Facility Investigation Phase I Environmental Monitoring Reports Solid Waste Management Units #15/06, #14/00, #16/16 Naval Surface Warfare Center, Crane Division*, Crane, Indiana.

Naval Energy and Environmental Support Activity, (NEESA) 1983. *Initial Assessment Study of Naval Weapons Support Center Crane, Indiana.* NEESA 13-003, May.

U. S. Environmental Protection Agency (USEPA) 1994. *RCRA Corrective Action Guidance Human Data Quality Levels for RFI Projects.* June 18, 1994.

U. S. Environmental Protection Agency (SW846) 1986. *Test Methods for Evaluating Solid Waste, SW846.*

APPENDIX A

APPROVALS, PERMITS AND REGULATOR INFORMATION

NAVAL SURFACE WARFARE CENTER
CRANE WORK PLAN

SOLID WASTE MANAGEMENT UNITS
#16/16 AND #24/00

NSWC CRANE
CRANE, INDIANA

August 18, 1995
Revision B

CONTRACT N62467-93-D-1106
DELIVERY ORDER #0009

Prepared by:

MORRISON KNUDSEN CORPORATION
2420 MALL DRIVE
CORPORATE SQUARE 1 - SUITE 211
NORTH CHARLESTON, SOUTH CAROLINA 92406

APPROVALS:

William P. Piispanen	18 Sep 95
MK Safety and Health Program Manager	Date
[illegible]	18 Sep - 95
MK Quality Program Manager	Date
[illegible]	18 Sep 95
MK Sr. Project Manager	Date
[illegible]	18 Sept 95
MK Program Manager	Date

ACCEPTANCE

[illegible]	18 SEPT 95
U.S. Navy Responsible Authority	Date

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL AND GOVERNMENT DIVISION

RECEIVED
JUL 12 1996
MK-CRANE

SWMU ACCEPTANCE AND TURNOVER

DATE: July 12, 19967

TO: Steven Downey, Proj. Mgr.

FROM: W.M. Kemp Jr., QCS

LOCATION: NSWC

LOCATION: NSWC

SUBJECT: Final inspection and acceptance by the ROICC

The final inspection for the Solid Waste Management Unit Interim Measures Cleanup for the physical work completed at SWMU-16/~~00~~ 16 ont was conducted on 7-11-96. The completed physical work was accepted by the ROICC on 7-11-96 establishing the beneficial date.

MORRISON KNUDSEN CORPORATION

Signature _____ Date 7-11-96
Signature _____ Date 7-12-96
Signature _____ Date _____

ROICC

Signature _____ Date 7/11/96
Signature _____ Date 7/12/96

The completion and acceptance of the Interim Measures Report will complete this closure at a later date.

cc: Greg Jones PMO
Brent Robertson ROICC
File

NSWC - CRANE			
4324-0009			
PROJECT MANAGER	ACT	INFO	INT
PROJECT MANAGER			270
PROJECT ENGINEER			
GNL SUPT			
SAFETY AND HEALTH			
DAMAGE CONTROL SUPERVISOR			
PROJECT CONTROLS			
FIELD DRAWINGS			
PROCUREMENT		X	
Jacobs	X		
FILE: 11.096.F			
FILE: 12.082.09.F			
FILE: 13.900.01.F			
13.050.07.F			

APPENDIX B

NAVY/REGULATORY CORRESPONDENCE

Post-it™ brand fax transmittal mem	# of pages ▸ 1
To Scott Newman	From Steve Downey
Co. MK	Co. MK
Dept.	Phone #
Fax #	Fax #

RECEIVED
OCT 18 1995
MK-CRANE

5090
Code 18011
18 Oct 95

Morrison Knudsen Corporation
2420 Mall Drive
Corporate Square 1 Suite 211
North Charleston, SC 29406

Subj: CONTRACT N62467-93-D-1106, DELIVERY ORDER 9, RESPONSE ACTION CONTRACT, NSWC CRANE, IN

Gentlemen:

This letter is to serve as technical direction for the following actions:

The following shall be completed at the Cast High Explosive Area SWMU # 16: the 3 tanks (2-100 gal and 1-250 gal) tanks and piping shall be dismantled, cleaned, wipe tested and properly disposed. Additionally, the visually stained soils and any free product are to be removed.
There are approximately 46 CY of product and 150 CY of stained soil.

You shall proceed promptly with the performance of this technical direction. You are to provide a budgetary impact of this direction to the Contracting Officer within 5 days of its issuance. If in your opinion, this direction falls within any of the categories defined in paragraph (b) of clause G8, Technical Direction, of your contract, you shall promptly notify the Contracting Officer in writing. You shall take no action until the Contracting Officer has issued a modification to the delivery order or otherwise resolved the issue.

If you have any questions, contact Jimmy Jones, Code 18011, at 803-743-0544 or DSN 563-0544.

J. F. Jones
J. F. Jones
COTR RAC II

OCT 18 1995

Copy to:
Code 0232RH
Code 1864
Code 052CH
~~Code 1838~~ 10-18-95
Brent Robertson- RCICC NSWC Crane

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL

To Brent Robertson	From Jimmy Jones
Department NTR RCICC	Phone # DSN 563-0544
Fax # 812 854 3800	Fax # DSN 563-0445

TOTAL P.01

RECEIVED
OCT 10 1995
MK-CRANE

DEPARTMENT OF THE NAVY
SOUTH NAVFAVENGCOM Environmental
Code 1864
P. O. Box 190010
N. Charleston, SC 29419-9010

NSWC - CRANE		
4324-0009		
PROJECT MEMBER	ACT	INFO
PROJECT MANAGER		
PROJECT ENGINEER		
GNL SUPT		
SAFETY AND HEALTH		
CACC SUPERVISOR		
PROJECT CONTROLS		
FIELD ENGINEERING		
FMO-CHARLESTON		
FILE: 11.041		
FILE: 11.011.5		
FILE: 10.305.5		
FILE: 18.021.5		
13.050.09		

FAX COVER SHEET

DATE: October 10, 1995 TIME: 12:00 PM

TO: Steve Downey
Morrison Knudsen Corp.
PHONE: 812-854-6941
FAX: 812-854-6944

FROM: Adrienne P. Townsel Wilson
South Div
PHONE: 803-743-0582
FAX: 803-743-0465

RE: USEPA Informal comments regarding Work Plan & Task Specific H&S Plan for IM at SWMUs 16 & 24 at NSWC CRANE, IN

CC:

Number of pages including cover sheet: 2

Message:

Steve,

Carol and I talked this morning. She will be sending her approval of the plan with the following concerns. Please just send corrected pages same revision since change are minor and has been navy approved.

Generally, she mentioned that the roll off box sampling should not be composited. Region 5 will be recommending discreet sampling with a minimum of 2 samples per box. If soils were tested in situ they do not have to be tested again to determine waste analysis.

1. Pg 3 remove 3rd sentence in last paragraph " If the removed.....as fill in beds" since this will not be allowed in the state of Indiana. Also delete in 4th sentence ..."and will be restored for continued use after remediation." since Beds A will not be altered.

2. Pg. 18 sec 4.1.4, para 1 line 4, delete "...or used as fill."

3. Pg 19, Soil Sampling-Carol will be calling Tom Brent this afternoon the be sure the 100 ft grid is consistent with the "How Clean is Clean Grid System", this system is based on acreage. We may have to make the grid tighter. The specifics will be relayed to Tom Brent.

4. Pg 21, Sec 4.2.5, The rinsate sample may be used to determine if the concrete is clean. This may be of more importance on cast High or other sites., since its no longer relevant at SWMU 24.

5. Pg 58 of SSHP, Phone number for Region 5 Emergency should be 312-353-2318. Add 24-hr emergency Indiana Number 317-233-7745

SENT BY:U.S. EPA 10-10-95 ;10:11AM ; RCMD 812 854 4177;# 1/

OPTION L FORM 38 (7-90)

FAX TRANSMITTAL

To Tom Breuer	From C. Will Smith EPA
Dept./Agency USACE	Phone # 312 886 6176
Fax # 812 854 4177	Fax # 312 353 1788

1 of pages ▶ 7

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

To: Tom Breuer Fax 812 854 4177

RECEIVED OCT 10 1995 MK-CRANE

Cost High Excavation

Medium Size (0.25 - 3.0 acres)

$$\frac{\sqrt{30{,}200/\pi}}{4} = \frac{97.72}{4} = 24.43 \text{ Grid feet}$$

$$\frac{\sqrt{37{,}500/\pi}}{4} = \frac{109.25}{4} = 27.31 \text{ Grid feet}$$

that's based only on area not depth included.

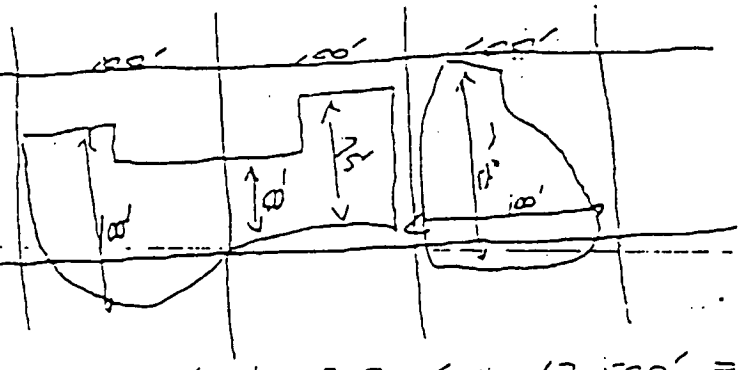
large size (3.0 acres +)

$$\sqrt{\frac{30{,}000 \cdot \pi}{300}} = \sqrt{\frac{94247.78}{300}} = \sqrt{314.16} = 17.7 \text{ feet}$$

$$\sqrt{\frac{37{,}500 \cdot \pi}{300}} = \sqrt{\frac{117809.72}{300}} = \sqrt{392.7} = 19.8 \text{ feet}$$

NSWC - CRANE
4324-0009

PROJECT MEMBER	ACT	INFO	INT
PROJECT MANAGER			
PROJECT ENGINEER			
CIVIL SUPT			
SAFETY AND HEALTH			
QA/QC SUPERVISOR			
PROJECT CONTROLS			
FIELD ENGINEERING			
PWC-CHARLESTON			
FILE: 10.305.5			
FILE: 13.050.05.5			
FILE: 17.121.5			

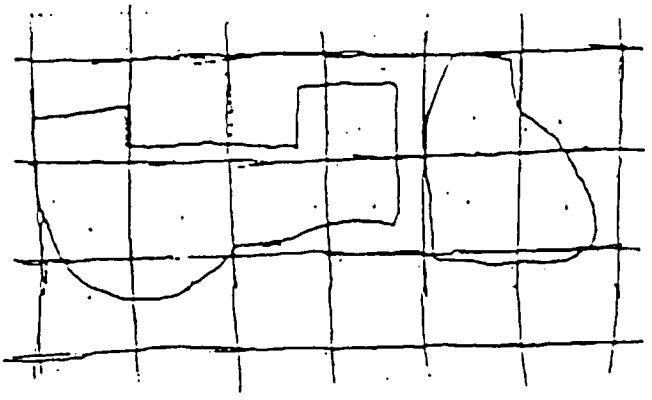


10,000' + 7,500' + 12,500' = 30,000 cuft

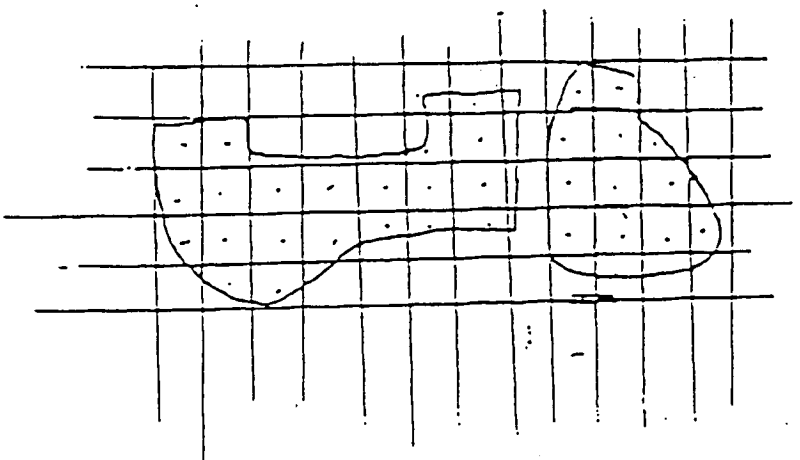
or

300' x 125' = 37,500 cuft

50 ft. grid



25 ft. grid



rough estimates

100 ft. GI = 5 samples → 3 samples
50 ft GI = 14 – 15 samples
25 ft. GI = 33 – 36 samples

DNR–GUIDANCE DOCUMENT, PART 2

MEDIUM AND LARGE SITE SOIL CLEANUP VERIFICATION (GREATER THAN 10,890 SQUARE FEET)

Part 2 describes statistical random sampling strategies to verify the remediation of medium and large sites greater than 0.25 acres in size. The strategies employ the use of gridding to facilitate the unbiased selection of sampling points and accepted statistical tools for evaluating the resultant data. The strategies provide a 95% confidence level of determining any hot spot concentrations on a site. It contains guidance on sampling protocol and necessary documentation for clean closures. Part 2 also discusses how to establish grid intervals, set grids, sample grids, statistically evaluate the data, use grids to guide additional remedial activities, disposal options, reporting, and a certification checklist. It also provides guidance on the sampling of ex-situ remedial processes (e.g., thermal desorption).

The term 'clean closure' means that the site has been restored to either Type A or Type B levels. Type A is defined in Act 307 P.A. 1982, as amended, which references non-detect or background levels. Type B is defined in Act 307 P.A. 1982, as amended, which references risk-based or background levels. Waste, soil, other environmental media, and/or debris removed should be classified as hazardous or non-hazardous to determine disposal options and handling requirements (i.e., solid waste under Act 641 P.A. 1978, as amended; hazardous waste under Act 64 P.A. 1979, as amended; land ban restrictions under 40 CFR Part 268).

All cleanup verification evaluations must consider the spatial arrangements of sample values (patterned vs totally random) and the impacts on the present and future uses of the site. Because Type B cleanups are based on residual risk, the distribution of that risk, now and in the future, must be determined. These procedures are not *absolutes*. Other sampling approaches may be developed and submitted for DNR approval.

Three of the statistical sampling strategies most commonly used for evaluating remedial sites and wastes are described in Attachment 2. For further discussion on sampling strategies and sample collection methods, see "Test Methods for Evaluating Solid Waste," SW-846 Volume II: Field Methods, November 1986, Third Edition, US EPA.

Compositing samples for verifying soil remediation is not acceptable without prior DNR approval. When verifying a soil remediation is complete, contaminant concentrations will be low. Compositing may result in the contaminant concentrations not being representative of what remains in the soil. If concentrations are low, compositing may dilute the concentrations of a contaminant to below its threshold detection limit. Additionally, if contamination is indicated in a composited sample, the location of the contamination remains unknown.

ESTABLISHING GRID INTERVALS.

When obtaining samples to verify that soil or wastes have been adequately remediated, it is important to insure that the analytical results obtained will provide an accurate representation of the entire area or volume under consideration. The location and number of samples to be taken at a particular remediation site depends on many factors: the level of confidence desired, the spatial and temporal variability of the media to be sampled, and the costs involved. An important objective in any sampling program is to obtain the most accurate data possible while minimizing the associated costs. One method to accomplish this goal is to use statistically valid sampling strategies. The appropriate sample number can be estimated and the sampling locations can be chosen without bias.

Such strategies employ the use of gridding to facilitate the unbiased selection of sampling points and accepted statistical tools for evaluating the resultant data. Statistical theory allows for the sampling of a subset of the grid points to achieve a reliable characterization of the entire remedial area or waste. Subsections describe ways to use sampling grids and statistical tools to evaluate areas of remediation.

The following equations and tables provide a simple basis to establish a grid system to facilitate unbiased selection of sampling points and sample coverage proportional to the area being verified.

1. *Basic Strategies.* A grid system should be established over the area being remediated. Grid point representation should be proportional to the size of the area. For excavation, both the sidewalls and bottom areas would be included in the determination of the area size. It is recommended that one of the following equations be used to determine grid intervals for stationing:

small site: see Part 1

$$\text{medium site: } \frac{\sqrt{A/\pi}}{4} = GI$$

$$\text{large site: } \sqrt{\frac{A\pi}{SF}} = GI$$

WHERE: A = area to be grid (square feet)
GI = grid interval
SF = Site Factor, length of area to be grid (unitless)

It appears that there are logical size ranges of sites to which the grid equations apply:

A) small: up to 0.25 acre

B) medium: 0.25 - 3.0 acres

C) large: 3.0 acres and greater

To simplify this application, use the following chart based on an average size range of sites (1 acre = 43,560 square feet). The approximate grid ranges are provided as a quick check on numbers generated for specific sites using the above formulas.

*Site Acreage**	*Square Feet**	*≈ Grid Interval Ranges*
up to 0.25 (small)	up to 10,890	See Part 1
0.25-3.00 (medium)	10,890-130,680	15-50 feet
3.0 and over (large)	130,680 +	30 feet plus

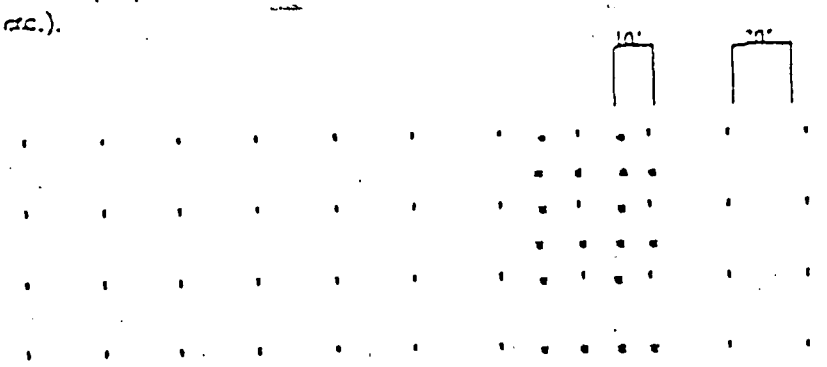
* Site acreage, square footage, is total area of sidewalls and base of excavation.

2. *Setting the Grid.* After the grid interval is calculated, it is recommended that a scaled grid overlay be made to superimpose on a map of the remediated area (this area includes both sidewalls and base). Some specified point (usually the southwest corner) should be designated as the 0,0 coordinate. The grid can then be adjusted to maximize sampling coverage. Some grid adjustment may be necessary for unusually shaped areas. Grid adjustment may also be needed to accommodate a minimum of at least one sample from each sidewall. Proposals for different grid strategies may be submitted for DNR review and approval on a case-by-case basis.

3. *Variations on Basic Strategy.*

A. Subgridding. It may be warranted to apply grids with different intervals within the remediated area so that a proportional sampling can be focused on suspect areas (such as sumps, tank l areas, etc.).

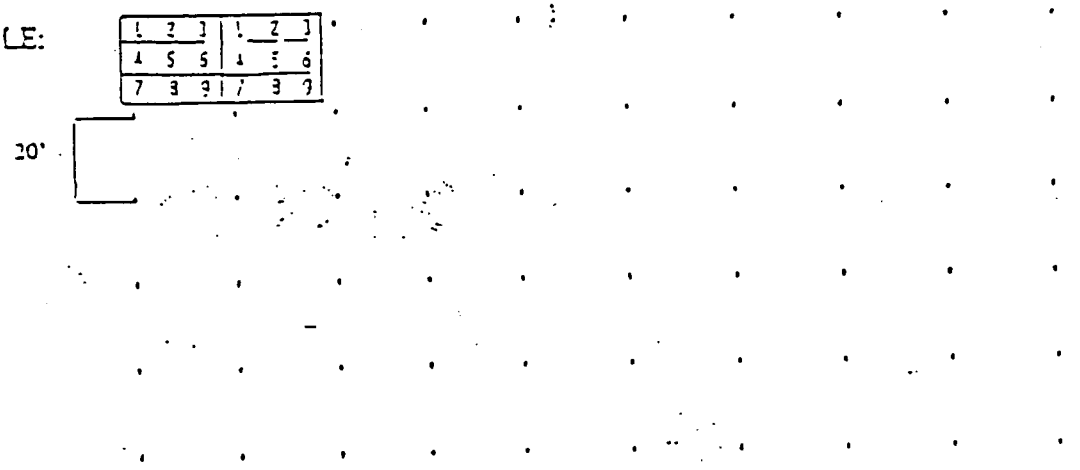
EXAMPLE:



' = Area I Sample Station, 80' x 200', GI = 20'
• = Area II (subset of I) Sample Station, 30' x 30', GI = 10'

B. Further Randomization. Sites that may have a patterned distribution of waste or contamination due to time sequence of filling, production sequences, or physical site conditions (i.e., furrows) may require a further randomization of sampling. In such cases, the following grid cell sampling format may be selected instead of at grid point stations. Each grid cell to be sampled must be divided into nine equal sized "subcells." Next, a random number table is used to select in which of the subcells the sample will be taken. The random number table is used again to select which subcell for the next cell and so on.

EXAMPLE:



• Area = 120' x 200', GI = 20'

In the example above, a sampling grid has been set up with grid point stations 20 feet apart using the appropriate formula. Two cells which have been selected at random have been divided into nine subcells each. Subcell #4 was chosen randomly in one cell and subcell #2 in the other cell. This process is continued for all of the cells selected at random for sampling. Samples are then taken in each randomly chosen subcell.

C. Three dimensional gridding: In-Situ and Ex-Situ Remediations.

In-situ and ex-situ remediations involving soils and/or wastes with a significant vertical component should be evaluated in three dimensions (volume evaluation). Examples of such remediations would be in-situ soil vapor extraction or ex-situ bioremediation involving several cubic feet of soil and/or waste. A grid is superimposed on the remediation area as described in the previous sections and a vertical component is added at each node. The vertical sampling increments would be site specific and require prior approval from the DNR. Refer to Attachment 1 "Guide to Sample Bias" for additional guidance on vertical sampling increments.

SAMPLING OF GRID

Sampling of grids may include all of the grid stations or a phased subset of the total stations. The subset of grid stations is created by assigning coordinates to all the nodes and randomly selecting nodes using a random number generator or a random number table (refer to Attachment 2). A minimum of 12 samples or 25%, whichever is larger, of the total grid stations should be sampled and analyzed initially to allow a large enough data pool for statistical analysis. It is advisable that extra samples also be taken and kept under proper chain of custody and storage procedures at the time of initial sampling. If the statistical analysis indicates that more samples are needed, an additional sample trip to the field may have been avoided. A method for calculating the sample size requirements is presented in Attachment 2 (Lamda relationship).

ESTABLISHING SOIL BACKGROUND

Establishing soil background, as required by Act 307 P.A 1982, as amended, Michigan Environmental Response Act (MERA), can be accomplished by utilizing Operational Memorandum #15 or using the following guidance.

Background should be established for site specific waste constituents, specific chemicals used in various processes, facility operations, or remedial investigation results. Sample analyses may include metals, organic constituents, or other site specific waste constituents. Analyses should be in accordance with Act. 307 P.A. 1982, as amended.

Many factors can play a part in the background concentrations of a chemical in soil.

EXAMPLE: The geologic origin (e.g., the parent rock) of glacial drift may have been high in copper, lead, or other metals that may be potential contaminants. Additionally, the hydrogeologic situation can alter the quantity of these elements. Groundwater recharge areas (e.g., highlands) are frequently leached of metals while groundwater discharge areas (e.g., swamps, floodplain) are the recipients of leached metals. Thus, sites in low areas will usually have higher background concentrations than upland areas. Other conditions, such as precipitation and atmospheric fallout from widely dispersed human and natural activities, also affect soil concentrations.

To: Scott Newman@NAVFAC@MKEnvironmental
John McCumbers@NAVFAC@MKEnvironmental
Ron Thompson@NAVFAC@MKEnvironmental
Cc:
Bcc:
From: Steve Downey@NAVFAC@MKEnvironmental
Subject: Changes @ Cast High
Date: Wednesday, October 18, 1995 17:03:35 EDT
Attach:
Certify: N
Forwarded by:

CID 034-003

The scope of this CID includes a lump sum activity to remove (2) 1,000 gal. and (1) 250 gal. fuel oil tanks, (3) valve boxes and contents, steel framework, and concrete foundations. The tanks have been removed, cleaned and staged on plastic for delivery to the DRMO. The concrete foundations have been disposed of on site and the other items have also been removed and staged on plastic for disposal on site. The bottom of the foundations were saturated with fuel oil and the soil in the hole was visually stained and odorous. There is no pooling or free liquid present. The lump sum price proposed by U.S. Tech Group, Inc. for this D/R work is $4,454.00. This CID also includes an estimated 46 CY of petrolium contaminated soil to be excavated and disposed of as a special waste. U.S. Tech proposed a unit rate of $85.00/CY for excavation, loading, transporting and disposing of this material (non-hazardous) to an approved disposal facility agreed upon by MK and backfilling the resulting hole. Based on contamination found at the bottom of the foundations (4 feet deep) the current estimate is that 100 CY of petrolium contaminated soil may need to be removed. If this soil contains PCB or lead contamination, it would not be classified as a special waste. Sample analysis results are expected by tomorrow.

CID 034-004

This CID was written to add 150 CY to the quantities for excavation, disposal and backfill at Cast High. The current unit price for excavation and disposal are $8.11/CY and $232.10/CY respectively. The current unit price for Backfill - Labor and Equipment is $12.00/CY. The current unit price for Backfill - Material Supply is $13.33/CY however U.S. Tech has offered a credit of $5.00/CY because backfill material is available on-site about 6 miles from the SWMU. This results in a backfill material cost of $8.33/CY. The total subcontract cost for the additional 150 CY is $40,253.00 which includes $1,172.00 for additional Performance & Payment Bond.

CID 034-005

As mentioned above U.S. Tech has offered a credit for utilizing the on-site borrow pit for backfill material. The credit is $5.00/CY for Cast High and $6.00/CY for Sludge Bed "B". Based on the current contract quantities (including Change Order No. 1) this credit amounts to $1,500.00 (300 CY X $5.00/CY) for Cast High and $2,400.00 (400 CY X $6.00/CY) for Sludge Bed "B" for a total subcontract change of $3,900.00 credit.

Additional Analytical

Approximately 25 additional samples will be collected and analyzed at an

average cost of approximately $250.00 per sample as a result of this added scope. This will result in added analytical subcontract costs of $6,250.00

Summary and Recommendations

The recommended path forward is as follows:

Above Ground Tank Area

- Complete D/R of tanks and appurtenances which was started today.
- Remove remaining metals contaminated soils in the tank area.
- Characterize remaining petrolium contaminated soils for disposal.
- Remove all apparently contaminated soils based on odor and visual stainin
- Sample the area to document final conditions.
- Backfill.
- Restore the site.

Balance of Cast High Area

- Continue excavation of metals contaminated soils.
- Closely monitor quantities as excavation progresses.
- Communicate daily with site Navy personnel (ROICC & Environmental) on are being excavated.
- Process an additional CID (if necessary) to add additional quantities pri to exceeding those currently authorized.

Cost Summary

CID 034-003	Tank Removal	$4,454.00
"	100 CY Petrolium Contaminated soil	$8,500.00
CID 034-004	150 CY additional Metals Contaminated Soil	$40,253.00
CID 034-005	Credit for backfill material	-$3,900.00
	Additional Analytical	$6,250.00
	Subtotal	$55,557.0

Additional Fee associated with this change should also be added to the above total.

Thanks,

Steve

APPENDIX C

PHOTOGRAPHS

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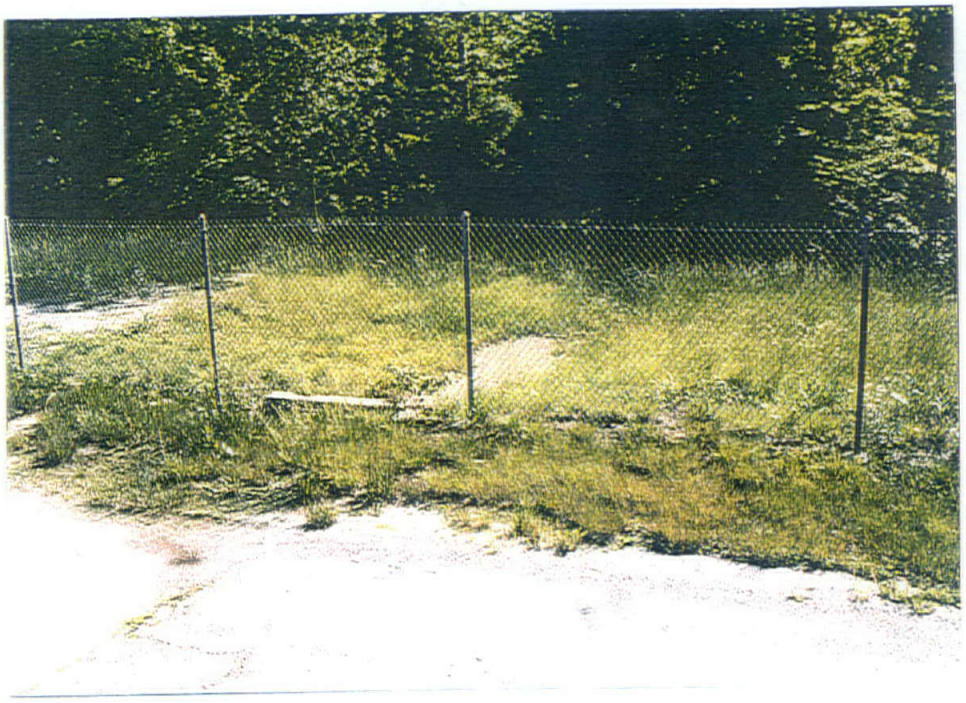
CONCRETE SUMP N/E OF BUILDING 146

PHOTOGRAPH 2:
CONCRETE SUMP S/W OF BUILDING 146



PHOTOGRAPH 3:
DISCHARGE POINT OFF-SITE SOUTH/EAST OF BUILDING 146

PHOTOGRAPH 4:
DRAINAGE DITCH DRAINING OFF-SITE SOUTH OF BUILDING 146

PHOTOGRAPH 5:
EXAMPLE OF NETWORK DITCHES COLLECTING SURFACE RUN-OFF

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CONTINUATION OF DITCHES NETWORKING TO DISCHARGE POINT OFF-SITE EAST OF B. 146

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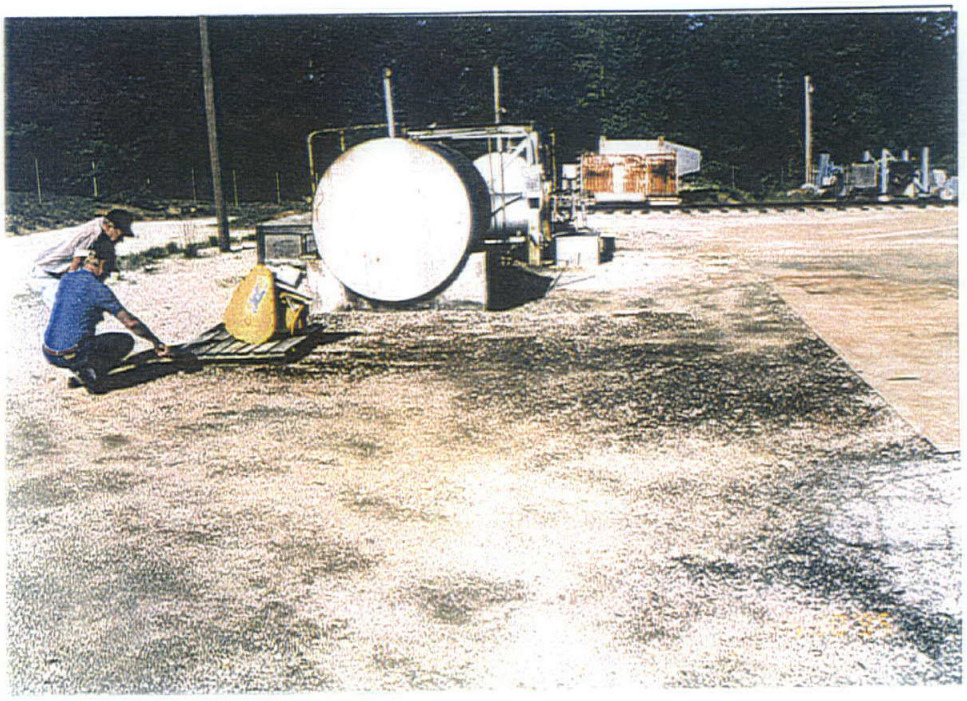

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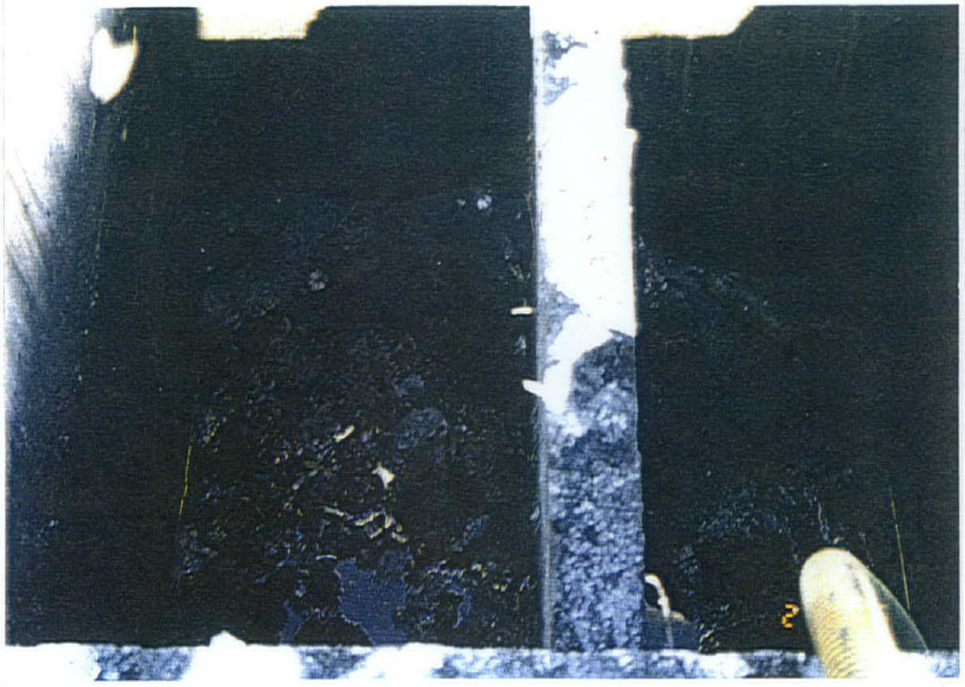
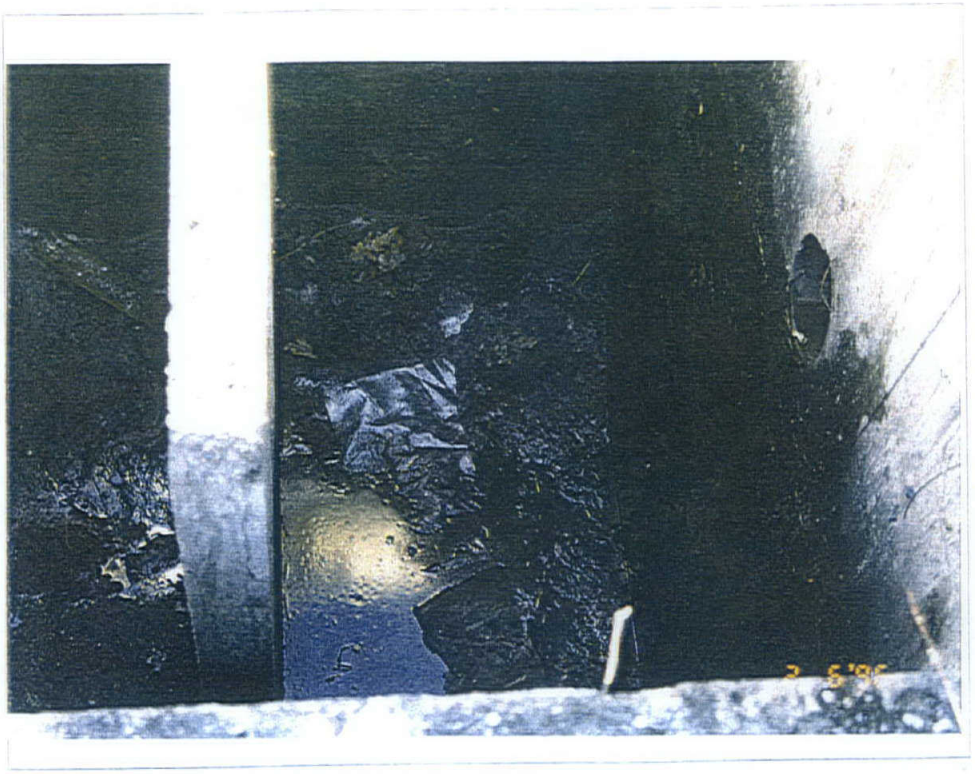
LOADING ROLL-OFF EAST SUMP AT CAST HIGH EXPLOSIVES

PHOTOGRAPH 21:
WEST SIDE SUMP AFTER PUMPING WATER OUT, LOOKING NORTH (CENTER)



PHOTOGRAPH 22:
WEST SIDE SUMP AFTER PUMPING WATER OUT LOOKING NORTH (CENTER)



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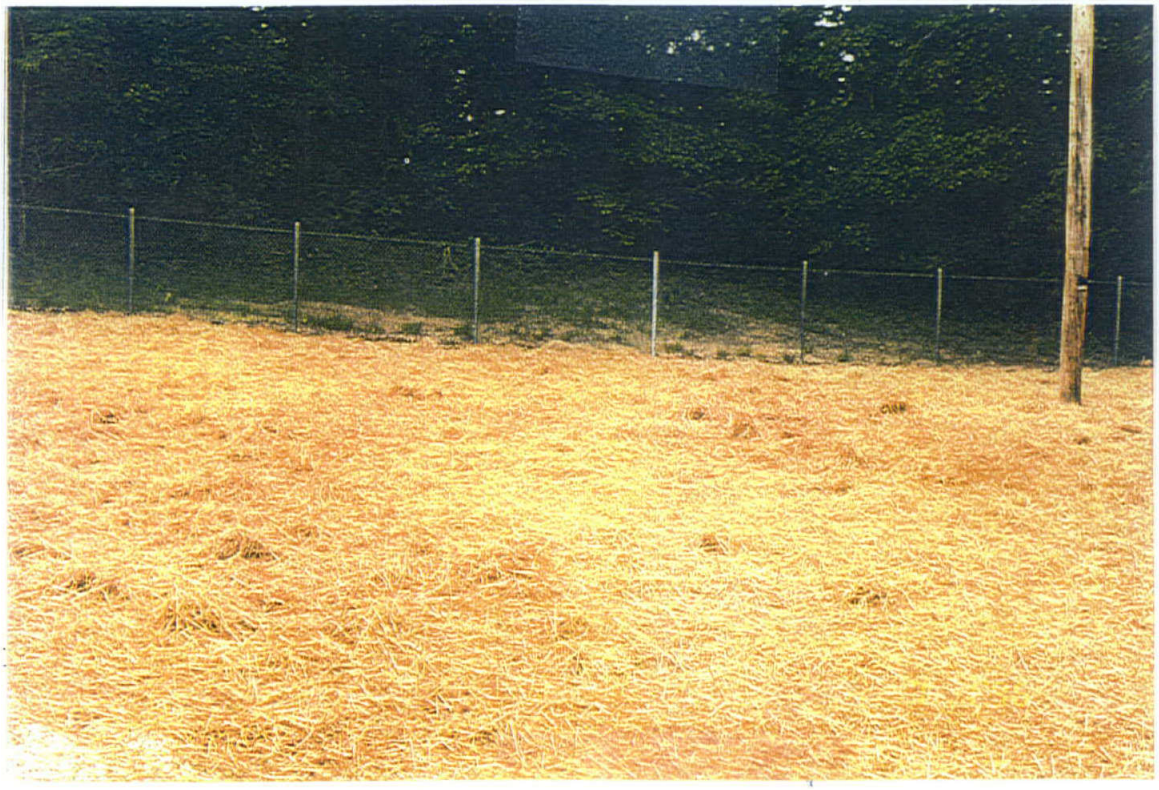

PHOTOGRAPH 28:
SEEDED AND MULCHED

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GRASS GROWING PROGRESS

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