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QUALITY ASSURANCE PROJECT PLAN
for
RCRA Corrective Action
Interim Measures
at
Naval Surface Warfare Center Crane

U.S. EPA ID NUMBER [IN 517 002 3498]

NSWC CRANE
Crane, Indiana

Contract No. N62467-93-D-1106
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December 29, 1995
Revision C

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SECTION 1
PROJECT DESCRIPTION

1.1 PROJECT DESCRIPTION

Promulgation of the USEPA's Resource Conservation and Recovery Act (RCRA) hazardous waste regulatory program provided the impetus to identify and control environmental contamination from past practices at Naval Surface Warfare Center (NSWC), Crane. Corrective action programs established as part of the RCRA Hazardous and Solid Waste Amendments (HSWA) required NSWC Crane to address past releases of hazardous waste or hazardous constituents at selected Solid Waste Management Units (SWMUs).

The scope of this corrective action includes interim cleanup measure at 12 SWMUs located within NSWC Crane under the direction of the Naval Facilities Engineering Command (NAVFACENGCOM), Southern Division. Data collected as part of this corrective action will be used to guide any future remediation activities that may occur. Remediation activities will be performed as specified by Delivery Order #0009, Statement Of Work #007, under the Environmental Remedial Action Contract (ERAC) No. N63467-93-D-1106. Specific activities to be performed at each SWMU and the project schedules are described in the SWMU Work Plans.

This Quality Assurance Project Plan (QAPP) presents the organization, objectives, planned activities, and specific Quality Assurance/Quality Control (QA/QC) procedures associated with the remedial activities for this facility. Specific protocols for sampling, sample handling and storage, chain-of-custody, and laboratory and field analyses will be described. All QA/QC procedures will be structured in accordance with applicable technical standards, U.S. Environmental Protection Agency's (USEPA) requirements, regulations, guidance, and technical standards. This QAPP was prepared in accordance with a guidance manual entitled, "Region 5 Model RCRA Quality Assurance Project Plan," May, 1993.

1.2 INTRODUCTION

NSWC Crane Division, is located in southwestern Indiana and provides support for equipment, shipboard weapons systems, and ordnance. NSWC Crane also supports the Crane Army Ammunition Activity (CAAA), including production and renovation of conventional ammunition, storage, shipment, and demilitarization and disposal of conventional ammunition.

Following promulgation of the USEPA's RCRA hazardous waste regulatory program, NSWC Crane filed notification and application to operate as a treatment,

storage or disposal (TSD) facility in October 1980. Interim status was granted, subject to operating requirements and applicable technical standards found in Title 40 Code of Federal Regulations, Part 265 (40 CFR 265).

In April 1981, the Navy implemented the Navy Assessment and Control of Installation Pollutants (NACIP), subsequently known as the Installation Restoration Program (IRP). The purpose of the NSWC Crane IRP was to identify and control environmental contamination from past practices. As part of the IRP, an Initial Assessment Study (ESE) was conducted in April and May 1981, by a team from the Naval Energy and Environmental Support Activity (NEESA), the Ordnance Environmental Support Office, and the Army Corps of Engineers. Based on information from historical records, aerial photographs, field inspections and personnel interviews, the ESE identified 17 potentially impacted sites at NSWC Crane. Fourteen of the 17 sites were recommended for confirmation studies to include sampling and monitoring.

Pursuant to RCRA regulations and the IRP, hydrogeologic investigations, including groundwater monitoring, were initiated at 10 sites in 1981. Eight of these 10 sites were later identified as warranting further investigation in the ESE. In November 1984, the Naval Facilities Engineering Command - Northern Division (NORTHDIV) contracted the Hazardous Material Technical Center (HMTC) to perform confirmation studies at several sites at NSWC Crane.

Corrective actions programs established as part of the RCRA HSWA required NSWC Crane to address past releases of hazardous waste or hazardous constituents at the SWMUs. Accordingly, NSWC Crane submitted a Hazardous Waste Management Report to the USEPA in January 1985. The report listed the ESE-identified hazardous waste sites as SWMUs. Following the Hazardous Waste Management Report, a RCRA Facility Assessment (A.T. Kearney, Inc., 1987) was conducted to characterize the potential for releases of hazardous waste or constituents from 100 SWMUs.

On December 23, 1989, the USEPA issued the federal portion of the Final RCRA Permit for NSWC Crane to the U.S. Navy. This permit established the HSWA Corrective Action Requirements and Compliance Schedules obligating the U.S. Navy to perform RCRA Facility Investigations (RFIs) at 30 SWMUs, to conduct Corrective Measures Studies (CMSs) and implement corrective measures if needed.

The RCRA Permit for NSWC Crane requires that RFI Phase I Environmental Monitoring Reports (EMRs) be submitted from many of the SWMUs at NSWC Crane. The purpose of the EMR is to identify and assess IRP Corrective Action SWMUs posing potential threat to human health or the environment due to

contamination from past hazardous material operations. The EMR for SWMUs #19/00, #08/17, #12/14 and #13/14 was completed in August 1992 (Halliburton NUS, 1992a). The EMR for SWMUs #15/06, #14/00 and #16/16 was completed in November 1992 (Halliburton NUS, 1992b). The Interim Measures Corrective Actions which will be performed under this scope of work are a result of the findings presented in the EMRs.

This QAPP has been prepared on behalf of NSWC Crane by MK to support the Interim Measure Corrective Action activities at NSWC Crane. A Work Plan, including a Quality Control Plan and a Site Safety and Health Plan, has been prepared to carry out the Interim Measures Corrective Action. A Field Sampling Plan has also been incorporated into the Work Plan and has been entirely incorporated into this QAPP through specific reference.

1.2.1 Overall Project Objectives

The purpose of the RCRA Corrective Action Interim Measure is to remove potential sources of contamination which pose a threat to human health and the environment. These potential areas of contamination were identified during the RCRA Facility Investigations (RFIs) conducted in 1992. The primary sampling program objective is to gather analytical data during the planned interim measures in accordance with the Indiana Department of Environmental Management (IDEM) Hazardous Waste Management Unit Closure Guidance (IDEM, 1994) requirements to support future SWMU closure and disposal/disposition of excavated soils. Specific objectives for sampling include:

- Field screen soil to identify the presence of volatile organic compounds (VOCs), polychlorinated byphenols (PCBs), and ordnance compounds.
- Verify whether the limits of soil excavation meet IDEM cleanup objectives for future closure activities by performing confirmation sampling.
- Characterize liquid and solid waste for disposal and to identify potential RCRA requirements when applicable.
- Confirm that material used as backfill meets chemical and geophysical requirements stated in the Work Plan.
- Support health and safety requirements.

1.2.2 Project Status/Phase

MK will utilize an integrated and phased approach for the Corrective Action Interim Measures. During the course of the work, data collection will be conducted as the

Interim Measure is completed at each SWMU, with the results of the sampling being a determining factor in decisions regarding the necessity for additional phases of Corrective Action prior to SWMU closure. Data collection requirements for each SWMU are discussed in Section 1.4.3 below.

1.2.3 QAPP Preparation Guidelines

As explained above, this QAPP has been prepared in accordance with the "Region 5 Model RCRA Quality Assurance Project Plan", dated, May 1993. Furthermore, information was received in discussions with the U.S. EPA on the Region's protocol for presentation of QAPPs as well as additional guidance on the specifics for the NSWC Crane facility.

1.3 SITE/FACILITY DESCRIPTION

A brief description of the facility, its geological setting, and associated features is presented in the section below.

1.3.1 Location

NSWC Crane is located in southwestern Indiana and occupies the northern half of Martin County as shown on Figure 1-1. The site encompasses more than 100 square miles (62,463 acres) including 800-acre Lake Greenwood. NSWC Crane provides Naval support for equipment, shipboard weapons systems and ordnance. In addition, NSWC Crane supports the Crane Army Ammunition Activity including production and renovation of conventional ammunition, and storage, shipment, demilitarization and disposal of conventional ammunition.

1.3.2 Facility/Size and Borders

This section is addressed on page 2-3 of the August EMR (Halliburton NUS, 1992a) and page 1-3 of the November EMR (Halliburton NUS, 1992b), which is herein incorporated into this QAPP through reference, and in the drawings which have been submitted along with the EMRs.

1.3.3 Natural and Manmade Features

This section is addressed in sections 3.0 through 6.0 of the August EMR (Halliburton NUS, 1992a) and sections 3.0 through 5.0 of the November EMR (Halliburton NUS, 1992b), which are hereby incorporated into this QAPP by reference.

1.3.4 Topography

See section 2.0 of both the EMRs for information concerning the site's general topography.

1.3.5 Local Hydrology and Hydrogeology

See section 2.0 of both EMRs for information concerning the site's physical features, population and land use, geology and soil, groundwater resources and surface hydrology and drainage.

1.4 SITE/FACILITY HISTORY

1.4.1 General History

In 1940, Congress authorized construction of a Naval Ammunition Depot (NAD) in southern Indiana, and in late 1941, the Burns City Ammunition Depot was commissioned. In 1943, NAD Burns City was renamed NAD Crane, and the Town of Crane was built to house the rapidly growing number of civil service employees. NAD Crane's overall mission was to load, prepare, renovate, receive, store and issue ammunition to the fleet.

During World War II, NAD Crane's mission expanded to include pyrotechnics production, mine filling, rocket assembly, field storage, torpedo storage, and ordnance spare parts and mobile equipment storage. During the 1950s, several new departments were created, the Ammunition Loading and Production Engineering Center (ALPEC) was transferred to Crane, and the Central Ammunition Supply Control Office (CASCO) was established. NAD Crane supplied ammunition to the fleet during the Korean and Vietnam conflicts. During the Southeast Asia crisis, the number of full-time employees at NAD Crane grew to 6,800.

In 1976, NAD Crane was designated NSWC Crane. Its new mission was to provide support for ships and crafts equipment, shipboard weapons systems and assigned ordnance items, and to perform additional functions as directed.

In 1977, the Single Manager Concept was implemented. The CAAA was created, and the Army assumed ordnance production, storage, and related responsibilities as a tenant organization. Other functions remained Navy, and currently the Navy retains ownership of all real estate and facilities at NSWC Crane. Responsibility for overall station safety, security and environmental protection remains with the Commanding Officer, NSWC Crane.

Until the late 1970s and early 1980s, a variety of liquid wastes from both ordnance and non-ordnance activities were disposed on site without treatment. For example, ordnance-impacted wastewaters were discharged into unlined ponds or into storm drains and ditches; wastewaters generated from cleaning operations were discharged into an unlined pond; oily waters, battery acids, paint thinner, acetone, boiler blowdown and solvents were dumped behind buildings or into ravines; and waste hydraulic oil was spread on dirt roads. Since that time, treatment plants have been built, wastewater streams have been connected to the sanitary sewer, and oils and solvents have been collected, segregated, and either recycled, sold, or properly disposed.

Air pollution control devices were not installed until the late 1970s. Therefore, ventilation systems at bomb loading facilities and the incinerator had no scrubber systems until the 1970s. Waste management activities included the burning of solid wastes and subsequent disposal of ash in unlined pits or gullies. Also, dye and dye-impacted materials have been disposed in on-site trenches.

Operations at NSWC Crane also included radiological activities and some radioactive materials were disposed on site during the early 1950s. Known burial grounds were excavated, decontaminated and released for unrestricted use in 1974.

1.4.2 Past Data Collection Activities

NSWC Crane has been subject to a number of investigations since the USEPA issued the federal portion of the Final RCRA Permit on December 23, 1989. The following summaries are based on a review of reports and supporting documents submitted by consultants and information obtained from the project files of NSWC Crane.

Beginning in 1992, NSWC Crane contracted with Halliburton NUS to assess the degree of contamination at various SWMUs within the facility, and recommend whether RFI Corrective actions should continue or cease at each investigated SWMU. The results of the RFI Phase I investigations are contained in two EMRs submitted to NSWC Crane by Halliburton NUS (Halliburton NUS, 1992a and 1992b).

Pursuant to these studies, Corrective Action Interim Measures will be conducted at 12 SWMUs located within NSWC Crane as shown on Figure 1-2. The Interim Measure selected for each SWMU is discussed below in Section 1.4.3. Verification samples following each Interim Measure will be taken in accordance with this QAPP.

1.4.3 Current Status

Based on reports and documents reviewed for the site, and a current assessment of all available information, the following target compounds and source area release mechanisms have been targeted for Interim Measures Corrective Action activities.

SWMU #02/11, Dye Burial Ground - The Dye Burial Grounds SWMU is located in the eastern section of NSWC Crane, just east of the Ammunition Burning Ground as shown on Figure 1-3. The Dye Burial Grounds was a series of three trenches, each approximately 50 feet long, 10 feet wide, and 6 feet deep. These trenches were used to dispose of dyes and dye-impacted material. The materials included magnesium, dye-impacted boxes and rags, and approximately 60 drums of dyes. The trenches were backfilled to levels ranging from grade to 1 foot below adjacent grades.

A 15,000 square foot RCRA cap will be installed to ensure the containment of toxic and/or carcinogenic materials. Proper containment will be achieved through use of a RCRA Cap which has been constructed in accordance with detailed plans and specifications. Samples will be collected from each layer of the RCRA cap to ensure the specifications have been met.

SWMU #03/10, Ammunition Burning Ground (ABG) - The ABG area is located in the eastern portion of the NSWC and occupies approximately 50 acres. Access is by Highway H-462 via H-58, H-274 and H-463 as shown on Figure 1-4. The ABG has been used extensively since the 1940s to destroy materials impacted with ordnance compounds, bare explosives, rocket motors, candles, flares, solvents, red phosphorus, small detonators, and fuse materials. The largest quantities were destroyed between 1956 and 1960, when 15,000 pounds per day of smokeless powder and 48,000 pounds per day of high explosives were burned directly on the soil surface. Ammunition burning is now performed in clay-lined steel pans (ACOE 1992a). The area is also used for flashing the residue from bombs and projectiles after they have been melted or drilled out to remove the bulk of the ordnance compounds. Close coordination between NSWC operations personnel and the remediation personnel will be required to minimize any impact to ongoing operations.

Soil samples revealed the presence of ordnance compounds, heavy metals, volatile organics, pesticides and herbicides. The most significant constituent (in terms of concentration) are ordnance compounds including 2,4-DNT; 2,6-DNT; TNT; Tetryl; DNB; RDX; and HMX. Concentrations of total ordnance compounds ranged from less than 2 mg/kg to over 1,000 mg/kg. The highest concentration for a single constituent was 1,640 mg/kg for TNT. Trichloroethene and tetrachloroethene were identified in two borings at maximum concentrations of 2.9 μg/kg and 1.3 μg/kg, respectively.

Pesticides and herbicides were detected at levels less than 1.0 mg/kg except for a 1.4 mg/kg level of methoxychlor in a single boring. Elevated levels of antimony, cadmium, chromium, copper, lead, mercury, nickel, silver, zinc, aluminum, cobalt, magnesium, and manganese were also found. In most cases the non-ordnance compound cinstituents were found in samples that also contained ordnance compound constituents. (ACOE 1992a)

Approximately 60,000 cubic yards of impacted soil will be excavated and analysis performed to confirm that all excavated soil from the ABG area is remediated to concentrations of ordnance compounds, leachable metals, trichloroethane, and tetrachloroethane below cleanup levels found in Tables 5 and 6 of the Sampling and Analysis Plan (SAP). Soil sampling within the excavated area will also be performed to confirm the removal of soils containing concentrations of constituents above cleanup levels.

SWMU #10/15, Rockeye - The Rockeye Munitions area is located in the northeastern portion of the NSWC at the intersection of Highways H-161 and H-45 as shown on Figure 1-5. This area, an NSWC operating unit, is a production facility that was formerly a press-loading operation for 3-inch projectiles. It was later converted to a case-filling operation for cluster bombs. A large volume of wastewater is produced by the operation and is collected in sumps. Prior to 1978, impacted waters from full sumps were discharged directly to a branch of Sulfur Creek on the north side of the facility and to Turkey Creek, a tributary to Boggs Creek, on the south. Residues from the sumps are now pumped and transported to an on-site treatment facility. (ACOE 1992b)

The subsurface soil impacts have been recorded up to 42.7 mg/kg for individual constituents. Surface soil sample impacts have been recorded from undetectable amounts to 10,400 mg/kg. DNB, DNT, and TNB were found at concentrations below quantitation limits (the concentration reported was estimated) and tetryl was not detected at all. TNT was found in surface samples at a maximum concentration of 295 mg/kg and at a maximum level of 1.40 mg/kg in subsurface samples. An RDX concentration of 3,350 mg/kg was found in surface samples. HMX was found in more samples and at higher concentration than any other ordnance compound analyzed. Subsurface soil samples contained HMX at concentrations above quantitation limits. HMX concentrations of 1,960 and 10,400 mg/kg were found in surface soil samples from two areas. The surface soils beneath the exhaust of a Rockeye building ventilator contained concentrations of TNT, RDX, and HMX at 295, 3,350, and 10,400 mg/kg, respectively. These concentrations were the maximums for these compounds in the sampled Rockeye soils. (ACOE 1992a)

Approximately 18,000 cubic yards of impacted soil within the Rockeye area will be excavated and analysis will be performed to confirm that all excavated soil is remediated to concentrations of ordnance compounds, volatile organics, and leachable metals below action levels found in Tables 5 and 6 of the SAP. Soil sampling within the excavated area will also be performed to confirm the removal of impacted soils as described above for the ABG.

SWMU #12/14, Mine Fill A - Mine Fill A is located in the west-central portion of NSWC. Mine Fill A consists of 29 buildings situated along Highway H-17 as shown on Figure 1-6, and has been used to manufacture mines, depth charges, rocket heads, aerial bombs, and projectiles. Currently, Mine Fill A is used to produce 2,000-pound aerial bombs. Demilitarization activities also take place in this area. The major impact sources are washdown operations and the exhaust ventilation system. Potential constituents include TNT, RDX, and HMX, and impacted wastewaters. Concentrations of individual constituents ranged from undetected to 15,300 mg/kg. Based on operational practices, location, and waste characteristics, releases to groundwater may have occurred. Analytical records and reports indicate releases to surface water and air have also occurred. Releases to soil are documented by analytical records and direct observation. (Halliburton 1992)

Approximately 11,000 cubic yards of impacted soil within the Mine Fill A area will be excavated and analysis performed to confirm that all excavated soil is remediated to concentrations of ordnance compounds and leachable Appendix IX metals below cleanup levels found in Tables 5 and 6 of the SAP. Soil sampling within the excavated area will be performed to confirm the remaining soil meets cleanup levels presented in Tables 5 and 6 of the SAP.

SWMU #13/14, Mine Fill B - Mine Fill B is located in the west-central portion of NSWC. Mine Fill B consists of 39 buildings and is situated along Highway H-18 as shown on Figure 1-7. Historically, its operations were similar to Mine Fill A. It is currently used for the renovation and rework of munitions. Activities include the application of enamel and bituminous solvent coatings, rotary grit blasting, spray painting, propellant removal, and fuse and configuration changes. Ordnance compound particulate matter was exhausted through the ventilation system. Rinse and wastewater containing TNT, Composition B, HBX-1, HBX-3, and H6 are potential contaminants. Concentrations of individual ordnance compounds in soils ranged from undetected to 24,000 mg/kg. Based on operational history, physical condition, location, waste characteristics, visual evidence, and analytical data, releases to groundwater, surface water, soil, and air have occurred.

Approximately 22,000 cubic yards of impacted soil within the Mine Fill A area will be excavated and analysis will be performed to confirm that all excavated soil is

remediated to concentrations of ordnance compounds and leachable Appendix IX metals below action levels found in Tables 5 and 6 of the SAP. Soil sampling within the excavated area will be performed to confirm the remaining soil meets cleanup levels presented in Tables 5 and 6 of the SAP.

SWMU #14/00, Sanitary Landfill and Lithium Battery Disposal Area -The Sanitary Landfill and Lithium Battery Disposal Area is located near the western boundary of NSWC. The Sanitary Landfill is an active 65-acre landfill which began operations in 1972 and currently receives materials from site operations, residences, and food preparation areas. The Indiana State Bureau of Health (ISBH) granted approval in 1981-82 to bury neutralized lithium batteries in the landfill. (Halliburton 1992)

Approximately 20 lithium batteries will be excavated from the disposal area and the surrounding soil analyzed for possible presence of Appendix IX compounds and lithium. Any soil containing concentrations of constituents above cleanup levels listed in Tables 5 and 6 of the SAP will be excavated.

SWMU #16/16, Cast High Explosive/Incinerator Building 146 - The Cast High Explosive area is located in the north central part of NSWC. Building 146 is situated along H-307 as shown on Figure 1-8, and was the site for melt-pouring TNT, RDX, and HMX ordnance compounds into projectiles (cast loading). High-pressure water washout of 5-inch projectiles filled with Composition A was also conducted at Building 146. Prior to 1978, the generated waste water was discharged to a storm drain, with release to a ditch and ultimately Boggs Creek. Beginning in 1967, small-arms ammunition was demilitarized in three incinerators located adjacent to Building 146. Incinerator ash collected in the emission controls system was stockpiled on the surface soil prior to disposal (Halliburton 1994). Scattered small piles of potentially impacted ash and slag are visible throughout the area.

Two settling basins are located near the northeast and northwest corners of Building 146. These basins are thought to accept discharge from the floor drains inside the building (Halliburton 1994). These settling basins (sumps) are constructed of concrete, with wood slats covering the tops. Each sump measures approximately 13 feet long by seven feet wide by seven feet deep. The bottom of a 12-inch diameter discharge pipe is located approximately three and one-half feet from the bottom of the sumps. The discharge areas will be sampled for potential soil contamination.

The major soil impacts resulting from Building 146 loading and washout activities were TNT, RDX, HMX, Composition A, Composition B, and ammonium picrate. The main compounds of concern in the incinerator ash are lead, barium, cadmium, chromium, and mercury. Potential impacts from PCB oxidation products resulting from fuel blending at the incinerator has also been reported. (Halliburton 1994)

Sampling at this SWMU shall be conducted in order to identify soils for excavation, where concentrations of ordnance compounds and leachable Appendix IX metals are above cleanup levels listed in Tables 5 and 6 of the SAP. Soil sampling within the excavated area will be performed to confirm the remaining soil meets cleanup levels presented in Tables 5 and 6 of the SAP.

SWMU #17/04, PCB Capacitor Burial/Pole Yard - The PCB Capacitor Burial/Pole Yard is located in the north-central area of NSWC. In 1977, three sealed PCB capacitors were buried at the pole yard (NEESA 1983).

Three PCB capacitors shall be excavated and the surrounding soil sampled and analyzed to identify soils for excavation, where concentrations of PCBs are present above cleanup levels found in Table 5 of the SAP.

SWMU #23/00, Battery Shop - The Battery Shop is located in north-central NSWC Crane. Each year from 1940 to 1975 about 2,000 gallons of battery acid were discharged onto a bank behind the Battery Shop, Building B-36 as shown on Figure 1-9. Miscellaneous debris and waste oils containing lead, sulfates, and oily water were also discharged in the same area (NEESA 1983). This dump area north of B-36, is rugged and wooded, and much of the debris is on steep slopes. Rock formations protrude from the slopes, causing sudden elevation changes of 12 to 14 feet. The dump site is accessible only on foot. The dump area is discontinuous, with debris unevenly scattered throughout the site. The debris generally consists of construction debris such as large sections of preformed concrete slabs, 55-gallon drums, cans, oil filters, and tires. Fallen leaves and brush may cover much of the debris. A small stream flows through the ravine.

Initial characterization soil samples from within the Battery Shop area will be collected and analyzed to determine whether concentrations of Appendix IX compounds are present above cleanup levels found in Table 5 of the SAP.

SWMU #24/00, Sludge Drying Beds -

Sludge Drying Beds A

The Sludge Drying Beds A are located in the east central section of NSWC at the sewage treatment plant at the intersection of H-15 and H-514 as shown on Figure 1-10. The sludge beds have processed sludges from industrial waste water treatment systems as well as sanitary sewer treatment systems and are potentially impacted with compounds such as metals, pesticides, and herbicides.

This portion of the SWMU consists of a large cell with concrete walls 8 inches thick and 5 feet-8 inches deep to the bottom of the footer (BOF). This cell measures 80 feet-8 inches wide by 51 feet-4 inches long and is divided into three separate sludge beds by two 8-inch concrete walls, 5 feet-8 inches BOF. The individual sludge beds are 26 feet wide by 50 feet long (inside dimensions). Each bed base is earthen lined with two 6-inch vitrified clay pipes traversing the entire length, covered with a 5-inch layer of coarse gravel, a 5-inch layer of fine gravel, and finally a 12-inch layer of sand.

A sludge slurry is deposited in the beds from a 6-inch cast iron manifold with isolation valves for bed selection. The inlet pipe and valve manifold is located on the north end of the sludge beds and enters the bed at approximately 6 inches down from the top of the bed walls. The outlet pipe of the beds exit at the south wall approximately 5 feet deep (top of footer) and tie into a 10-inch interceptor sewer line which drains to the sewage treatment system.

Initial characterization sampling and analysis will be performed on the sludge drying beds to determine constituent contaminant levels prior to excavation. After removal of impacted sludges and base materials from the beds, soils at the base of the beds will be sampled and analyzed to confirm the removal of all soils with concentrations of Appendix IX compounds above the cleanup levels in the SAP. Analysis will be performed on all excavated material for disposal characterization.

Sludge Drying Beds B

The Sludge Drying Beds B are located in the northwest section of NSWC, just outside of the Crane Gate (Gate #4) on H-498 off of H-5 as shown on Figure 1-11. These sludge beds also processed sludges from industrial waste water treatment systems as well as sanitary sewer treatment systems and are potentially impacted with compounds such as metals, pesticides, and herbicides (MK 1994).

This portion of the SWMU consist of a smaller cell with 8-inch concrete block walls, two feet-8 inches deep BOF. This cell measures 51 feet-4 inches wide by 51 feet-8 inches long and is divided into three separate sludge beds by two 2-inch concrete block walls, 2 feet-8 inches BOF. The individual sludge beds are 19 feet-8 inches wide by 50 feet-4 inches long (inside dimensions). Each bed base is earthen lined and covered with a layer of gravel. These beds have not been in service for a significant time period; they are overgrown with vegetation and have badly deteriorated walls.

The sludges from the sludge drying beds and the soils around the perimeter of the beds will be sampled and analyzed to determine if the removal of soils with

concentrations of Appendix IX compounds above the cleanup levels in the SAP are necessary. Analysis will be performed on all excavated material for disposal characterization.

SWMU #25/07D, Highway 58 Dump Site A - Highway 58 Dump Site A is located west of the NSWC Crane Salvage Yard, across the road from Building 2167 near the guardrail as shown on Figure 1-12. Disposal was apparently along the hillside. An intermittent stream is located at the base of the hill. Access to the site is via H-58 above or a trail below. The disposal areas are located on the slopes between the road and the trail. The debris may consist of paper, cardboard containers, paints, thinners, lubrication and hydraulic fluids, scrap metal, concrete block, and pipe. Fallen leaves and brush may cover much of the debris. Drums containing unknown materials may be present. Additionally, the soil on the bank and the creek bed may be impacted (MK 1994). The dump area is discontinuous, with debris unevenly scattered throughout the site. The larger site is approximately 39 feet by 150 feet. The smaller area to the southeast contains primarily transite (asbestos) tiles and is approximately 25 feet by 10 feet (Brent 1994).

Initial characterization soil sampling will be performed at this SWMU to determine the presence of Appendix IX compounds above the cleanup levels listed in Table 5 of the SAP. Results of the sampling will determine whether or not excavation of soil in the area is required.

SWMU #26/08D, Highway 58 Dump Site B - Highway 58 Dump Site B is located east of the NSWC Salvage Yard as shown on Figure 1-13. The dump site is at the bottom of a stone cliff. The debris may consist of paper, cardboard containers, paints, thinners, lubrication and hydraulic fluids, scrap metal, containers and drums, and corrugated pipe. The debris is confined primarily within the area, mostly continuous, and covers an area approximately 160 feet by 43 feet. The site is accessible off Highway 58 by a gravel lane off which extends down to the bottom of the cliff structure. (Brent 1994)

Initial characterization soil sampling will be performed at this SWMU to determine the presence of Appendix IX compounds above the cleanup levels listed in Table 5 of the SAP. Results of the sampling will determine whether or not excavation of soil in the Unit is required.

1.5 PROJECT OBJECTIVES

Data Quality Objectives (DQOs) are qualitative and quantitative statements which specify the quality of the data required to support decisions made during RFI activities, including Corrective Action Interim Measures, and are based on the end

uses of the data to be collected. As such, different data uses may require different levels of data quality. There are at least five analytical levels which address various data uses and the QA/QC effort and methods required to achieve the desired level of quality. This project will utilize two, Level II and Level III.

1.5.1 Specific Objectives and Associated Tasks

For this project, it will be necessary to gather sufficient information to evaluate the nature and extent of contaminants remaining in the soils after the Corrective Action Interim Measures have been completed.

The analytical levels used for data collection at NSWC Crane are as follows:

- **EPA Level II** - EPA Analytical Level II involves the use of semiquantitative field analyses to obtain real-time results.
- **EPA Level III/NEESA Level C** - EPA Analytical Level III and NEESA Level C involve the use of an off-site analytical laboratory to analyze the samples. Level III and Level C allow the use of non-Contract Laboratory Program (non-CLP) methods, but do require that the methods be EPA-approved or equivalent. Specific quality control (QC) procedures and deliverables are required for NEESA Level C data according to NEESA 20.2-047B (NEESA, 1988).

Level II field screening techniques will be used to define limits of excavation in SWMUs #03/10, #10/15, #12/14, #13/14, #14/00 and #17/04. Field screening will be accomplished using immunoassay test kits for ordnance compounds (*i.e.*, TNT and RDX) and polychlorinated biphenyls (PCBs). An Organic Vapor Monitor/Meter will be used to screen soils for presence of organic vapors.

Level III laboratory analyses, using EPA methods from the most recent edition of SW-846 (USEPA, 1995), will be performed on investigative and confirmation samples collected at all eleven SWMUs (excluding SWMU #02/11, Dye Burial Ground). In addition, these analyses will be used on waste characterization samples collected to determine off-site disposal requirements. Additionally, 10 percent of the field screening samples will be analyzed by the appropriate SW-846 method. QC documentation, similar to CLP requirements, will be generated to enable data verification and validation. The analytical parameters, analytical methods and data set deliverable requirements are identified in Tables 1, 3 and 4 of the Sampling and Analysis Plan for Interim Measures Cleanup.

1.5.2 Project Target Parameters and Intended Data Usages

The list of target parameters for this project is included in the Sampling and Analysis Plan for Interim Measures Cleanup. Intended data usages are to determine residual soil concentrations of constituents of concern after the interim measures are complete and to verify whether these concentrations are below IDEM cleanup objectives for future closure activities. The data shall be compared to background soil levels, or to measured reporting limits and other (low level) health based criteria with the ultimate objective being to develop a strategy for future SWMU closure. Data may also be used to assess feasibility of using certain remediation technologies if contamination is found to exist. However, it is understood that a QAPP modification to allow bench scale or pilot scale testing of a remediative process, or further evaluation of remediative process feasibility may be required.

1.5.2.1 Field Parameters

The intended field parameters are stated in the Sampling and Analysis Plan for Interim Measures Cleanup.

1.5.2.2 Laboratory Parameters

The intended laboratory parameters are stated in the Sampling and Analysis Plan for Interim Measures Cleanup.

1.5.3 Data Quality Objectives

The intended data quality objectives for this project are summarized in Tables 1-1 through 1-10.

1.6 SAMPLE NETWORK DESIGN AND RATIONALE

The sample network design and rationale for sample locations within each SWMU is fully described in detail in Section 4 of the individual SWMU Work Plans. Rationale for why certain groups or classes of hazardous constituents some of which include those in 40 CFR 261, Appendix IX, is described in Table 1 of the Sampling and Analysis Plan for Interim Measures Cleanup.

1.6.1 Sample Network by Task and Matrix

Sample matrices, analytical parameters and frequencies of sample collection can be found in the Sampling and Analysis Plan and the individual SWMU Work Plans.

1.6.2 Site Maps of Sampling Locations

Maps showing soil sampling locations are generated by using topographical maps overlayed with the sampling grid thereby identifying each sample location with coordinates. These maps are generated prior to mobilization at each individual SWMU. It is possible, however, that depending on the nature of encountered field conditions some of these locations will be changed. The person who shall be responsible for making such decisions will be the Project Manager whose responsibilities are described in Section 2 of this QAPP.

1.6.3 Rationale of Selected Sampling Locations

The rationale for why the selected sampling locations and depths were chosen in conjunction with each solid waste management unit is fully described in the individual SWMU Work Plans.

1.6.4 Sample Network Summary Table

The sample network for this project is presented in tabular format in the individual SWMU Work Plans.

1.7 PROJECT SCHEDULE

1.7.1 Anticipated Date of Project Mobilization

The earliest date for which samples are planned to be collected is June, 1995. However, sampling activities will be conducted on a SWMU by SWMU basis, as indicated on the Project Schedule provided in each SWMU site specific Work Plan.

1.7.2 Task Bar Chart and Associated Timeframes

The dates of projected milestones are indicated in the submitted schedule found in Section 10 of the individual SWMU site specific Work Plan.

SECTION 2
PROJECT ORGANIZATION AND RESPONSIBILITY

2.1 PROJECT ORGANIZATION CHART

Figure 2.1 of this plan shows the project organization chart indicating individual assignments for the remediation activities at NSWC Crane. All participants are directly subject to the requirements of this QAPP. The responsibilities of individual positions are briefly described in the following sections. Detailed descriptions are also presented in Section 3.0 of the site specific Work Plan.

2.2 MANAGEMENT RESPONSIBILITIES

U.S. EPA RCRA Project Coordinator/State Project Manager

The RCRA Project Coordinator (RPC) has the overall responsibility for all aspects of the RCRA Corrective Action Interim Measure. The State Project Manager has overall responsibility for all phases of the RCRA Corrective Action Interim Measure with oversight by the U.S. EPA RPC.

NAVFACENGCOM Project Manager

The NAVFACENGCOM Project Manager is responsible for implementing the project, and has the authority to commit the resources necessary to meet project objectives and requirements. The NAVFACENGCOM Project Manager's primary function is to ensure that technical, financial, and scheduling objectives are achieved successfully. The NAVFACENGCOM Project Manager will report directly to the U.S. EPA Region 5 RPC and will provide the major point of contact and control for matters concerning the project. The NAVFACENGCOM Project Manager will:

- Define project objectives and develop a detailed work plan schedule;
- Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task;
- Acquire and apply technical and corporate resources as needed to ensure performance within budget and schedule constraints;
- Orient all field leaders and support staff concerning the project's special considerations;
- Monitor and direct the field leaders;
- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product;
- Review the work performed on each task to ensure its quality, responsiveness, and timeliness;

- Review and analyze overall task performance with respect to planned requirements and authorizations;
- Approve all reports (deliverables) before their submission to U.S. EPA Region 5;
- Ultimately be responsible for the preparation and quality of interim and final reports; and
- Represent the project team at meetings and public hearings.

MK Program Management Office

The Program Management Office (PMO) in Charleston, South Carolina has overall responsibility for all cleanup measure activities at all sites in the Southern Division of the Naval Facilities Engineering Command under Contract No. N62467-93-D-1106. The PMO is the primary point of contact for NAVFACENGCOM.

MK Project Manager

The MK Project Manager (MK PM) will have overall management responsibilities for technical, financial and scheduling matters. The PM will report to the designated NAVFACENGCOM Project Manager for all project related issues and to the MK PMO for project oversight, management direction, and resolution of any company related matters. The MK PM will follow the project developments and notify NAVFACENGCOM of any problems encountered in the field which may effect data quality or the project schedule.

2.3 QUALITY ASSURANCE RESPONSIBILITIES

MK Program QA Manager

The MK Program QA Manager will remain independent of direct job involvement and day-to-day operations, and have direct access to corporate executive staff as necessary, to resolve any QA dispute. The Program QA Manager is responsible for auditing the implementation of the QA program in conformance with the demands of specific investigations, MK's policies, and U.S. EPA requirements. Specific functions and duties include:

- Providing QA audit on various phases of the field operations;
- Reviewing and approving of QA plans and procedures;
- Providing QA technical assistance to project staff; and
- Reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the program manager and executive vice president for technical operations.

MK Site Quality Control Supervisor

The MK Site Quality Control Supervisor (SQCS) will provide the necessary guidance to the project staff on quality-related matters. The SQCS will provide quality assurance reviews of project documents, field procedures, laboratory quality assurance plans, project documentation and will perform project audits. Duties of the SQCS include identifying quality problems, initiating corrective actions and verifying the implementation of the corrective actions.

U.S. EPA Region 5 Quality Assurance Manager (RQAM)

EPA RQAM has the responsibility to review and approve all Quality Assurance Project Plans (QAPPs). Additional U.S. EPA responsibilities for the project include:

- Conducting external Performance and System Audits of Laboratory; and
- Reviewing and evaluating analytical field and laboratory procedures.

2.4 LABORATORY RESPONSIBILITIES

MK Project Chemist

The MK Project Chemist will report to the MK Project Manager and will be responsible for:

- Review of analytical laboratory Qualifications;
- Coordinating laboratory analyses requirements with field personnel;
- Review of preliminary analytical data;
- Review of analytical reports; and
- Approving final analytical reports prior to submission to SouthDiv.

Laboratory Project Manager

The Laboratory Project Manager will report directly to the MK Project Chemist and will be responsible for the following:

- Ensuring all resources of the laboratory are available on an as-required basis; and
- Reviewing of final analytical reports.

Laboratory Operations Manager

The Laboratory Operations Manager will report to the Laboratory Project Manager and will be responsible for:

- Coordinating laboratory analyses;
- Supervising in-house chain-of-custody;
- Scheduling sample analyses;
- Overseeing data review;
- Overseeing preparation of analytical reports; and
- Approving final analytical reports prior to submission to MK.

Laboratory Quality Assurance Officer

The Laboratory QA Officer has the overall responsibility for data after it leaves the laboratory. The Laboratory QA Officer will be independent of the laboratory but will communicate data issues through the Laboratory Project Manager. In addition, the Laboratory QA Officer will:

- Overview laboratory quality assurance;
- Overview QA/QC documentation;
- Conduct detailed review of analytical data in reports prior to submission to MK;
- Determine whether to implement laboratory corrective actions, if required;
- Define appropriate laboratory QA procedures;
- Prepare laboratory Standard Operation procedures; and

Laboratory Sample Custodian

The Laboratory Sample Custodian will report to the Laboratory operations manager. Responsibilities of the Laboratory sample custodian will include:

- Receiving and inspecting the incoming sample containers;
- Recording the condition of the incoming sample containers;
- Signing appropriate documents;
- Verifying chain-of-custody and its correctness;
- Notifying Laboratory Manager and Laboratory Supervisor of sample receipt and inspection;
- Assigning a unique identification number and customer number, and entering each into the sample receiving log;
- With the help of the laboratory manager, initiating transfer of the

samples to appropriate lab sections; and

- Controlling and monitoring access/storage of samples and extracts.

Final responsibility for project quality rests with MK's Project Manager. Independent quality assurance will be provided by the Laboratory Project Manager and Laboratory QA Officer prior to release of all data to MK.

Laboratory Technical Staff

The Laboratory technical staff will be responsible for sample analysis and identification of corrective actions. The staff will report directly to the Laboratory Operations Manager.

2.5 FIELD RESPONSIBILITIES

MK Project Engineer

The primary role of the Project Engineer (PE) will be to directly supervise the day-to-day performance of field activities of the field technical staff and specific subcontractors. The PE will ensure that the data quality objectives established for the project are met through review of field procedures and project schedule. The project engineer will also be responsible to the PM for coordination with all support service groups including procurement, project controls and quality control.

MK Site Safety and Health Officer

The Site Safety and Health Officer (SSHO) is responsible for the implementation of the Site Safety and Health Plan and the day-to-day control of health and safety activities. This individual will provide the necessary guidance to the project staff so they can safely perform their functions in accordance with corporate, state, and federal requirements. The SSHO will report directly to the PM and the MK PMO Safety and Health Manager.

MK Cost/Schedule Engineer

The Cost/Schedule Engineer (CSE) has primary responsibility for maintaining the project cost and schedule controls including regular assessments of performance. The CSE will report directly to the Project Engineer.

MK Field Technical Staff

The technical staff (team members) for this project will be drawn from MK's pool of corporate resources. The technical team staff will be utilized to gather and analyze data, and to prepare various task reports and support materials. All of the designated technical team members are experienced professionals who possess the degree of specialization and technical competence required to effectively and efficiently perform the required work.

SECTION 3
QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective for this project is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results which are legally defensible in a court of law. Specific procedures for sampling, chain-of-custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, audits, preventive maintenance of field equipment, and corrective action are described in other sections of this QAPP.

3.1 PRECISION

3.1.1 Definition

Precision is a measure of the reproducibility of measurements under a given set of conditions. Precision is usually stated in terms of relative standard deviation or relative percent difference. Results of QC samples can be used to calculate the precision of the analytical or sampling process. Field duplicate and replicate samples will be used to determine the precision of the sampling process. Laboratory duplicates, matrix spikes and matrix spike duplicates will be used to determine the precision of the analytical process.

3.1.2 Field Precision Objectives

For Level III data, field duplicate data will be evaluated to determine potential variability introduced by soil heterogeneity and sampling technique. This evaluation will be performed during data validation and summarized in the data assessment. For Level II data, numeric precision goals are not applied to semiquantitative data from immunoassay tests, because the result is based on a colormetric result. One duplicate sample will be analyzed for every 20 samples to qualitatively evaluate precision. The test kit meter will be calibrated daily (each time the meter is turned on) to known concentrations to ensure proper instrument operation.

3.1.3 Laboratory Precision Objectives

Precision in the laboratory is assessed through the calculation of relative percent differences (RPD) and relative standard deviations (RSD) for three or more replicate samples. The equations to be used for precision in this project can be found in Section 12 of this QAPP. Precision control limits are established by the SW-846 methods and are referenced to the provided SOPs. These limits are summarized in Tables 1-1 through 1-10.

3.2 ACCURACY

3.2.1 Definition

Accuracy is a measure of the bias in a measurement system, and defined as the closeness of the reported value to the true value. Potential sources of error include the sampling process, field contamination, preservation, handling, sample matrix, sample preparation and analytical techniques. The accuracy of a measurement system will be assessed by evaluating the results of quality control samples such as matrix spikes, analytical surrogates and the use of field/trip blanks, and equipment rinsate blanks.

3.2.2 Field Accuracy Objectives

For Level III data, field/trip blank and equipment rinsate blank data will be evaluated to identify potential sources of error introduced during sampling. This evaluation will be performed during data validation and summarized in the data assessment. Accuracy in the field is also assessed through the adherence to all sample handling, preservation and holding times.

3.2.3 Laboratory Accuracy Objectives

Laboratory accuracy is assessed through the analysis of standard matrix spikes, sample matrix spikes (MS) or standard reference materials (SRM) and the determination of percent recoveries. The equation to be used for accuracy in this project can be found in Section 12 of this QAPP. The accuracy control limits are also summarized in Tables 1-1 through 1-10.

3.3 COMPLETENESS

3.3.1 Definition

Completeness is a measure of the amount of valid data obtained from an analytical data set compared to the amount that was expected to be obtained under normal sampling and analytical conditions.

3.3.2 Field Completeness Objectives

Field completeness is a measure of the amount of valid measurements obtained from all the measurements taken in the project. The equation for completeness is presented in Section 12 of this QAPP. Field completeness for this project will be 90 percent (*i.e.*, Level II data). This goal reflects the ability to collect additional

samples, if necessary, given the real-time results.

3.3.3 Laboratory Completeness Objectives

Laboratory completeness is a measure of the amount of valid measurements obtained from all measurements taken in the project. The equation for completeness is presented in Section 12 of this QAPP. The laboratory completeness goal for Level III/Level C data is 80 percent, which is considered to be attainable using SW-846 and other EPA-approved analytical methods.

3.4 REPRESENTATIVENESS

3.4.1 Definition

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.

3.4.2 Measures to Ensure Representativeness of Field Data

Representativeness is a qualitative parameter which is controlled by the proper design of the sampling program. Representativeness is addressed by describing sampling techniques and the rationale used to select sampling locations. It will be assessed through the use of samples collected in a manner such that they are equally representative of a given point in space or time. Representativeness will be satisfied by ensuring that the Sampling and Analysis Plan is followed and that proper sampling techniques are used.

3.4.3 Measures to Ensure Representativeness of Laboratory Data

Representativeness in the laboratory is ensured by using the proper analytical procedures, meeting sample holding times and analyzing and assessing field duplicated samples. The sampling network was designed to provide data representative of site conditions. During development of this network, consideration was given to past waste disposal practices, existing analytical data, physical setting and processes, and constraints inherent to the RCRA program.

3.5 COMPARABILITY

3.5.1 Definition

Comparability is a qualitative parameter expressing the confidence with which one

data set can be compared with another.

3.5.2 Measures to Ensure Comparability of Field Data

The comparability goal is achieved by using standard techniques to collect and analyze representative samples and reporting analytical data in appropriate units. Comparability will be satisfied by ensuring that the Sampling and Analysis Plan is followed and that proper sampling techniques are used.

3.5.3 Measures to Ensure Comparability of Laboratory Data

Planned analytical data will be comparable when similar sampling and analytical methods are used and documented per the QAPP. Comparability is also dependent on similar QA objectives.

3.6 LEVEL OF QUALITY CONTROL EFFORT

Field blank, trip blank, method blank, sample duplicate, standard reference materials (SRM), standards matrix spike and sample matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs.

Field and trip blanks consisting of analyte-free water will be submitted to the analytical laboratories to provide the means to assess the quality of the data resulting from the field sampling program. Field blank samples are analyzed to check for procedural contamination at the facility which may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage.

Method blank samples are generated within the laboratory and used to assess contamination resulting from laboratory procedures. Duplicate samples are analyzed to check for sampling and analytical reproducibility. Matrix spikes provide information about the effect of the sample matrix on the extraction or digestion and measurement methodology. All matrix spikes are performed in duplicate for organic methods and are hereinafter referred to as MS/MSD samples. One matrix spike/matrix spike duplicate will be collected for every 20 or fewer investigative samples. MS/MSD samples are designated/collected for all analytical methods.

MS/MSD samples are investigative samples. Soil MS/MSD samples require no extra volume for VOCs or extractable organics. However, aqueous MS/MSD samples must be collected at triple the volume for VOCs and double the volume for extractable organics. One MS/MSD sample will be collected/designated for every

20 or fewer investigative samples per sample matrix (*i.e.*, groundwater, soil).

The general level of the QC effort will be one field duplicate and one field blank for every 10 or fewer investigative samples and are field blanks from each source of water used for decontamination for each event. One volatile organic analysis (VOA) trip blank consisting of distilled deionized ultra pure water will be included along with each shipment of aqueous VOA samples.

The number of duplicate and field blank samples to be collected and sampling procedures are specified in the Sampling and Analysis Plan.

SECTION 4
SAMPLING PROCEDURES

The sampling procedures to be used in this site activities will be consistent for the purpose of this project. The field sampling plan outlines all the sampling procedure information. Please refer to the following sections and subsections of the Sampling and Analysis Plan for the following information:

- Hand Auger or Trowel Soil Sampling - Section 2.1
- Sampling of Liquids - Section 2.2
- Explosives Field Testing (TNT and RDX) - Section 2.3.1
- Polychlorinated Biphenyl (PCB) Field Testing - Section 2.3.2
- QC Sample Procedures - Section 3.0
- Trip Blank Preparation - Section 3.1
- Equipment Rinsate Blank - Section 3.2
- Field Blank Collection - Section 3.3
- Field Duplicate Collection - Section 3.4
- Matrix Spike/Matrix Spike Duplicate Collection - Section 3.5
- Sample Containers - Table 4
- Sampling Equipment Decontamination - Section 4.0

Additional sampling procedures to be used in this site activities are provided below.

Obtaining Contaminant-Free Sample Containers - Sample containers shipped directly by a factory or distributor will include certification of cleanliness. If certification is not included or cleanliness of the containers is suspect, USEPA approved cleaning procedures will be carefully conducted by the analytical laboratory. The procedures are as follows:

Metals: Detergent wash, tap water rinse, 1:1 HNO_3 rinse, tap water rinse, 1:1 HCL rinse, final Type II water rinse.

Volatiles (40 ml glass vials and septa): Non-phosphate detergent wash, tap water rinse, deionized water wash, dry (glassware only) in a muffle furnace at 105 degrees Celcius for one hour.

Semivolatiles and Pesticides: Non-phosphate detergent wash, tap water rinse, deionized water rinse, methanol rinse, final Type II water rinse.

SECTION 5
CUSTODY PROCEDURES

Custody is one of several factors which is necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files. Final evidence files, including all originals of laboratory reports and purge files, are maintained under document control in a secure area.

A sample or evidence file is under your custody if:

- The item is in actual possession of a person; or
- The item is in the view of the person after being in actual possession of the person; or
- The item was in actual physical possession but is locked up to prevent tampering; or
- The item is in a designated and identified secure area.

5.1 FIELD CUSTODY PROCEDURES

Field logbooks will provide the means of recording data collecting activities performed. As such, entries will be described in as much detail as possible so that persons going to the facility could reconstruct a particular situation without reliance on memory.

Field logbooks will be bound, field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in the document control center when not in use. Each logbook will be identified by the project-specific document number.

The title page of each logbook will contain the following:

- Person or persons to whom the logbook is assigned,
- Logbook number,
- Project name,
- Project start date, and
- End date.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of all sampling team members

present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the site, field sampling or investigation team personnel and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded. All entries will be made in indelible ink, signed, and dated and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark which is signed and dated by the sampler. Whenever a sample is collected, or a measurement is made, a detailed description of the location of the SWMU, which includes compass and distance measurements from permanent features or monuments, shall be recorded. The number of the photographs taken of the SWMU, if any, will also be noted. All equipment used to make measurements will be identified, along with the date and results of calibration.

Samples will be collected following the sampling procedures documented in Section 4.0 of this QAPP. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample was collected, volume and number of containers. Sample identification numbers will be assigned prior to sample collection. Field duplicate samples, which will receive an entirely separate sample identification number, will be noted under sample description. A detailed description of assigning sample identification numbers can be found in Section 6.0 of the Sampling and Analysis Plan.

The sample packaging and shipment procedures summarized below will ensure that the samples will arrive at the laboratory with the chain of custody intact. The protocol for specific sample numbering using SWMU numbers and other sample designations are included in Section 6.1 of the Sampling and Analysis Plan. An example of a field custody document is presented in Figure 5-1.

5.1.1 Field Documentation

Field notebooks will be used to document all field activities. Information to be entered in the field notebook includes at a minimum:

- Project name and location
- Name and address/phone number of field contact
- Individuals on site
- Weather conditions
- Sample locations and depths
- Date and time of each activity
- Results of air monitoring and personal protective equipment levels

- Sample identification
- Date and time of sample collection
- Requested analyses, type and number of sample containers, preservative
- Results of field screening measurements
- Type of sample collected (ground water, soil, composite, grab, etc.)

Notes will be written on sequentially numbered pages with indelible ink. Each page will be initialed and dated when full. Corrections to logbook entries will be made by lining through incorrect entries with a single line and initialing and dating the strike out. At the end of the day, any unused space at the bottom of the last page will be "x-ed" out, initialed and dated.

5.1.2 Chain of Custody

To maintain and document sample possession, chain-of-custody procedures must be implemented. A chain of custody form will be used to record pertinent information for each sample and the individuals responsible for the sample collection, shipment and receipt. A sample is considered in custody if it is:

- In a person's actual possession;
- In view, after being in physical possession;
- Locked so that no one can tamper with it, after having been in physical custody;
- In a secured area, restricted to authorized personnel.

The subcontracted laboratories will not accept samples collected by MK for analysis without a completed chain of custody form. The chain of custody record shall be initiated in the field by the person collecting the sample, for each sample. Each sample will be assigned a unique identification number, as described in Section 6.0 of the SAP, and that number will be entered on the chain of custody form. In order to be complete, project identification, date and time of sample collection, sample location, requested analyses, turnaround time, and any special instructions must be included on the chain of custody, along with each sample identification. Custody will be relinquished by using the signature blocks at the bottom of the custody form. The original chain of custody will record will accompany the shipment and a copy will be retained by the PM or designee. A signed chain of custody record will be obtained from the laboratory custodian after the samples have been received and their condition checked. For samples shipped by commercial carrier, the waybill will serve as an extension of the chain of custody record.

Upon receipt in the laboratory, all samples will proceed through an orderly processing sequence (as defined in the laboratory QA/QC Plan) specifically designed to ensure continuous integrity of both the sample and other information pertinent to the analysis. All samples will be carefully checked and verified for proper chain-of-custody (COC) records, preservation, presence of broken or leaking sample containers, proper label identification, and any associated discrepancies. If any samples arrive leaking or broken, or the custody seal on the shipment coolers is not intact, the Project Manager and QA/QC Coordinator will be notified of the problem(s) immediately. If no discrepancies are identified, the sample COC record will be signed, and the samples will subsequently be assigned a unique laboratory identification number by the laboratory for tracking and filing. The laboratory QA system and the use of an internal COC procedure will ensure that the samples are appropriately tracked from receipt through completion of the analytical process.

5.1.3 Handling and Shipping

All samples will be collected in the appropriate containers for each analysis, as detailed on Table 3 of the SAP. All sample labels used on sample containers will include, at a minimum, a sample identification code, the date and time of sample collection, site name, and the analytical method requested. The label will adhere to the container and the writing on it will be in indelible ink. The label will be secondarily affixed to the container with clear adhesive tape completely covering the label. A waterproof metal or equivalent strength plastic cooler will be used for packaging and shipping samples. Samples will be packed with bubble wrap or other cushioning material to prevent breakage during transport. Ice will be placed in the coolers with the samples to maintain shipping temperature at 4° C. The COC will be placed in plastic and affixed to the underside of the cooler lid. Custody seals will be affixed to the front and back of each cooler and covered with clear adhesive tape.

Samples packaging and shipping will vary depending upon sample media, contaminant concentration, preservation technique, and sample container. All samples will be packaged and shipped following all state and federal regulations and will conform with DOT and IATA requirements.

5.2 LABORATORY CUSTODY PROCEDURES

Laboratory custody procedures for sample receiving and log-in; sample storage and numbering; tracking during sample preparation and analysis; and storage of data are described in the Laboratory QA Plan.

5.3 FINAL EVIDENCE FILES

The final evidence file will be the central repository for all documents which constitute evidence relevant to sampling and analysis activities as described in this QAPP. MK is the custodian of the evidence file and maintains the contents of evidence files for the Interim Measure, including all relevant records, reports, logs, field notebooks, pictures, subcontractor reports and data reviews in a secured, limited access area, under custody of the MK Project Manager.

The final evidence file will include at a minimum:

- Field logbooks;
- Field data and data deliverables;
- Photographs;
- Drawings;
- Laboratory data deliverables;
- Data validation reports;
- Data assessment reports;
- Progress reports, QA reports, interim project reports, etc.; and
- All custody documentation (tags, forms, airbills, etc.)

SECTION 6
CALIBRATION PROCEDURES AND FREQUENCY

This section describes the calibration procedures and the frequency at which these procedures will be performed for both field and laboratory instruments.

6.1 FIELD INSTRUMENT CALIBRATION

Field instruments will be calibrated as prescribed by the owner's manual using reference standards provided by the instrument supplier. Frequency of calibrations will also follow manufacturer's recommendations. Calibration data will be documented in the field notebook.

6.2 LABORATORY INSTRUMENT CALIBRATION

Laboratory instruments will be calibrated at prescribed intervals and/or as part of daily use. Frequency will be based upon the analytical method, type of equipment, inherent stability, and manufacturers recommendations. Equipment will be calibrated, whenever possible, using reference standards having known relationships to nationally recognized standards or accepted values of physical constants. If national standards do not exist, the basis for calibration will be documented.

The analytical laboratory will be responsible for the maintenance of laboratory instruments and equipment. Instruments, and the measurements made as part of the analytical methodology, will be as specified in the method, without modification. The laboratory's quality assurance (QA) program ensures that only trained personnel perform routine maintenance on all major instruments and that repairs are performed by trained laboratory personnel or service technicians employed by the instrument manufacturer or representative. Instrument maintenance will be appropriately documented through the use of instrument logs which will be included in the laboratory project file.

SECTION 7
ANALYTICAL PROCEDURES

This section describes the analytical procedures for all samples collected for analysis.

7.1 FIELD ANALYTICAL PROCEDURES

The standardization and QA information for field measurements of RDX, TNT and PCBs are described in Section 3 of this QAPP. A copy of the Sampling and Analysis Plan has been submitted with the QAPP to expedite review and approval of these methods.

7.2 LABORATORY ANALYTICAL PROCEDURES

The laboratory will implement the project required Standard Operating Procedures (SOPs). These laboratory SOPs for sample preparation, cleanup and analysis are based on the latest SW-846 Revision [January 1995]. These SOPs provide sufficient details and are specific to this RCRA Corrective Action Interim Measure.

The site samples for volatile organic compounds analysis (VOA) shall be screened in the laboratory, as described in the VOA SOP and shall be analyzed, either as low or medium level concentration samples, or as a series of dilutions in order to cover the expected concentration range of the site-specific compounds of interest.

The site soil sample extracts requiring pesticide/PCB and/or semivolatile organic compounds analysis (acid/base/neutral analysis or BNAs) shall be subjected to gel permeation chromatography cleanup and/or other column chromatography cleanup, as necessary.

The documentation of appropriate method validation for the project target compounds is submitted in Interim Measures Completion Report for each SWMU. It includes the criteria for acceptance, rejection or qualification of data.

7.2.1 List of Project Target Compounds and Laboratory Detection Limits

A listing of project target compounds, soils cleanup levels, and analytical methods to be used for samples collected during the project are summarized in Tables 1 through 6 of the SAP.

7.2.2 List of Associated QC Samples

The analytical methods and laboratory SOPs include a QC section which address the minimum QC requirements for the analysis of specific analyte groups. Compounds to be spiked will be representative of the target compounds of interest. Section 7.1 of the Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program (NEESA 20.2-047B, 1988) contains a complete listing of the associated QC samples required for this project.

SECTION 8
INTERNAL QUALITY CONTROL CHECKS

8.1 FIELD QUALITY CONTROL CHECKS

QC procedures for field measurement of TDX, TNT and PCBs in soil will include calibrating the field test kits as described in Section 6.0 of this QAPP, measuring duplicate samples and checking the reproducibility of the measurements by taking multiple readings on a single sample or reference standard. The QC information for field equipment is stated in Section 3.0 of this QAPP. Assessment of field sampling precision and bias will be made by collecting field duplicates and field blanks for laboratory analysis. Collection of the samples will be in accordance with the applicable procedures in Section 2.3 of the SAP.

8.2 LABORATORY QUALITY CONTROL CHECKS

The laboratory QC program shall ensure the reliability and validity of the analysis performed at the laboratory. All analytical procedures are documented in writing as SOPs and each SOP includes a QC section which addresses the minimum QC requirements for the procedure. The internal quality control checks might differ slightly for each individual procedure but in general the QC requirements include the following:

- Field/Trip blanks;
- Method blanks;
- Reagent/preparation blanks (applicable to inorganic analysis);
- Instrument blanks;
- Matrix spikes/matrix spike duplicates;
- Surrogate spikes;
- Analytical spikes (Graphite furnace);
- Field duplicates;
- Laboratory duplicates;
- Laboratory control standards;
- Internal standard areas for GC/MS analysis; control limits;
- Mass tuning for GC/MS analysis;
- Endrin/DDT degradation checks for GC/EC analysis; and
- Second, dissimilar column confirmation for GC/EC analysis.

For a description of the specific QC requirements of this facility investigation and the frequency of audit, refer to the submitted SOPs. The QC criteria are also included in the SOPs.

All data obtained will be properly recorded. The data package will include a full deliverable package capable of allowing the recipient to reconstruct QC information and compare it to QC criteria. Any samples analyzed in nonconformance with the QC criteria will be reanalyzed by the laboratory, if sufficient volume is available and holding times have not been exceeded. It is expected that sufficient volumes/weights of samples will be collected to allow for reanalysis when necessary.

SECTION 9
LABORATORY DATA REDUCTION, VALIDATION AND REPORTING

All data generated during field activities or by the laboratory shall be reduced and validated prior to submittal to MK. No data shall be disseminated by the laboratory until it has been subjected to these procedures which are summarized in subsections below.

9.1 DATA REDUCTION

9.1.1 Field Data Reduction Procedures

Field data reduction procedures will be minimal in scope compared to those implemented in the laboratory setting. Only direct read instrumentation will be employed in the field. The use of field test kits will generate measurements directly read from the meters following calibration per manufacturer's recommendations as outlined in Section 6 of this QAPP. Such data will be written into field log books immediately after measurements are taken. If errors are made, results will be legibly crossed out, initialed and dated by the field sampler, and corrected in a space adjacent to the original (erroneous) entry. Later, when the results forms required for this study are being filled out, the MK Project Manager, identified in Section 2 of this QAPP, will proof the forms to determine whether any transcription errors have been made by the field crew.

Because the use of field instrumentation such as a mobile gas chromatograph will not be used, there will be no further need for assuring that field data has been reduced properly through the use of formulas or interpretation of raw data printouts.

9.1.2 Laboratory Data Reduction Procedures

Laboratory data reduction procedures will be followed according to the following protocol. All raw analytical data will be recorded in numerically identified laboratory notebooks. These notebooks will be issued only by the Laboratory QA Manager. Data are recorded in this notebook along with other pertinent information, such as the sample identification number and the sample tag number. Other details will also be recorded in the lab notebook, such as the analytical method used (SOP#), name of analyst, the date of analysis, matrix sampled, reagent concentrations, instrument settings, and the raw data. Each page of the notebook shall be signed and dated by the analyst. Copies of any strip chart printouts (such as gas chromatograms) will be maintained on file. Periodic review of these notebooks by the Lab QA Manager will be completed prior to final data reporting. (Records of

notebook entry inspections are maintained by the Lab QA Manager.)

For this project, the equations that will be employed in reducing data are those associated with the CLP-SOW (Multi-Media, Multi-Concentration Contractual Requirements and Equations For Volatile Data Review OLM03.1, August 1994). Two of these equations, expressing analytical accuracy and precision, have been presented in Section 12 of this QAPP. Such formulae make pertinent allowances for matrix type. All calculations will be checked by the Organic Section supervisor at the conclusion of each operating day. Errors are noted, corrections are made, but the original notations are crossed out legibly. Analytical results for soil samples shall be calculated and reported on a dry weight basis, and TCLP results will not be matrix spike recovery-corrected.

Quality control data (e.g. laboratory duplicates, surrogates, matrix spikes, and matrix spike duplicates) will be compared to the method acceptance criteria. Data considered to be acceptable will be entered into the laboratory computer system. Data summaries will be sent to the Laboratory QA Manager for review. If approved, data are logged into the project database format. Unacceptable data shall be appropriately qualified in the project report. Case narratives will be prepared which will include information concerning data that fell outside acceptance limits, and any other anomalous conditions encountered during sample analysis. After the Lab QA Manager approves these data, they are considered ready for third party data validation.

9.2 DATA VALIDATION

Data validation procedures shall be performed for both field and laboratory operations as described below:

9.2.1 Procedures Used to Evaluate Field Data

Procedures to evaluate field data for this project primarily include checking for transcription errors and review of field log books, on the part of field crew members. This task will be the responsibility of the SQCS, who will otherwise not participate in making any of the field measurements, or in adding notes, data or other information to the log book.

9.2.2 Procedures to Validate Laboratory Data

First, all Level C data will be verified by reviewing Chain-of-Custody records, sample preservation records, analytical holding times, requested turnaround time, sample data as compared to QC sample data, and reporting requirements.

Following verification, 10 percent of the Level C data will be validated according to EPA and NEESA data validation guidelines. Qualifiers will be applied to the data based on results of the validation effort.

During the Corrective Action Interim Measures at NSWC Crane, 10 percent of the data for samples collected for final confirmatory results will be validated to substantiate and document that these data are of known quality. Data validation of laboratory data will follow accepted criteria defined by Section 7.3.2 of NEESA 20.2-097B. Validation will be performed on 10 percent of the final confirmatory data collected. Problems or discrepancies will be discussed with the laboratory by the data validator for resolution and/or documentation. A data validation summary report will be written for each data package, and will include a copy of the validated results and data qualifiers where appropriate.

9.3 DATA REPORTING

Data reporting procedures shall be carried out for field and laboratory operations as indicated below:

9.3.1 Field Data Reporting

Field data reporting shall be conducted principally through the transmission of report sheets containing tabulated results of all measurements made in the field, and documentation of all field calibration activities.

9.3.2 Laboratory Data Reporting

The task of reporting laboratory data begins after the validation activity has been concluded. The Laboratory QA Manager must perform a final review of the report summaries and case narratives to determine whether the report meets project requirements. In addition to the record of chain-of-custody, the report format shall consist of the following:

1. Case Narrative:
   - i. Date of issuance
   - ii. Laboratory analysis performed
   - iii. Any deviations from intended analytical strategy
   - iv. Laboratory batch number
   - v. Numbers of samples and respective matrices
   - vi. Quality control procedures utilized and also references to the acceptance criteria
   - vii. Laboratory report contents

viii. Project name and number
ix. Condition of samples 'as-received' including cooler temperature
x. Discussion of whether or not sample holding times were met
xi. Discussion of technical problems or other observations which may have created analytical difficulties
xii. Discussion of any laboratory quality control checks which failed to meet project criteria
xiii. Signature of the Laboratory QA Manager

2. Chemistry Data Package
   i. Case narrative for each analyzed batch of samples
   ii. Summary page indicating dates of analyses for samples and laboratory quality control checks
   iii. Cross referencing of laboratory sample number to project sample identification numbers
   iv. Data qualifiers to be used should be adequately described
   v. Sample preparation and analyses for samples
   vi. Sample results
   vii. Raw data for sample results and laboratory quality control samples
   viii. Results of (dated) initial and continuing calibration checks, and GC/MS tuning results
   ix. Matrix spike and matrix spike duplicate recoveries, laboratory control samples, method blank results, calibration check compounds, and system performance check compound results
   x. Labelled (and dated) chromatograms/spectra of sample results and laboratory quality control checks

The data package submitted will be a "CLP-like" data package consisting of all the information presented in a CLP data package. Details of the laboratory deliverables are found in Section 3.6 of the Sampling and Analysis Plan.

SECTION 10
PERFORMANCE AND SYSTEM AUDITS

10.1 PERFORMANCE AND SYSTEM AUDITS AND FREQUENCY

To verify compliance with the specific project Quality Assurance Program requirements, MK quality assurance personnel will perform planned and documented surveillances and audits of project activities. These audits will consist of, as appropriate, an evaluation of quality assurance/quality control procedures and the effectiveness of their implementation; an evaluation of work areas and activities; and a review of project documentation. Audits will be performed in accordance with written checklists by trained personnel and, as appropriate, technical specialists. Surveillance results will be formally documented and sent to the PM.

Audits may include, but not be limited to, the following:

- Subcontractor capabilities and performance;
- Field operations and records;
- Laboratory testing and records;
- Equipment calibration and records;
- Identification and control of samples;
- Computer program documentation and verification;
- Transmittal of information; and
- Record control and retention.

Planned audits and surveillances for this project will, as appropriate, cover the field activities and final reports. At regular intervals, ongoing field activities, laboratory activities and office material generated to backup future reports will be examined. Reports will be audited between the draft and final stages. Auditing will be performed in accordance with applicable engineering and quality assurance standards. The audits of field and laboratory activities include two independent parts - internal and external audits.

10.2 FIELD PERFORMANCE AND SYSTEM AUDITS

10.2.1 Internal Field Audits

10.2.1.1 Internal Field Audit Responsibilities

An individual audit plan will be developed by the SQCS to provide a basis for each audit. This plan will identify the audit scope, activities to be audited, audit

personnel, any applicable documents, and the schedule. The plan will be consistent with the scope of work, schedule, and requirements.

10.2.1.2 Internal Field Audit Frequency

These audits will verify that all established procedures are being followed. Internal field audits will be conducted at least once at the beginning of the site sample collection activities at each SWMU and periodically, as needed, throughout the life of the project.

10.2.1.3 Internal Field Audit Procedures

Field operations surveillance will involve an on-site visit by the SQCS or designated representative. Items to be examined may include the availability of appropriate and approved Work Plan and procedures; implementation of approved procedures; calibration and operation of equipment; labeling, packaging, storage and shipping of samples obtained; subcontractor performance; and documentation of deviations from the Work Plan and nonconformance.

The records of field operations will be reviewed to verify that field-related activities were performed in accordance with appropriate project procedures. Items reviewed will include, but not be limited to, the calibration records of field equipment; daily field activity logs; photographs; and data, logs, and checkprints resulting from the field operations.

10.2.2 External Field Audits

10.2.2.1 External Field Audit Responsibilities

External field audits may be conducted by the U.S. EPA Project Coordinator.

10.2.2.2 External Field Audit Frequency

External field audits may be conducted any time during the field operations. These audits may or may not be announced and are at the discretion of the U.S. EPA

10.2.2.3 Overview of the External Field Audit Process

External field audits will be conducted according to the field activity information presented in the QAPP.

10.3 LABORATORY PERFORMANCE AND SYSTEMS AUDITS

10.3.1 Internal Laboratory Audits

10.3.1.1 Internal Lab Audit Responsibilities

The internal laboratory audit will be conducted by the SQCS.

10.3.1.2 Internal Lab Audit Frequency

The internal lab system audits will be done on an annual basis while the internal lab performance audits will be conducted on a quarterly basis.

10.3.1.3 Internal Lab Audit Procedures

The auditing of laboratory testing records will include, but not be limited to, the original data presentations prepared by the laboratory staff and laboratory test scheduling records.

A report audit will be performed prior to issuance of a final report. A report audit may examine, as appropriate, the documentation and verification of field and laboratory data; performance, documentation, and verification of analyses; documentation and verification of computer programs; preparation and verification of drawings, logs, and tables; content, consistency, and conclusions of the report; compliance with MK, regulatory, and project requirements; and maintenance and filing of project records. The issuance of the final submittal will be postponed if quality assurance personnel determine that the work does not meet requirements. If the project schedule demands issuance of a report prior to audit, it may be issued "preliminary" or "draft."

During an audit and upon its completion, the auditors will discuss the findings with the individuals audited and cite corrective actions to be initiated. Minor administrative findings, which can be resolved to the satisfaction of the auditors during an audit, are not required to be cited as items requiring corrective action. All findings that are not resolved during the course of the audit and findings affecting the overall quality of the project, regardless of when they are resolved, will be noted on the audit checklists. Audit results will be given to and discussed with the PM who will, along with the SQCS, institute the necessary corrective actions.

10.3.2 External Laboratory Audits

10.3.2.1 External Lab Audit Responsibilities

An external audit will be conducted by U.S. EPA Region 5 Central Regional Laboratory (CRL).

10.3.2.2 External Lab Audit Frequency

An external lab audit will be conducted at least once prior to the initiation of the sampling and analysis activities. These audits may or may not be announced and are conducted at the discretion of the U.S. EPA.

10.3.2.3 Overview of the External Lab Audit Process

External lab audits will include (but not be limited to) review of laboratory analytical procedures, laboratory on-site audits, and/or submission of performance evaluation samples to the laboratory for analysis.

SECTION 11
PREVENTATIVE MAINTENANCE

11.1 FIELD INSTRUMENT PREVENTATIVE MAINTENANCE

The field equipment for this project consists of field test kits to be used to measure RDX, TNT and PCBs in soil. Specific preventative maintenance procedures to be followed for field equipment are those recommended by the manufacturer. Field instruments will be checked and calibrated daily before use. Calibration checks will be documented in the Field Log Book. Critical spare parts such as spare test kits will be kept on-site to reduce downtime. Backup instruments and equipment will be available on-site or within one day shipment to avoid delays in the field schedule.

11.2 LABORATORY INSTRUMENT PREVENTATIVE MAINTENANCE

As part of their QA/QC program, a routine preventative maintenance program is conducted by the laboratory to minimize the occurrence of instrument failure and other system malfunctions. Designated laboratory employees shall regularly perform routine scheduled maintenance and repair of all instruments, or coordinate with the vendor for the repair of all instruments. All maintenance that is performed shall be documented in the laboratory's operating record. All laboratory instruments are maintained in accordance with manufacturer's specification.

SECTION 12
SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY AND COMPLETENESS

12.1 ACCURACY ASSESSMENT

In order to assure the accuracy of the analytical procedures, an environmental sample is randomly selected from each sample shipment received at the laboratory, and spiked with a known amount of the analyte or analytes to be evaluated. In general, a sample spike should be included in every set of 20 samples tested on each instrument. The spike sample is then analyzed. The increase in concentration of the analyte observed in the spiked sample, due to the addition of a known quantity of the analyte, compared to the reported value of the same analyte in the unspiked sample determines the percent recovery. Daily control charts are plotted for each commonly analyzed compound and kept on instrument, matrix, and analyte specific bases. The percent recovery for a spiked sample is calculated according to the following formula:

$$\%R = \frac{\text{Amount in Spiked Sample} - \text{Amount in Sample}}{\text{Known Amount Added}} \times 100$$

12.2 PRECISION ASSESSMENT

Spiked samples are prepared by choosing a sample at random from each sample shipment received at the laboratory, dividing the sample into equal aliquots, and then spiking each of the aliquots with a known amount of analyte. The duplicate samples are then included in the analytical sample set. The splitting of the sample allows the analyst to determine the precision of the preparation and analytical techniques associated with the duplicate sample. The relative percent difference (RPD) between the spike and duplicate spike are calculated and plotted. The RPD is calculated according to the following formula:

$$RPD = \frac{|\text{Amount in Spike 1} - \text{Amount in Spike 2}|}{0.5(\text{Amount in Spike 1} + \text{Amount in Spike 2})} \times 100$$

12.3 COMPLETENESS ASSESSMENT

Completeness is the ratio of the number of valid sample results to the total number of samples analyzed with a specific matrix and/or analysis. Following completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$\text{Completeness} = \frac{\text{(number of valid measurements)}}{\text{(number of measurements planned)}} \times 100$$

SECTION 13
CORRECTIVE ACTION

13.1 CHANGE CONTROL

Prior to implementation, changes to original documents, procedures, amd specifications will require approval by the parties originally responsible for approval of this document. It is the responsibility of project personnel to appropriately record the change and to make the documentation available to the PM and SQCS. The effect of the change on the project will then be evaluated by the PM and SQCS. A description of the proposed change, along with the results of the evaluation, will be presented to the Navy for approval. Following Navy approval, the change will be documented as a revision to the original document to reflect the work as actually performed.

13.2 FIELD CORRECTIVE ACTION

Nonconforming items and activities are those which do not meet the project requirements, procurement document criteria, or approved work procedures. Nonconformances may be detected and identified by:

- Project Staff - During the performance of field investigation and testing, supervision of subcontractors, and preparation and verification of analyses and design,
- Laboratory Staff - During the preparation for and performance of laboratory testing, calibration of equipment, and quality control activities, and
- Quality Assurance Personnel - During the performance of audits.

Each nonconformance affecting quality will be documented by the personnel identifying the nonconformance. For this purpose, a standard form (e.g., Nonconformance Report), results of laboratory analysis quality control tests, audit report, internal memorandum, or letter will be used as appropriate. Documentation will include:

- Identification of the individual(s) identifying the nonconformance,
- Cause and description of the nonconformance,
- Method(s) for correcting the nonconformance (corrective action) or description of the variance granted,
- Schedule for completing corrective action, and

- Any required approval signatures,

Documentation will be distributed to the Program Quality Control Manager (PQCM) with copies to the PM and SQCS. It is then the responsibility of the PQCM to approve and initiate resolution for the institution of the necessary corrective action to the nonconformance. Documentation describing the nonconformance and the corrective action implemented will be placed in the project file. Completion of corrective actions for significant nonconformances should be verified by quality assurance personnel as part of future auditing activities.

Any recurring nonconformance should be evaluated by project, laboratory, and/or quality assurance personnel to determine its cause and appropriate changes instituted in project requirements and procedures to prevent future recurrence. When such an evaluation is performed, the results will be documented.

13.3 LABORATORY CORRECTIVE ACTION

Corrective action in the laboratory may occur prior to, during and after initial analyses. A number of conditions such as broken sample containers, multiple phases, low/high pH readings, and potentially high concentration samples may be identified during sample log-in or just prior to analysis. Following consultation with lab analysts and section leaders, it may be necessary for the laboratory Quality Control Coordinator to approve the implementation of corrective action. The laboratory standard operating procedures (SOPs) specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, automatic reinjection/reanalysis when certain quality control criteria are not met, etc.

The bench chemist will identify the need for corrective action. The Laboratory Manager, in consultation with the Laboratory supervisor and staff, will approve the required corrective action to be implemented by the laboratory staff. The Laboratory QA manager will ensure implementation and documentation of the corrective action. If the nonconformance causes project objectives not to be achieved, it will be necessary to inform all levels of project management including the U.S. EPA RPC to concur with the corrective action.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both Laboratory's corrective action log (signed by analyst, section leader and quality control coordinator), and the narrative data report sent from the laboratory to the MK

Project Chemist. If corrective action does not rectify the situation, the laboratory will contact the NSWC Project Manager.

13.4 CORRECTIVE ACTION DURING DATA VALIDATION AND DATA ASSESSMENT

The facility may identify the need for corrective action during either the data validation or data assessment. Potential types of corrective action may include resampling by the field team or reinjection/reanalysis of samples by the laboratory.

These actions are dependent upon the ability to mobilize the field team, whether the data to be collected is necessary to meet the required quality assurance objectives (*e.g.*, the holding time for samples is not exceeded, etc.) When the MK Project Chemist identifies a corrective action situation, it is the Project Manager who will be responsible for approving the implementation of corrective action, including resampling, during data assessment. All corrective actions of this type will be documented by the SQCS.

SECTION 14
QUALITY ASSURANCE REPORTS TO MANAGEMENT

Following completion of an audit, the auditors will prepare and submit an audit report to the Project Engineer, PM, or, as necessary, the Laboratory Manager. This report will serve to notify management of audit results. The report may also be sent to other individuals contacted during the audit and the management of any affected subcontractor.

The report will be prepared as soon as possible (within 30 days) after the audit and contain, as appropriate:

- Date(s) of the audit
- Identification of audit participants
- Identification of activities audited
- Audit results
- Description of items requiring corrective action and, if possible, the means for correction
- Due date for completion of corrective actions and/or audit response
- Means for audit response (i.e., in writing)
- Impact, if any, on project schedule

If corrective action is required in the audit report, the corrective action will be undertaken and completed on schedule unless sufficient evidence can be provided to prove that the action is unnecessary.

The individuals audited will respond in writing to the audit report. The response will clearly state the corrective action taken or planned. If all corrective actions have not been completed prior to issuance of the audit response, a scheduled date for completion must be provided.

Completion of corrective action will be verified by the auditors through written communication, reaudit, or other appropriate means.

After acceptance and verification of corrective actions, an audit closure will be issued by the auditors to the same individuals receiving the audit report.

Table 1-1
QA OBJECTIVES FOR
PRECISION, ACCURACY, AND COMPLETENESS
TAL VOLATILES

Data Quality Parameters	**Matrix**	**Method of Determination[1]**	**Frequency**	**QC Limits Required Objective[2]**
Precision	Water	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0 - 14
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0 - 14
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0 - 24[4]
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0 - 20[4]
Accuracy	Water	Surrogate	All Samples & Standards	Recovery = 76-115
	Soil, Sediment	Surrogate	All Samples & Standards	Recovery = 59-138[4]
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 56-138
	Water	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 61-145
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 59-138[4]
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 59-172[4]
Completeness	Water, Soil, Sediment	Valid Samples	All Samples	90 Percent[5]

Notes: [1]MS/MSD = Matrix spike/matrix spike duplicate.
[2]RPD = Relative percent difference.
[3]Analytical batch $\leq$ 20 samples.
[4]Limits for soil, not established for sediment.
[5]Number of valid samples divided by number of samples analyzed.

Table 1-2
QA OBJECTIVES FOR
PRECISION , ACCURACY, AND COMPLETENESS
ORDNANCE COMPOUNDS

Data Quality Parameters	**Matrix**	**Method of Determination[1]**	**Frequency**	**QC Limits Required Objective[2]**
Precision	Water	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0 - 30
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0 - 30
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0-40[4]
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0-40[4]
Accuracy	Water	Surrogate	All Samples & Standards	Recovery = 50-140
	Soil, Sediment	Surrogate	All Samples & Standards	Recovery =50-140[4]
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 50-140
	Water	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 50-140
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 50-140
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 50-140
Completeness	Water, Soil, Sediment	Valid Samples	All Samples	90 Percent[5]

Notes: [1]MS/MSD = Matrix spike/matrix spike duplicate.
[2]RPD = Relative percent difference.
[3]Analytical batch $\leq$ 20 samples.
[4]Limits for soil, not established for sediment.
[5]Number of valid samples divided by number of samples analyzed.

Table 1-3QA OBJECTIVES FOR
PRECISION , ACCURACY, AND COMPLETENESS
TAL METALS

Data Quality Parameters	**Matrix**	**Method of Determination[1]**	**Frequency**	**QC Limits Required Objective[2]**
Precision	Water, Soil, Sediment	Laboratory Duplicate	Analytical Batch[3]	RPD = 0 - 20
Accuracy	Water, Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 75-125[4]
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 80-120[4]
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 80-120[4]
Completeness	Water, Soil, Sediment	Valid Samples	All Samples	90 Percent[5]

Notes: [1]MS/MSD = Matrix spike/matrix spike duplicate.
[2]RPD = Relative percent difference.
[3]Analytical batch $\leq$ 20 samples.
[4]Limits for water and soil, not established for sediment.
[5]Number of valid samples divided by number of samples analyzed.

Table 1-4
QA OBJECTIVES FOR
PRECISION, ACCURACY, AND COMPLETENESS
TAL SEMI-VOLATILES

Data Quality Parameters	**Matrix**	**Method of Determination[1]**	**Frequency**	**QC Limits Required Objective[2]**
Precision	Water	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0 - 50
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0 - 50
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0 - 50[4]
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0 - 50[4]
Accuracy	Water	Surrogate	All Samples & Standards	Recovery = 10-1
	Soil, Sediment	Surrogate	All Samples & Standards	Recovery = 18-137[4]
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 9-127
	Water	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 9-127
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 11-142[4]
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 11-142[4]
Completeness	Water, Soil, Sediment	Valid Samples	All Samples	90 Percent[5]

Notes: [1]MS/MSD = Matrix spike/matrix spike duplicate.
[2]RPD = Relative percent difference.
[3]Analytical batch $\leq$ 20 samples.
[4]Limits for soil, not established for sediment.
[5]Number of valid samples divided by number of samples analyzed.

Table 1-5
QA OBJECTIVES FOR
PRECISION, ACCURACY, AND COMPLETENESS
TAL PESTICIDES

Data Quality Parameters	Matrix	Method of Determination[1]	Frequency	QC Limits Required Objective[2]
Precision	Water	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0 - 27
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0 - 27
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0 - 50[4]
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0 - 50[4]
Accuracy	Water	Surrogate	All Samples & Standards	Recovery = 30-150
	Soil, Sediment	Surrogate	All Samples & Standards	Recovery = 30-150[4]
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 38-127
	Water	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 38-131
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 23-139[4]
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 23-139[4]
Completeness	Water, Soil, Sediment	Valid Samples	All Samples	90 Percent[5]

Notes: [1]MS/MSD = Matrix spike/matrix spike duplicate.
[2]RPD = Relative percent difference.
[3]Analytical batch $\leq$ 20 samples.
[4]Limits for soil, not established for sediment.
[5]Number of valid samples divided by number of samples analyzed.

Table 1-6
QA OBJECTIVES FOR
PRECISION, ACCURACY, AND COMPLETENESS
TAL HERBICIDES

Data Quality Parameters	**Matrix**	**Method of Determination[1]**	**Frequency**	**QC Limits Required Objective[2]**
Precision	Water	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0 - 30
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0 - 30
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0 - 40[4]
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0 - 40[4]
Accuracy	Water	Surrogate	All Samples & Standards	Recovery = 50-1
	Soil, Sediment	Surrogate	All Samples & Standards	Recovery = 50-140[4]
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 50-140
	Water	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 50-140
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 50-140[4]
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 50-140[4]
Completeness	Water, Soil, Sediment	Valid Samples	All Samples	90 Percent[5]

Notes: [1]MS/MSD = Matrix spike/matrix spike duplicate.
[2]RPD = Relative percent difference.
[3]Analytical batch $\leq$ 20 samples.
[4]Limits for soil, not established for sediment.
[5]Number of valid samples divided by number of samples analyzed.

Table 1-7
QA OBJECTIVES FOR
PRECISION, ACCURACY, AND COMPLETENESS
TAL DIOXINS/FURANS

Data Quality Parameters	**Matrix**	**Method of Determination[1]**	**Frequency**	**QC Limits Required Objective[2]**
Precision	Water	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0 - 50
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0 - 50
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0 - 50[4]
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0 - 50[4]
Accuracy	Water	Surrogate	All Samples & Standards	Recovery = 25-150
	Soil, Sediment	Surrogate	All Samples & Standards	Recovery = 25-150[4]
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 50-150
	Water	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 50-150
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 50-150[4]
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 50-150[4]
Completeness	Water, Soil, Sediment	Valid Samples	All Samples	90 Percent[5]

Notes: [1]MS/MSD = Matrix spike/matrix spike duplicate.
[2]RPD = Relative percent difference.
[3]Analytical batch $\leq$ 20 samples.
[4]Limits for soil, not established for sediment.
[5]Number of valid samples divided by number of samples analyzed.

Table 1-8
QA OBJECTIVES FOR
PRECISION, ACCURACY, AND COMPLETENESS
TAL ORGANOPHOSPHATE PESTICIDES

Data Quality Parameters	**Matrix**	**Method of Determination[1]**	**Frequency**	**QC Limits Required Objective[2]**
Precision	Water	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0 - 30
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0 - 30
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0 - 40[4]
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0 - 40[4]
Accuracy	Water	Surrogate	All Samples & Standards	Recovery = 50 - 140
	Soil, Sediment	Surrogate	All Samples & Standards	Recovery = 50 - 140[4]
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 50 - 140
	Water	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 50 - 140
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 50 - 140[4]
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 50- 140[4]
Completeness	Water, Soil, Sediment	Valid Samples	All Samples	90 Percent[5]

Notes: [1]MS/MSD = Matrix spike/matrix spike duplicate.
[2]RPD = Relative percent difference.
[3]Analytical batch $\leq$ 20 samples.
[4]Limits for soil, not established for sediment.
[5]Number of valid samples divided by number of samples analyzed.

Table 1-9
QA OBJECTIVES FOR
PRECISION, ACCURACY, AND COMPLETENESS
TAL CYANIDE, SULFIDE and NITRATE

Data Quality Parameters	**Matrix**	**Method of Determination[1]**	**Frequency**	**QC Limits Required Objective[2]**
Precision	Water	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0 - 20
	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0 - 20
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	RPD = 0 - 30[4]
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	RPD = 0 - 30[4]
Accuracy	Water	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 85-115
	Water	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 85-115
	Soil, Sediment	Laboratory Control Sample/Duplicate	Analytical Batch[3]	Recovery = 80 - 120[4]
	Soil, Sediment	Laboratory MS/MSD	Analytical Batch[3]	Recovery = 80 - 120[4]
Completeness	Water, Soil, Sediment	Valid Samples	All Samples	90 Percent[5]

Notes: [1]MS/MSD = Matrix spike/matrix spike duplicate.
[2]RPD = Relative percent difference.
[3]Analytical batch $\leq$ 20 samples.
[4]Limits for soil, not established for sediment.
[5]Number of valid samples divided by number of samples analyzed.

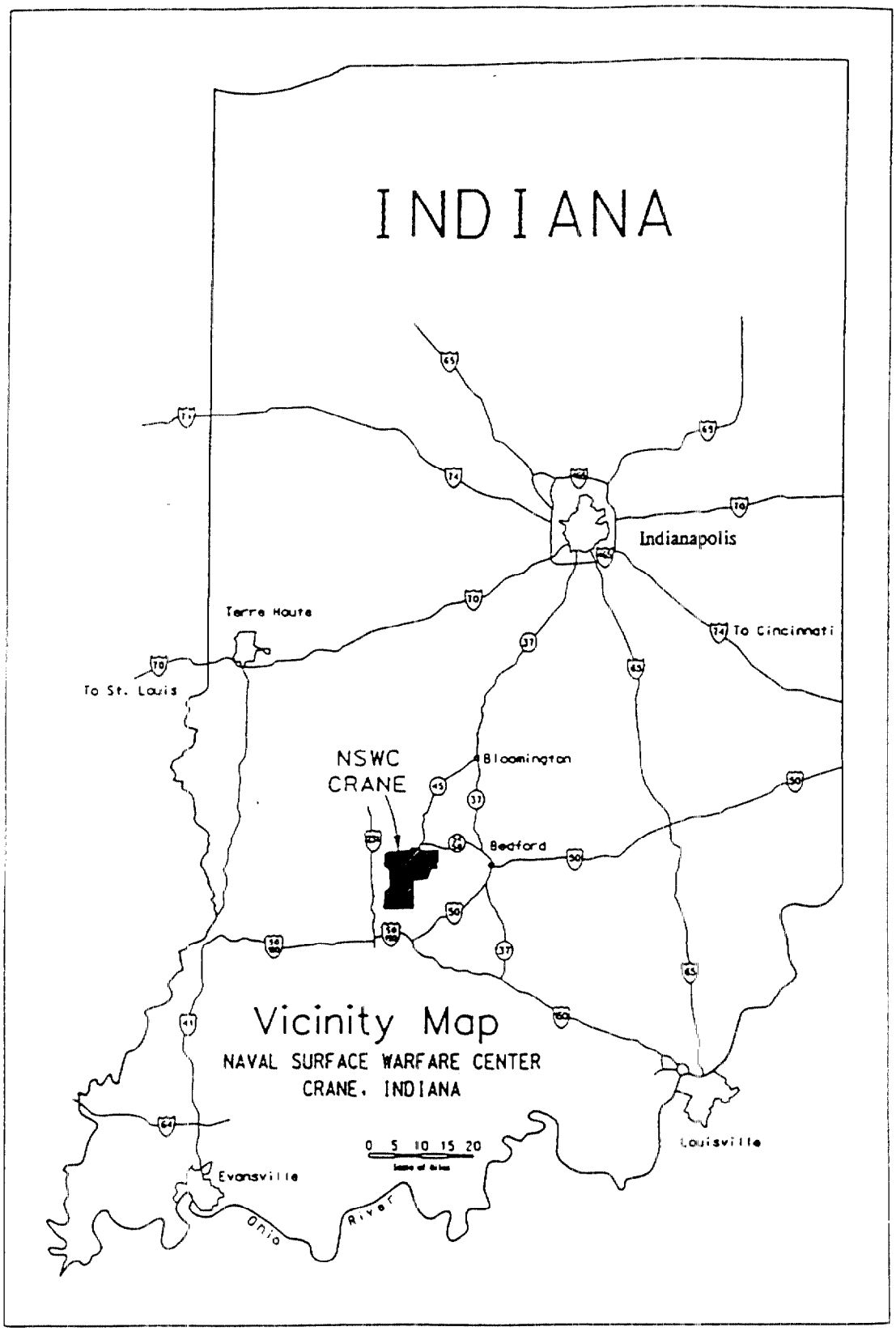
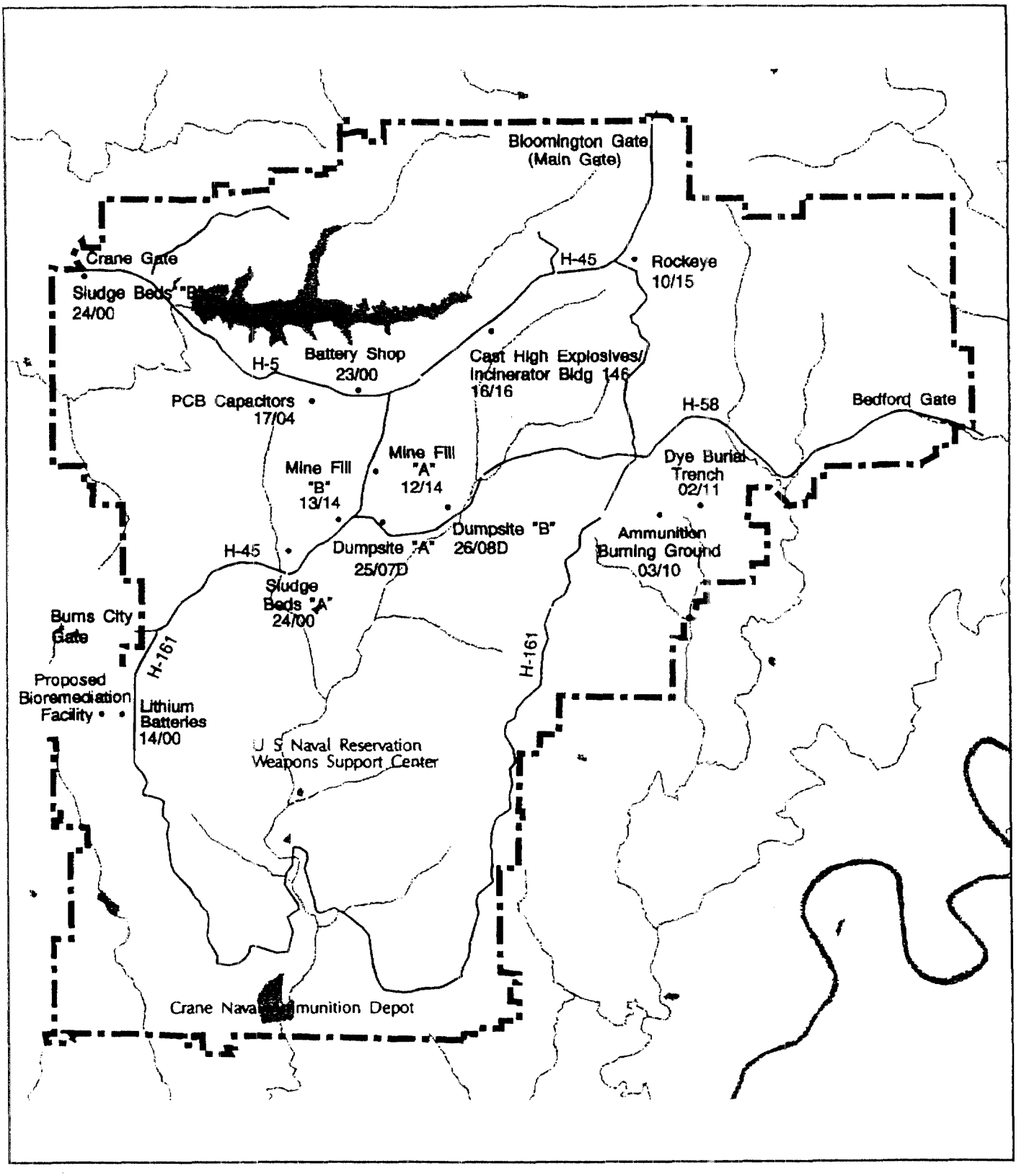


FIGURE 1-1
VICINITY MAP OF NSWC CRANE, INDIANA



02/11 Dye Burial Ground
03/10 Ammunition Burning Ground Area
10/15 Rockeye
12/14 Mine Fill A
13/14 Mine Fill B
14/00 Sanitary Landfill and Lithium Batterey
16/16 Cast High Explosives Fill/Incineration complex
17/04 PCB Capacitor Burial/Pole Yard
23/00 Battery Shop
24/00 Sludge Drying Bed A
24/00 Sludge Drying Bed B
25/07D Highway 58 Dump Site A
26/08D Highway 58 Dump Site B

Figure 1-2
Location of Solid Waste Management Units

.5 .25 0 0.5 1 1.5 2 2.5 MILE

MORRISON KNUDSEN CORPORATION
Engineering, Construction
& Environmental Group

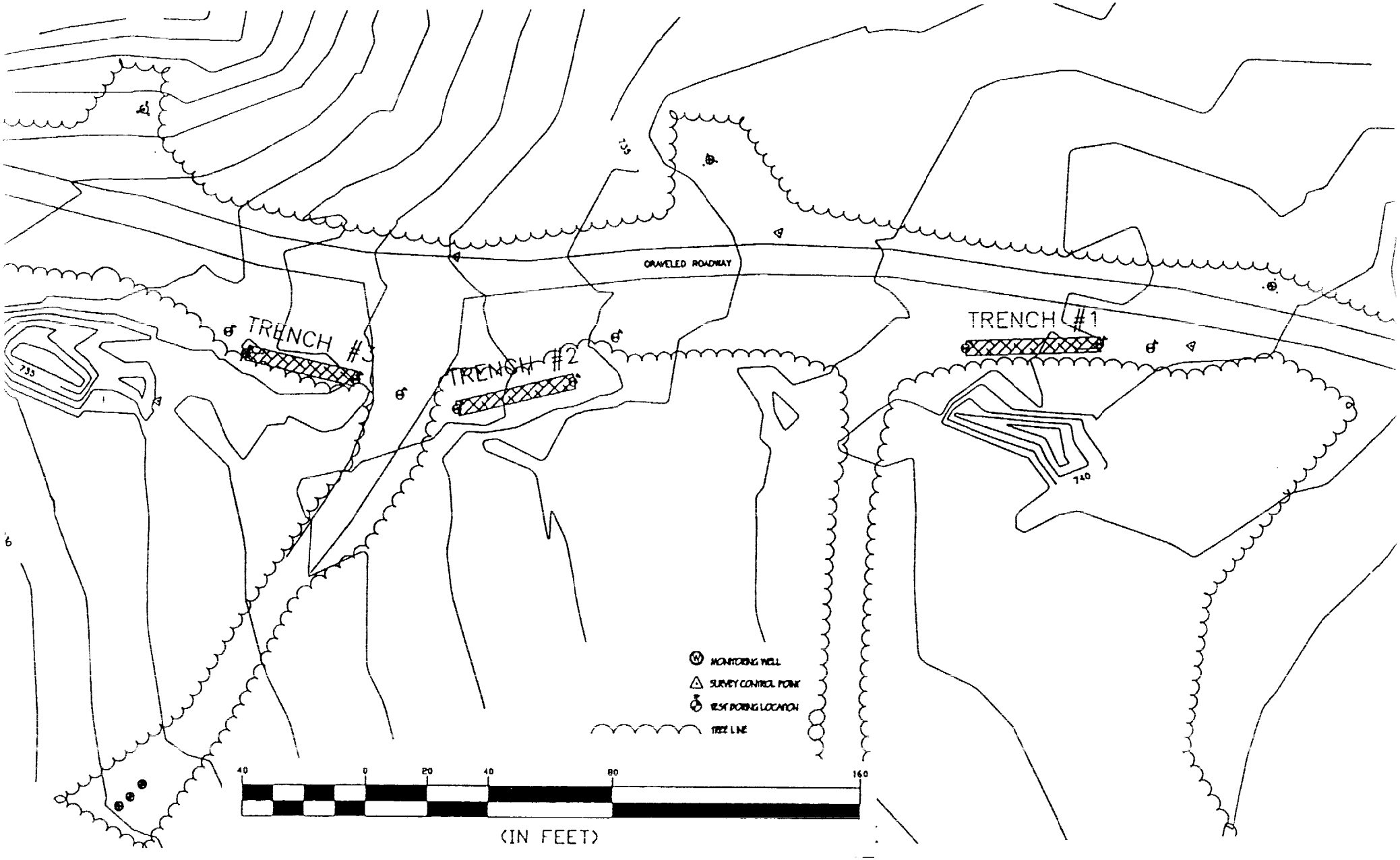


FIGURE 1-3
SWMU #02/11 DYE BURIAL GROUND LOCATION MAP

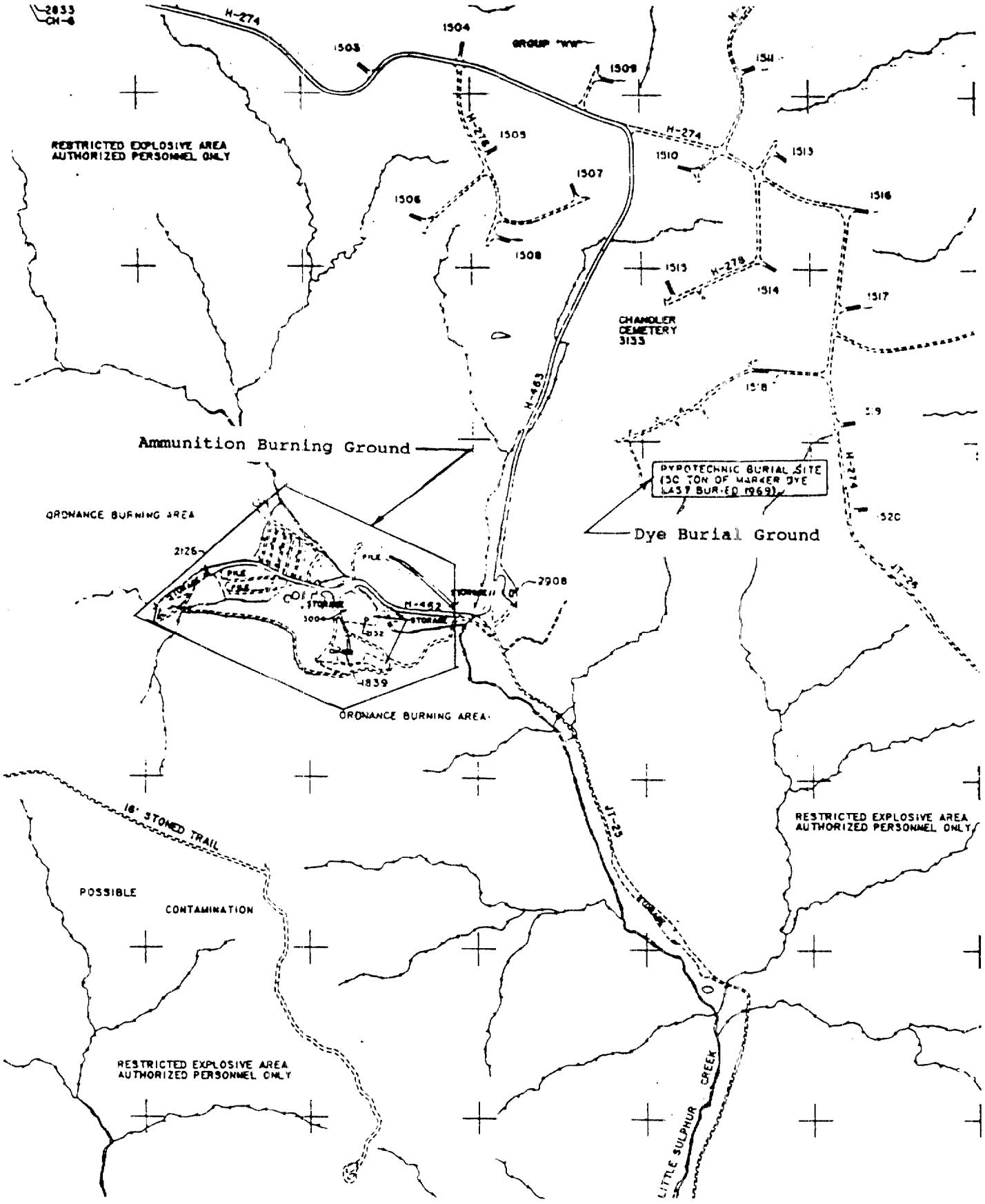


FIGURE 1-4
SWMU #03/10 AMMUNITION BURNING GROUND LOCATION MAP

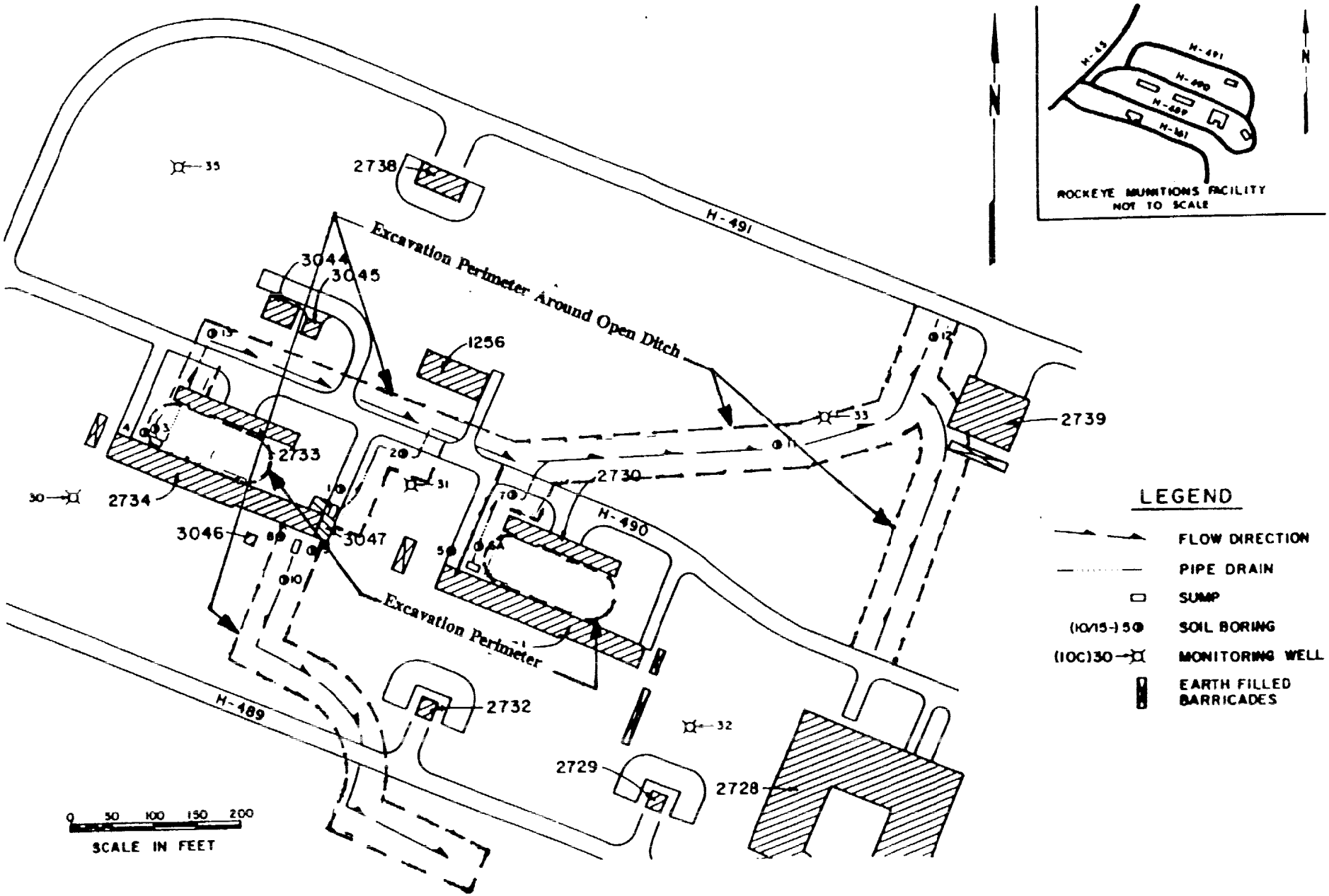


FIGURE 1-5
SWMU #10/15 ROCKEYE MUNITIONS LOCATION MAP

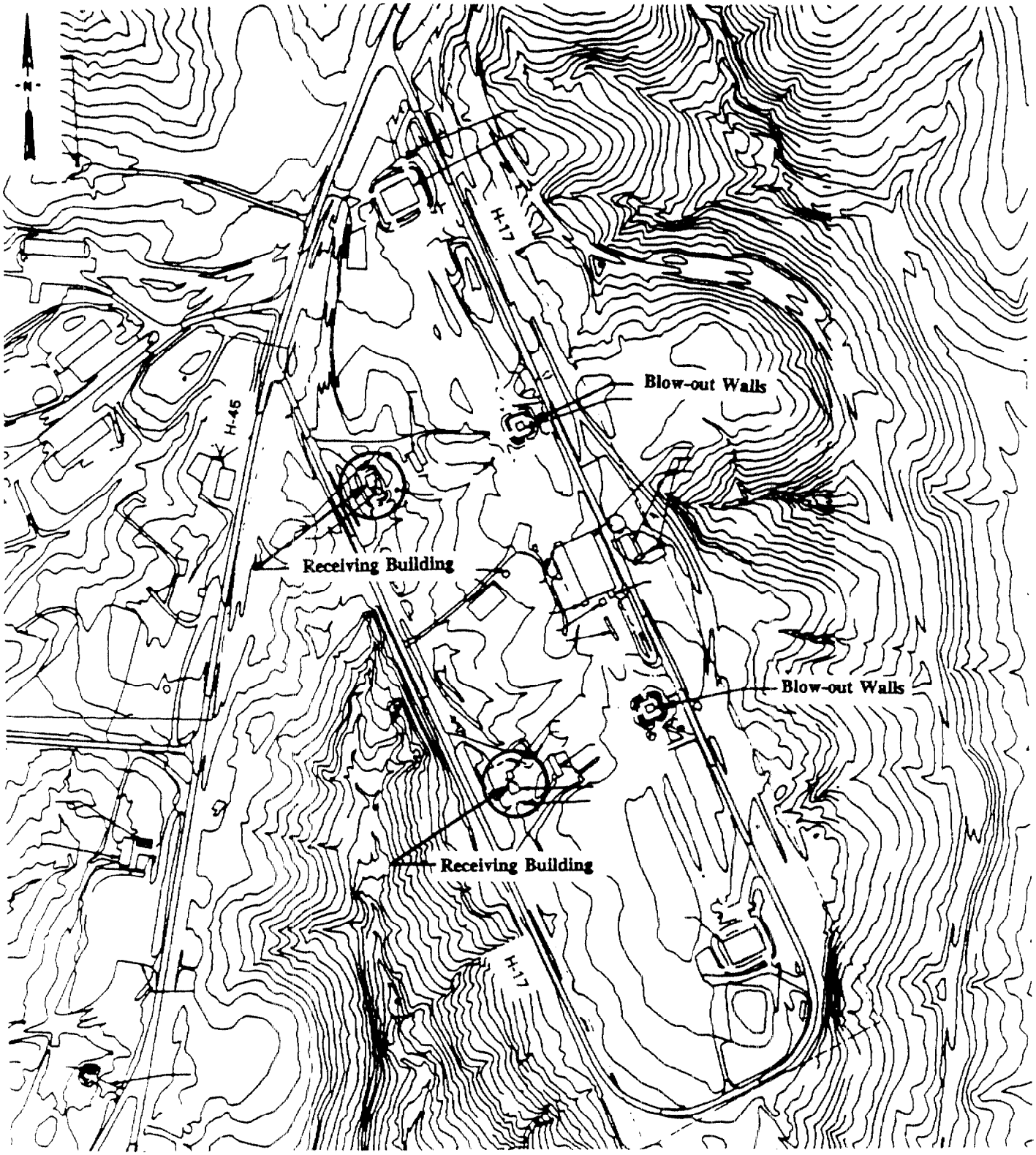


FIGURE 1-6
SWMU #12/14 MINE FILL A LOCATION MAP

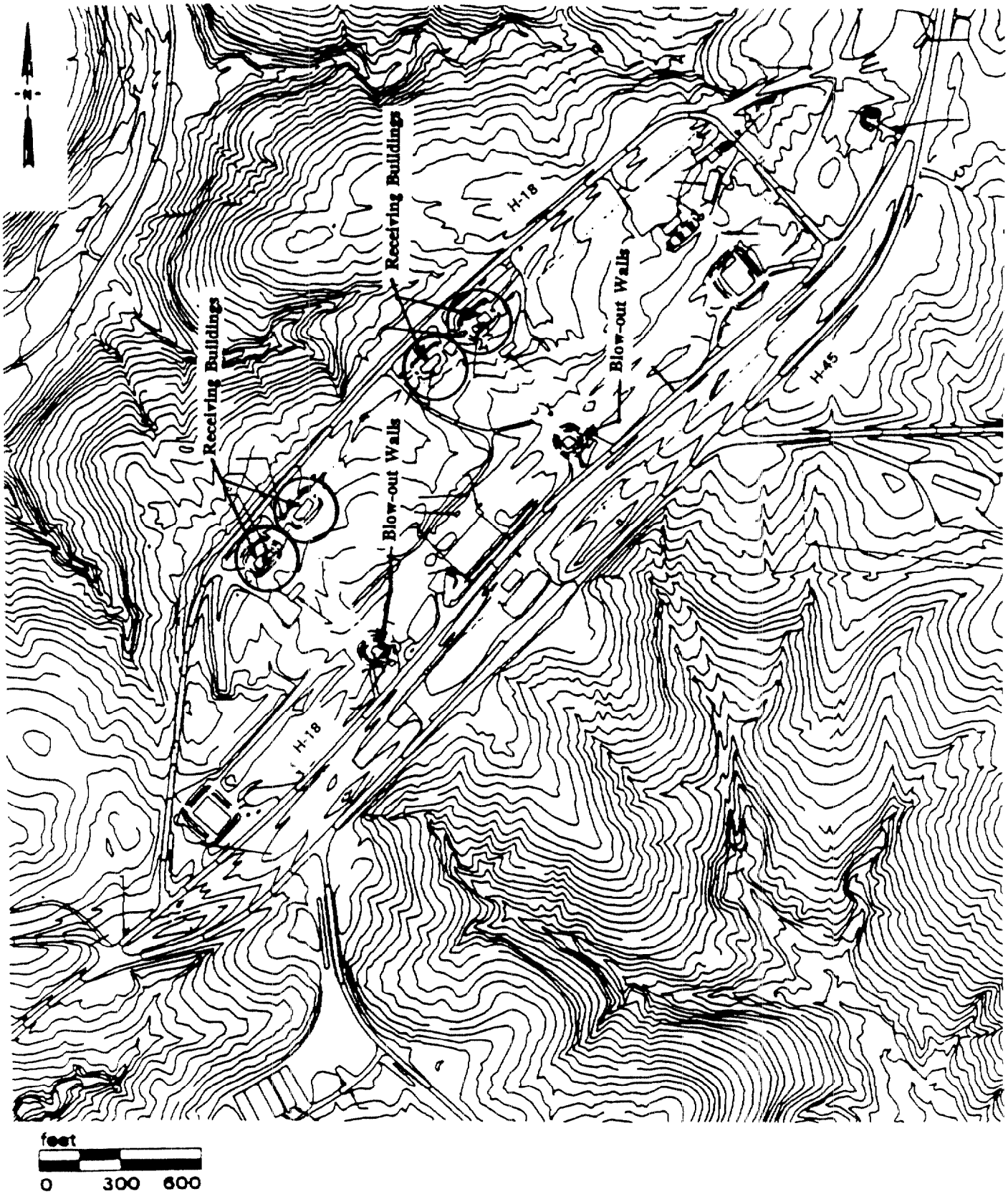


FIGURE 1-7
SWMU #13/14 MINE FILL B LOCATION MAP

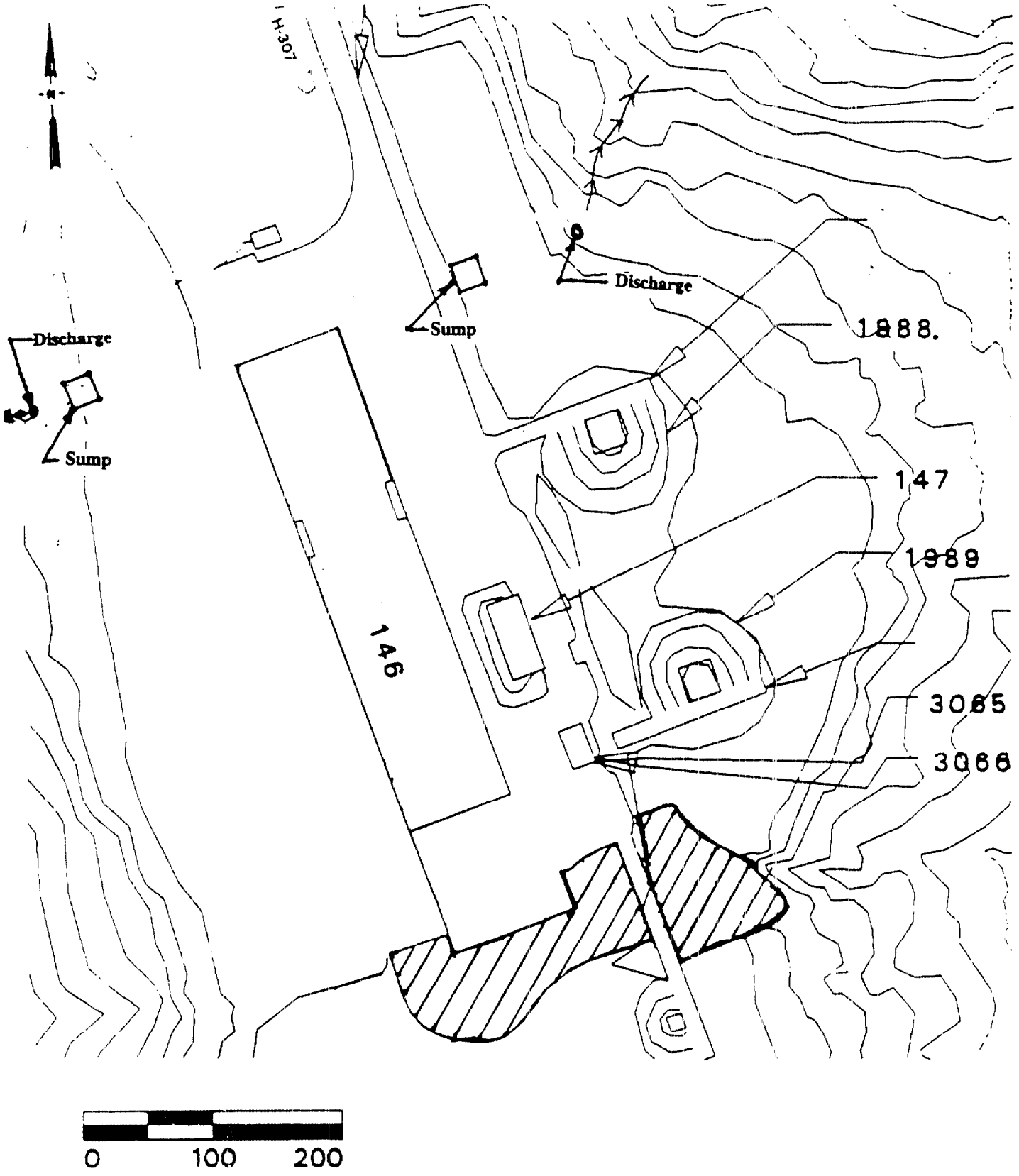


FIGURE 1-8
SWMU #16/16 CAST HIGH EXPLOSIVE LOCATION MAP

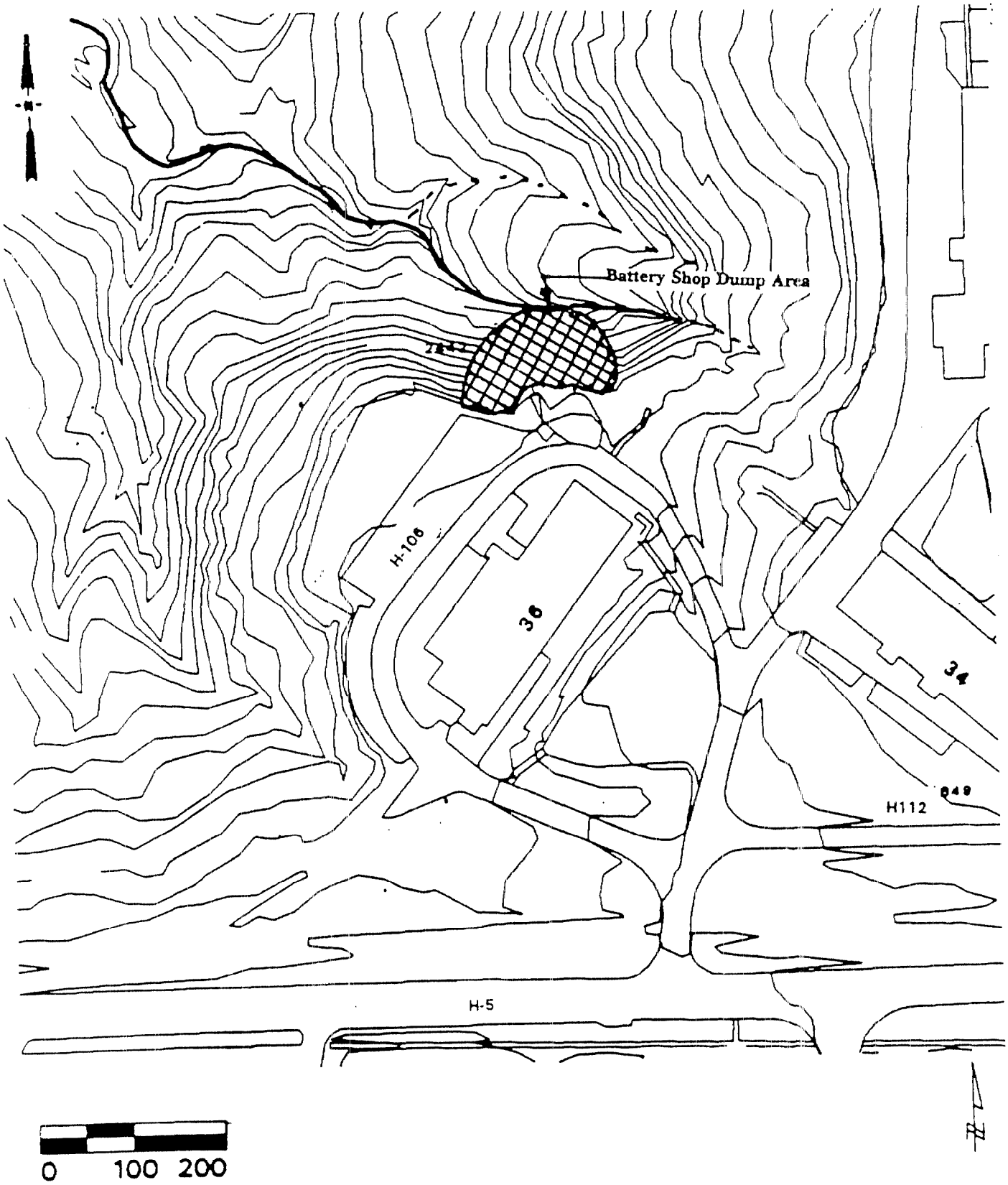


FIGURE 1-9
SWMU #23/00 BATTERY SHOP DEBRIS REMOVAL AREA

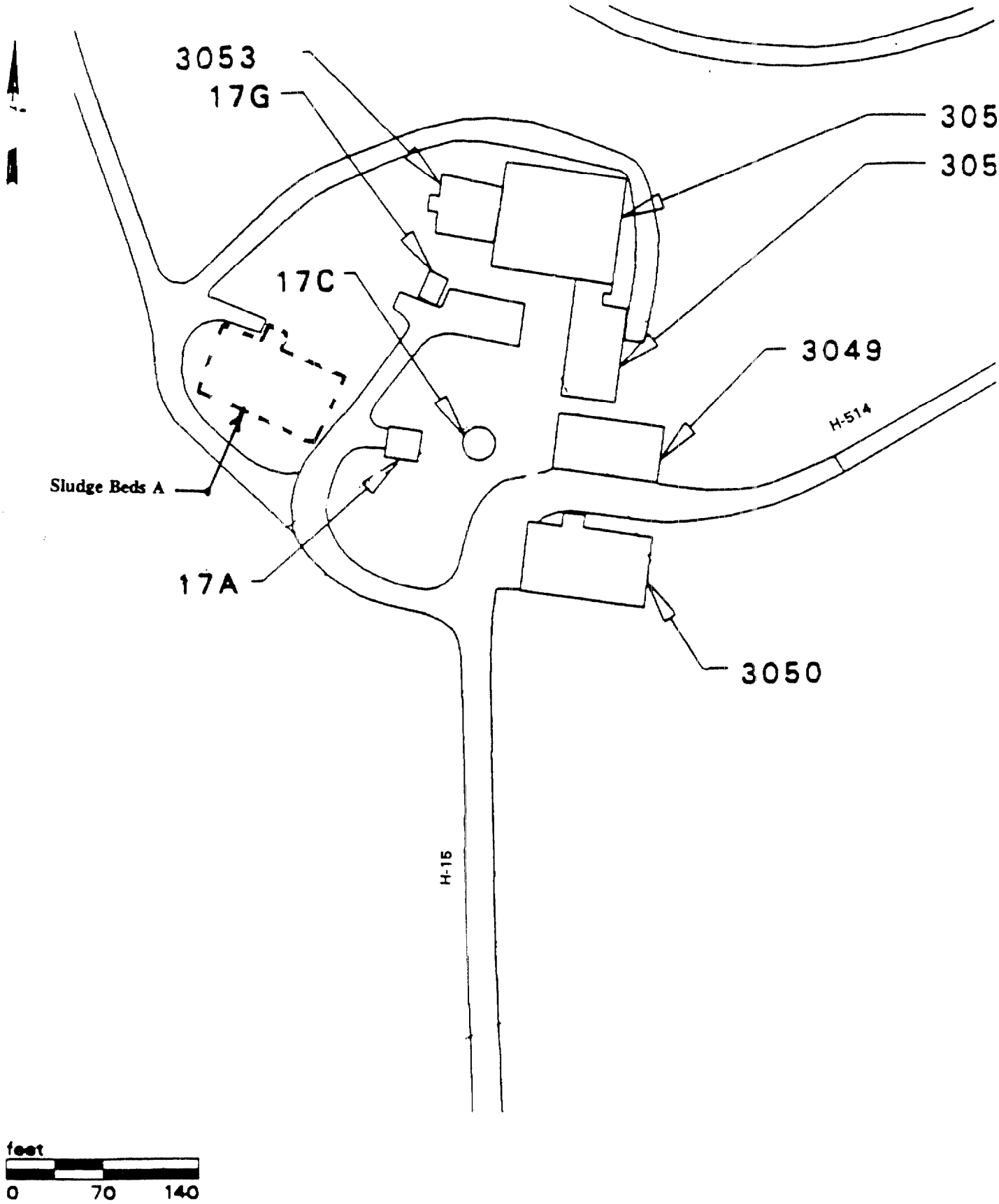


FIGURE 1-10
SWMU #24/00 SLUDGE DRYING BED A LOCATION MAP

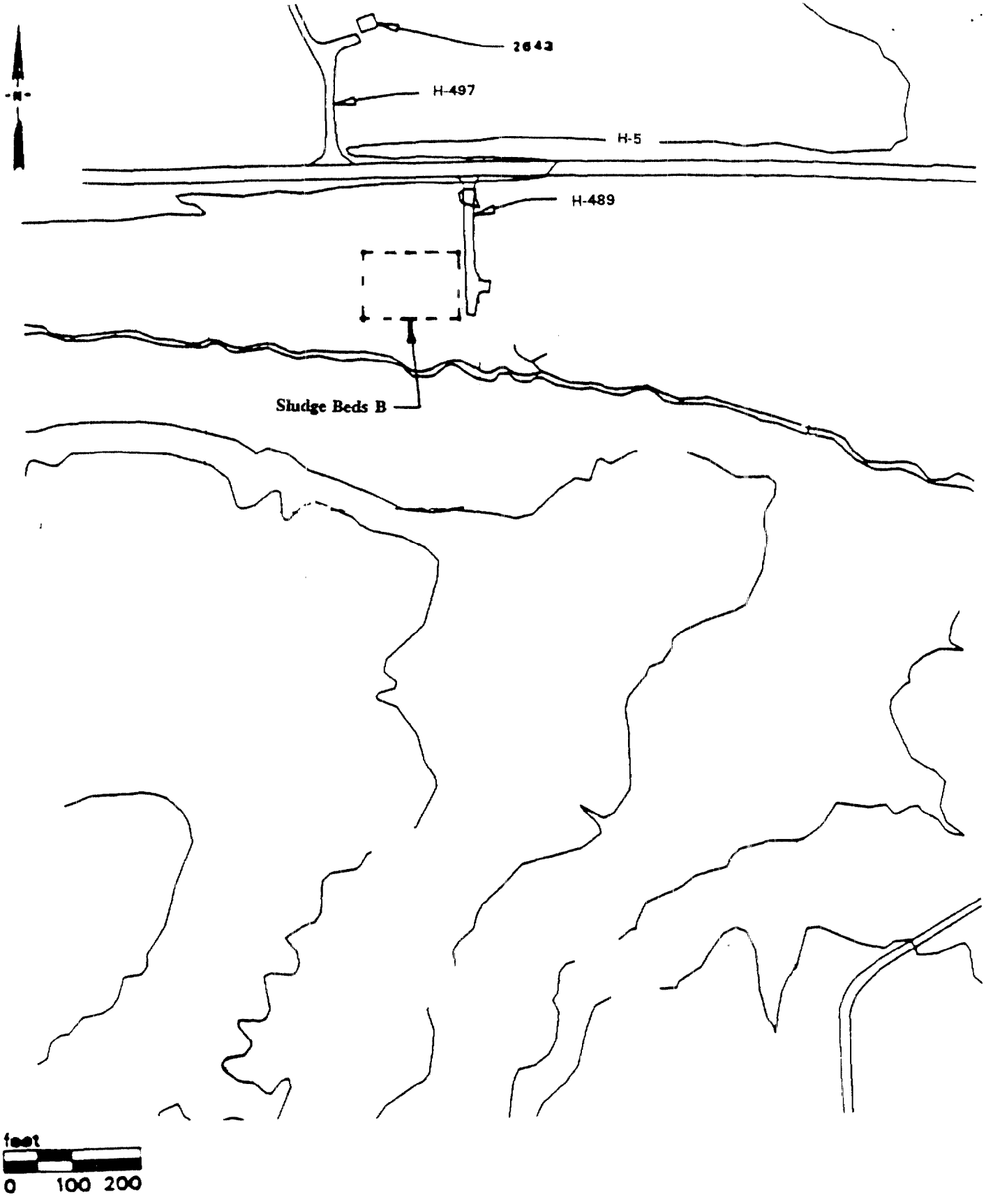


FIGURE 1-11
SWMU #24/00 SLUDGE DRYING BED B LOCATION MAP

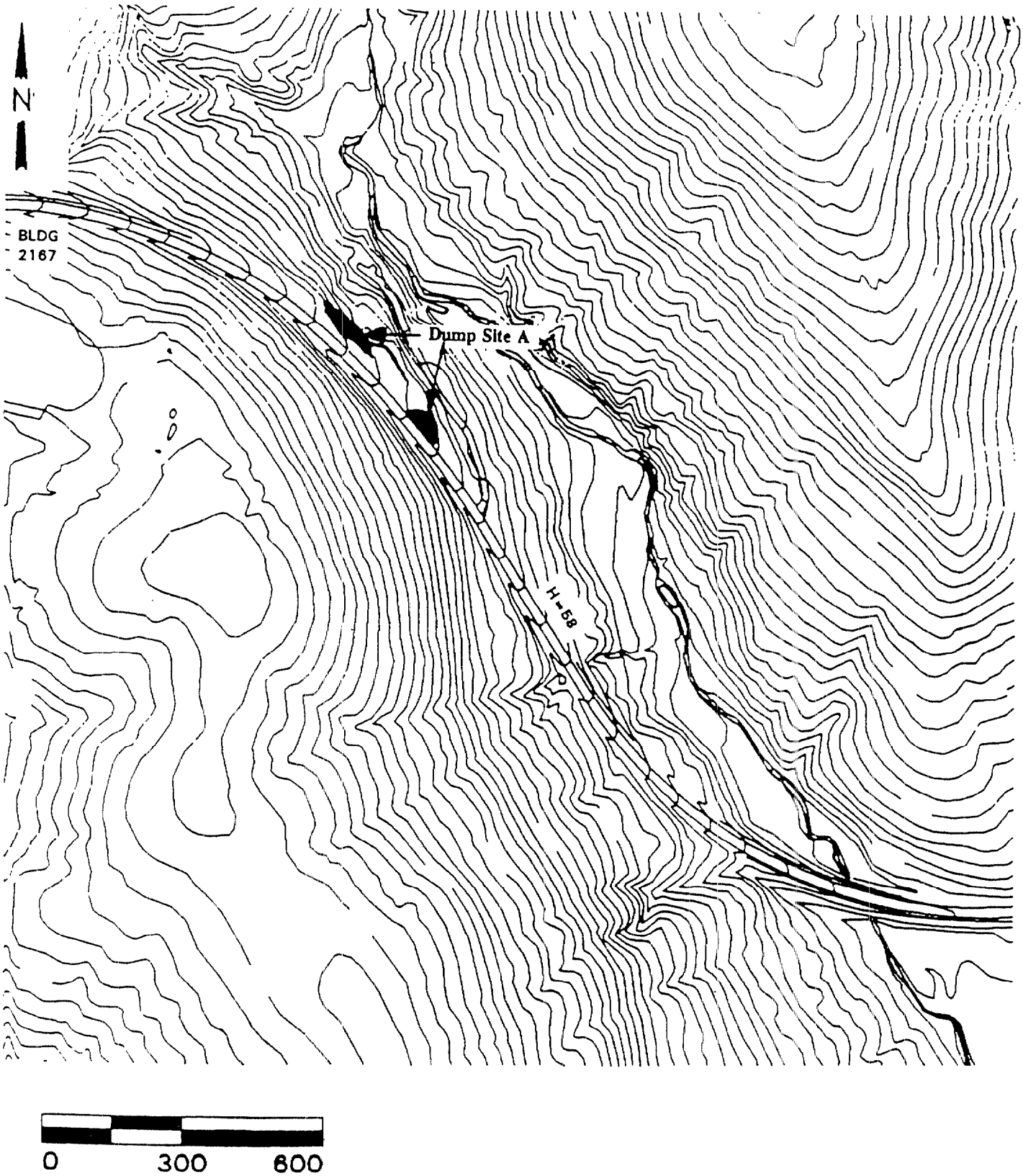


FIGURE 1-12
SWMU #25/07D HIGHWAY 58 DUMP SITE A DEBRIS REMOVAL AREA

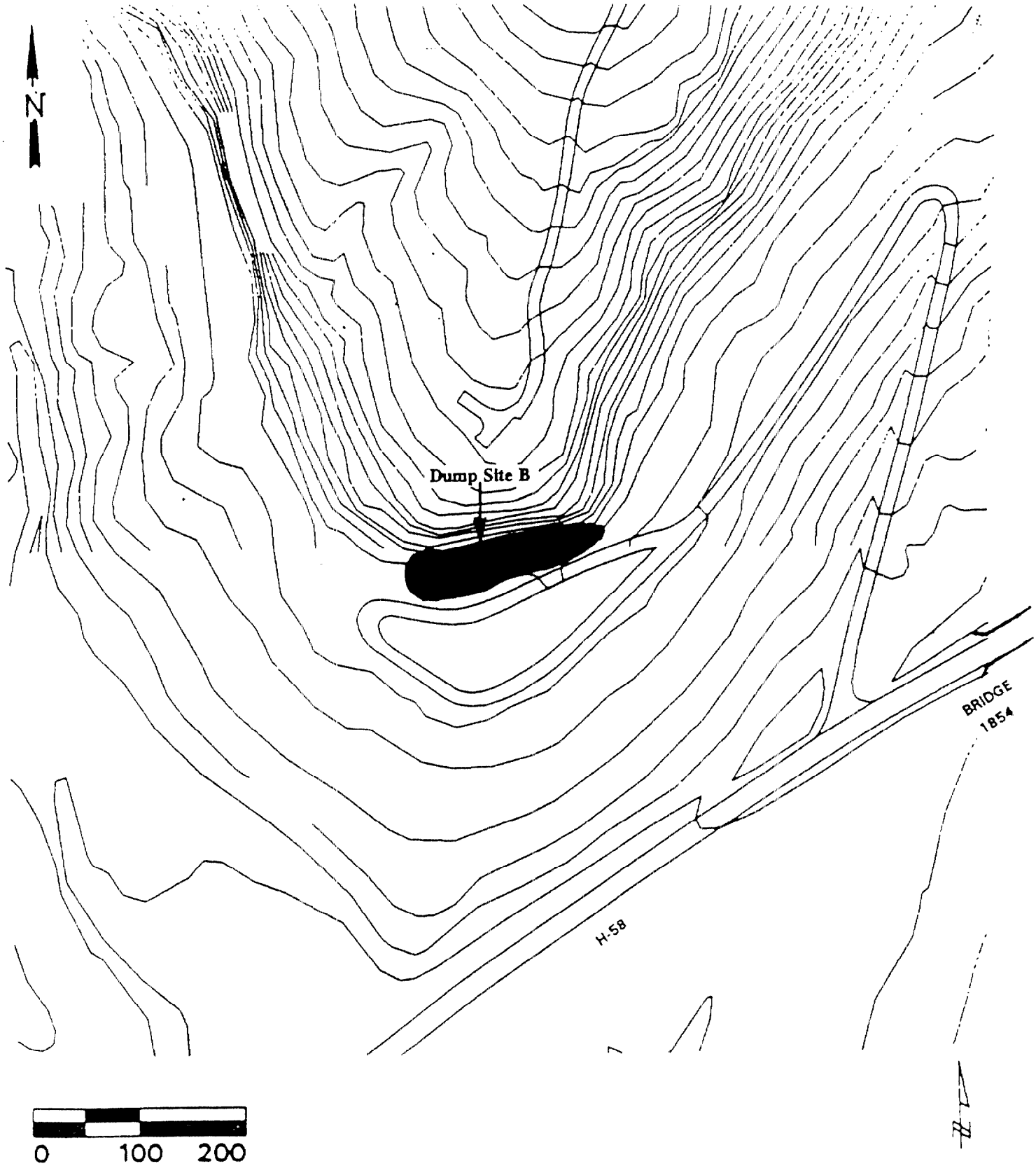


FIGURE 1-13
SWMU #26/08D HIGHWAY 58 DUMP SITE B DEBRIS REMOVAL AREA

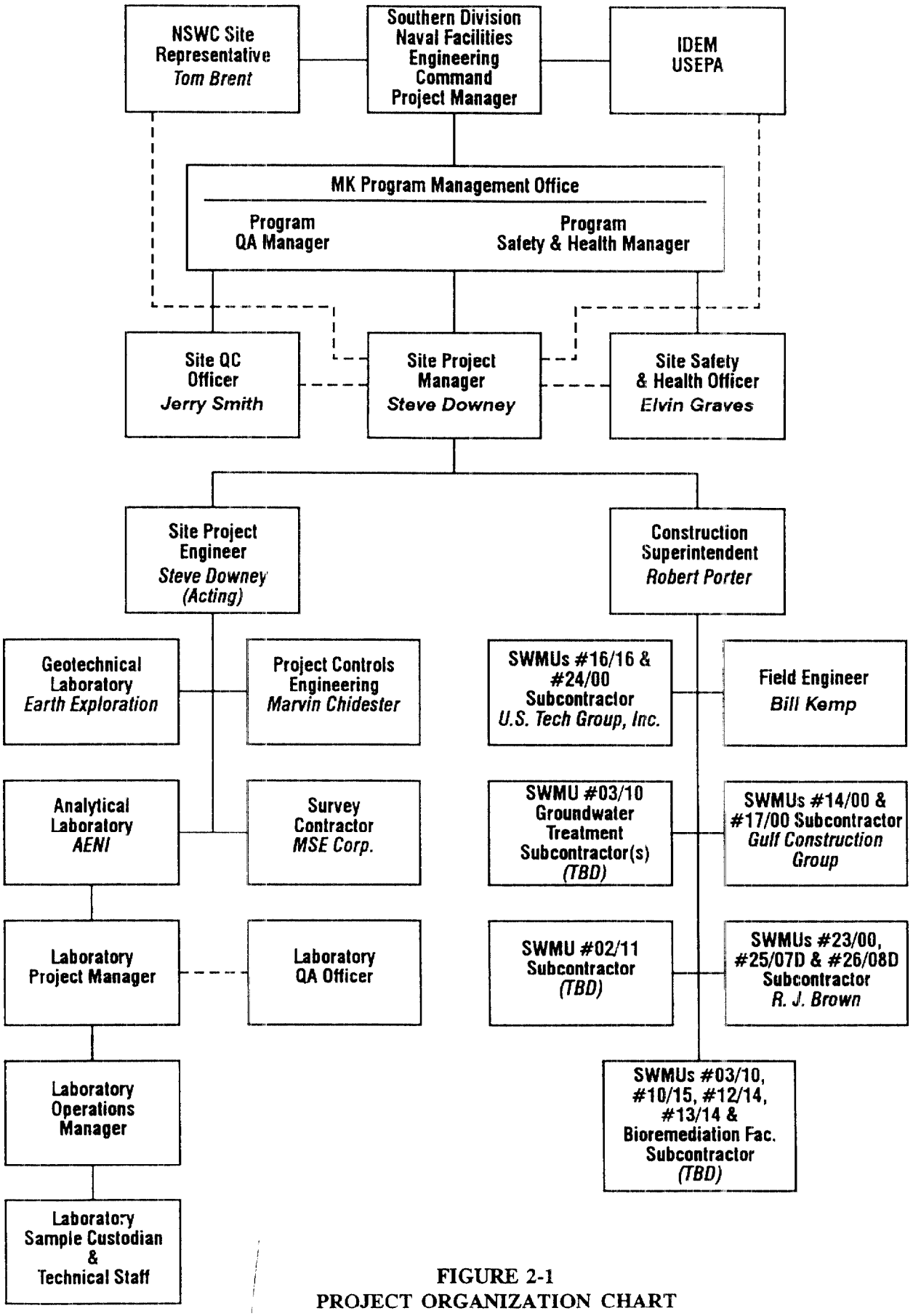


FIGURE 2-1
PROJECT ORGANIZATION CHART

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES DIVISION

CHAIN OF CUSTODY RECORD

Laboratory		Project Number:	Project Name:
Task Number:	Task Name:	Airbill Number:	Custody Seal Number(s):
Samplers Signature:			

Site Number	Date	Time	Sample Identification	Site Description	No. of Cont.	Analyses Requested	Remarks

Relinquished by: (Sig.)	Secured by: (Sig.)	Date: Time:	Received by: (Sig.)	Relinquished by: (Sig.)	Date: Time:
Received by: (Sig.)	Relinquished by: (Sig.)	Date: Time:	Received by: (Sig.)	Relinquished by: (Sig.)	Date: Time:
Received by Laboratory by: (Sig.)	Date: Time:	Remarks			

FIGURE 5-1
FIELD CUSTODY DOCUMENT

DEPARTMENT OF THE NAVY
CRANE DIVISION
NAVAL SURFACE WARFARE CENTER
300 HIGHWAY 361
CRANE, INDIANA 47522-5001

IN REPLY REFER TO
5090
Ser 095/U6024
30 JAN 1996

From: Commander, Crane Division, Naval Surface Warfare Center
To: Commanding Officer, Southern Division, Naval Facilities Engineering Command (Code 1864)

Subj: **QUALITY ASSURANCE PROJECT PLAN REVIEW COMMENTS**

Encl: (1) Comments on Quality Assurance Project Plan

1. Crane Division, Naval Surface Warfare Center (NAVSURFWARCENDIV Crane) has completed review of Morrison Knudsen Corporation's Quality Assurance Project Plans for the Interim Measures. Comments are submitted as enclosure (1).

2. NAVSURFWARCENDIV Crane point of contact is Mr. Thomas J. Brent, Code 09510, telephone 812-854-6160.

Copy to:
OICC (Brent Robertson)
MK (Steve Downey)

DEPARTMENT OF THE NAVY
CRANE DIVISION
NAVAL SURFACE WARFARE CENTER
300 HIGHWAY 361
CRANE, INDIANA 47522-5001

IN REPLY REFER TO
5090
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G. L. HILL
By direction

Copy to:
OICC (Brent Robertson)
MK (Steve Downey)

Brent
Steve

Q570 311K
1/7/96

Code 4/30
PAK Cat

QUALITY ASSURANCE PROJECT PLANS REVIEW COMMENTS

1. p.2 §1

   a. The Initial Assessment Study is normally referred to as the IAS, not the ESE.

   b. Last ¶, typographical error: " . . (EMRs) be submitted ~~from~~ for many of the SWMU at NSWC Crane.

2. p.4 §1.3.1

This is unnecessarily redundant with the first paragraph of §1.2 on p.1.

3. p.6 §1.4.2

A paragraph needs to be added describing the RFI and other related work conducted by the U.S. Army Corps of Engineers, Waterways Experiment Station (WES), since 1981. The WES work is the basis for much of the IM work.

4. p.7 §1.4.3 SWMU #02/11

   a. Figure 1-3 does not show how the DBG is "located in the eastern section of NSWC Crane, just east of the Ammunition Burning Ground."

   b. Change "dye-impacted" to "dye-contaminated."

5. p.7 §1.4.3 SWMU #03/10

Last sentence of the first paragraph seems out of place. Perhaps it should be tied to the last paragraph.

6. p.8 First ¶

Typographical error: "cinstituents" should be "constituents."

7. pp.7-10

For SWMUS 03/10, 10/15, 12/14, and 13/14, clarify that the excavated soils are targeted for composting.

8. p.9 SWMU 13/14

Include a discussion of the presence of PCB contaminated soils. Although PCB cleanup is not scheduled as part of the IM, they will impact the extent and procedures of the operation.

9. p.13 SWMU 26/08D and Figure 1-13

Figure 1-13 does not show the Dump Site's location with respect to the Salvage Yard, as referenced.

10. p.15 §1.6

Typographical error: ". . . classes of hazardous constituents, some of which include . . ."

11. p.16 §1.6.2

Typographical error: " . . . ~~that~~ depending on the nature of encountered field conditions, that some of these locations will be changed."