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KEMRON ENVIRONMENTAL SERVICES

FINAL REPORT
RCRA FACILITY INVESTIGATION (RFI)
CHARLESTON NAVAL BASE
CHARLESTON, SOUTH CAROLINA

Report to:

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

SEPTEMBER 1991

KEMRON
ENVIRONMENTAL SERVICES

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EXECUTIVE SUMMARY

An RFI Workplan is an integral part of the RCRA permitting process as regulated by the U.S. Environmental Protection Agency (EPA). This RCRA Facility Investigation (RFI) work plan for the Charleston Naval Shipyard (NSY), Charleston, South Carolina, has been prepared in accordance with guidelines in USEPA's Interim Final RFI Guidance Document (EPA 530/SW-89-031). The purpose of this document is to develop a plan for characterizing prior or continuing releases from the 35 Solid Waste Management Units (SWMU's) originally identified during the RCRA Facility Assessment (RFA) and subsequent RFA Addendum. The RFI incorporates the results of previous environmental studies and investigations conducted at the NSY. If any SWMU is suspected to be a source of a contaminant release, then information and data must be developed to sufficiently characterize the nature, extent, and rate of migration of release of hazardous wastes into the environment. The information generated from the RFI is used to determine whether a corrective measures study (CMS) will be necessary and is also key in formulating and implementing appropriate corrective measures at the SWMU's. USEPA proposed action levels are referenced for evaluation of on-site contamination in this Workplan. The proposed action levels were issued by USEPA in the Federal Register (55 FR 307981 and established target cleanup levels for releases at permitted RCRA facilities.

The Workplan begins with a summary of existing conditions at the Naval Shipyard and surrounding areas including land use, hydrogeographic features, industrial operations and waste generation. Next, the work plan presents detailed descriptions of existing conditions and previous data generated for each of the 35 SWMU's. The descriptions and data are based primarily upon previous studies and assessments completed at the site. The next section identifies remaining data gaps and provides a detailed narrative of proposed investigative activities at 11 SWMU's where contamination from prior releases has not been sufficiently identified and delineated. The following section details quality assurance/quality control procedures to insure the integrity of proposed sampling programs and the validity of analytical data. This section includes a presentation of the proposed project organizational structure and details QA/QC objectives and procedures. In addition, it provides detailed protocols for specific field activities including soil boring and monitoring well installation, sampling procedures, and instrument calibration methods. The RFI then discusses the data management procedures to be utilized during the proposed activities. Included in this section are guidelines for collection and organization of field data. In addition, the RFI plan identifies potential receptors of regulated constituents which may have been released from the various SWMU's at NSY. Finally, a Health and Safety Program is presented to insure that all planned RFI activities are conducted using proper procedures and guidelines as required by 29 CFR 1910.120 and the Occupational Health and Safety Administration (OSHA).

Implementation of the RFI will be guided by a Corrective Action Management Plan (CAMP) which will be submitted under separate cover.

CHAPTER 1. INTRODUCTION

1.1 OBJECTIVES. This RCRA Facility Investigation Workplan (RFI Workplan) for the Charleston Naval Shipyard (NSY), Charleston, South Carolina, was prepared by WAPORA, Inc. at the direction of Naval Facilities Engineering Command, Southern Division under Contract No. N62467-89-D-0650 dated 16 March 1989. The purpose of the project is to develop a plan for characterizing prior or continuing releases of hazardous waste or constituents from solid waste management units (SWMUs) identified during the RCRA Facility Assessment (Ref. 2). The objectives of the RFI are to conduct those investigations necessary to: (1) characterize the facility setting, (2) define the source, degree, and extent of releases of hazardous constituents, and (3) identify actual or potential receptors. The investigation must be of sufficient scope and contain adequate detail to support design of any necessary corrective action.

This document was developed following the guidelines in USEPA's Interim Final RFI Guidance Document (EPA 530/SW-89-031) published in May 1989. It is based on information contained in the RCRA Facility Assessment (RFA) prepared by Ebasco Services, Inc. (Ebasco), RFA Addendem prepared by Southern Division, Naval Facilities Engineering Command (SOUTHDIV) for the U.S. Environmental Protection Agency (EPA), the Part B permit application submitted by the Naval Shipyard (NSY), and on the prior work of Geraghty and Miller, Inc. (G&M), Environmental Science and Engineering, Inc. (ES&E), Environmental and Safety Designs, Inc. (EnSafe), Davis and Floyd, Inc. (DFI), and Westinghouse Environmental and Geotechnical Services, Inc. (WEGs)Prior reports and other documents referenced throughout are clearly identified in the Reference List, Section 8.

1.2 RCRA FACILITY INVESTIGATION WORKPLAN. In November 1984, Congress enacted the Hazardous and Solid Waste Amendments (HSWA) amending the Solid Waste Disposal Act (SWDA). SWDA is more commonly known as the Resource Conservation and Recovery Act (RCRA) and will be referred to as RCRA herein. Among the provisions of HSWA are Section 206 which added to RCRA a new subsection 3004(u) (requiring corrective action for releases of hazardous waste or constituents from SWMUs at hazardous waste treatment, storage and disposal (TSD) facilities seeking final RCRA permits) and Section 207 which added a new subsection 3004(v) (compelling corrective action for releases which have migrated beyond the facility property boundary). For any SWMU suspected to be the source of a contaminant release to the environment, information must be available to sufficiently characterize the nature, extent, and rate of migration of releases of hazardous wastes or constituents to soils, groundwater, subsurface gas, air, and surface water. This information is used to determine whether interim corrective measures (ICM) or a corrective measures study (CMS) will be necessary. It is also used in formulating and implementing appropriate corrective measures. Such corrective measures may range from stopping the release through application of source control techniques to full-scale clean-up of the affected area. "No action" may also be an appropriate measure. If sufficient information to determine what is most appropriate is lacking prior to the RFI, it must be generated during the RFI. The RFI Workplan identifies needed information and describes procedures for gathering and organizing it during the RFI.

Previous studies in the area have indicated that the NSY could be characterized as having widespread, low-level contaminant concentrations in both the surficial soils and shallow groundwater (Refs. 2, 4 to 9, and 12). This is due in part to past waste handling practices by

various NSY operational units (commands). But it may also be due to the method of construction of the NSY site itself. Construction involved primarily fill operations using dredge spoil consisting of contaminated sediments taken from nearby waterways.

Metropolitan Charleston along the Cooper River, in the Harbor area, and along the Ashley River has been heavily industrialized for the past 100 years. Waste disposal practices for much of this period included discharging raw wastes into the nearest surface water body. Much of the NSY site area was originally marshy. Most of the site was built up by placing dredged spoils as fill across the site. Most spoil materials came from the Cooper River, Harbor Area, and Ashley River although the exact location of spoil origin is unknown. Several studies have been performed to determine the background levels of potential contaminants (Refs. 4 to 8). The distribution of background concentrations (especially lead) is erratic. This suggests a heterogeneous mix of spoils having several origins with at least some of the spoil material having been previously contaminated by industrial sources. Sediment contamination is heterogeneous but ubiquitous in the Charleston Area (Refs. 9 and 12).

A detailed description of the land usage, geology and hydrogeology is presented in Section 2.0. Section 2 of the RFI work plan also describes existing conditions at the Charleston Naval Base and summarizes the available data from previous studies of all 35 Solid Waste Management Units (SWMU) at the Naval Base South. Section 3 identifies data gaps for 11 SWMU's and proposes methods for completing the investigations at these units. This chapter includes a detailed scope-of-work for activities in support of filling the data gaps. Section 4 provides a comprehensive quality assurance/quality control plan covering all activities described in Section 3. Section 5 discusses the data management procedures to be utilized during the RFI. Section 6 identifies potential receptors of regulated constituents which may have been released from various SWMU's at the Naval Base South. Finally, Section 7 is a Health and Safety Plan covering all planned RFI activities. References cited in the RFI are listed in Section 8.

CHAPTER 2. BACKGROUND INFORMATION

This section provides a detailed description of the environmental setting and current conditions at the Charleston Naval Shipyard (NSY). Initial sections describe the overall land use, hydrogeographic features, and NSY industrial operations. Section 2.6 focuses on current conditions in each identified solid waste management unit (SWMU). This characterization includes, for each SWMU, a summary of previous investigations and studies, methods of investigation, plans and tables delineating and summarizing data, interpretation of the data, and identification of data gaps.

2.1 LOCATION AND ORGANIZATION. Charleston Naval Base is located on various contiguous and discontiguous properties in Charleston and Berkeley counties on South Carolina's central coast (Figure 2-1). The base is divided into two major areas, Naval Weapons Stations and Naval Base South. Only Naval Base South is covered by the RCRA regulatory activities which are the subject of this RFI Workplan. For purposes of RCRA, that part of Naval Base South situated on the right bank of the Cooper River constitutes a "facility." This part of Naval Base South is referred to as the Naval Shipyard (NSY). While the Naval Shipyard proper is only one of several Naval commands owning property at the base, it controls all of the RCRA regulated activity and has been designated by the Base Commander as having responsibility for implementation of RCRA at the "facility" as a whole.

Naval Base South is located on both banks of the Cooper River, approximately five miles north of downtown Charleston. The installation consists of two major areas: an undeveloped area on the east or left bank of the Cooper River consisting of Daniel Island in Berkeley County which is currently used only for the disposal of dredge spoil, and a developed area on the west or right bank of the Cooper River (Figure 2-2). The developed portion of Naval Base South lies on a peninsula, bound on the west by the Ashley River and the east by the Cooper River. This portion of the base (the "facility") is situated on the east side of the Ashley-Cooper or Charleston peninsula and is bounded on the west, for the most part, by Shipyard Creek. This is the area which will be hereafter referred to as the Naval Shipyard even though parts of it, for non-RCRA purposes, are controlled by other Naval commands.

Naval Base South covers approximately 3,300 acres and is divided between or into several distinct activities or "commands." Of these, Naval Shipyard proper is the largest "landholder" having jurisdiction over the spoil area and the majority of the central third of the developed area on the west bank of the river, approximately 1,958 acres. The southern one-third of the developed area of Naval Base South is controlled primarily by the Naval Station. The Naval Supply Center and Naval Station are the major landholders on the northern one-third of the developed area. Other commands control lesser areas of what shall be referred to generically as the Naval Shipyard (NSY).

2.2 LAND USE. Areas surrounding NSY, like NSY itself, are "mature urban" having been long developed with commercial, industrial, and residential land uses. Commercial areas are located primarily west of NSY; industrial areas lie to the north of NSY and along the west bank of Shipyard Creek.

The west or right bank of Shipyard Creek is concentrated with heavy industry, and has been for many years. Railways have served the area since at least the early 1900s. This, when combined with nearby waterways, has made the area ideal for heavy industry. While ownership has changed from time to time, the land adjacent to NSY remains dedicated to chemical, fertilizer, oil refining, metallurgical, and lumber operations.

The east or left bank of the Ashley River is also dotted with industry. In contrast, the east bank of the Cooper River is undeveloped and contains extensive wetlands, particularly along Clouter Creek and Thomas Island. Active dredge spoil disposal areas are located on Naval property, not part of NSY, between the Cooper River and Clouter Creek (Figure 2-1). Active dredge spoil disposal areas are also located on the southern portion of Daniel Island and on Drum Island.

2.3 HYDROGEOGRAPHIC FEATURES.

2.3.1 Topography. NSY is in the lower South Carolina Coastal Plain Physiographic Province, on the Cooper River side of the Charleston Peninsula. The Charleston Peninsula is formed by the confluence of the Cooper and Ashley Rivers. Topography in the area (Figure 2-3) is typical of South Carolina's lower coastal plain, having low relief plains broken only by the meandering courses of sluggish streams and rivers which flow toward the coast past occasional marine terrace escarpments. Topography at NSY is essentially flat. Elevations range from just over 20 feet above mean sea level (MSL) in the northwest part of the base to sea level at the Cooper River. Most of the original topography at NSY has been modified by man's activities. The southern end was originally tidal marsh drained by Shipyard Creek and its tributaries, and originally, the other portions of the facility were only slightly higher in elevation. The land surface at NSY has been filled with both solid wastes and dredged spoil (primarily the latter) in increments over the last 70 years. Nonetheless, most of NSY remains within the 100-year flood zone, that is, less than ten feet MSL.

2.3.2 Geology. Geology of the Charleston area is typical of the southern Atlantic Coastal Plain. Cretaceous and younger sediments thicken seaward and are underlain by older igneous and metamorphic basement rock (Figure 2-4). Surface exposures at NSY, in the limited areas which remain undisturbed, consist of recent and/or Pleistocene sands, silts, and clays of high organic content. NSY is underlain by a plastic calcareous clay known as the Cooper Marl. The Cooper Marl is, in turn, underlain by the Santee limestone and sequentially older rocks. A generalized north-south cross section passing through the approximate center of the base is shown in Figure 2-5.

2.3.3 Soil Characteristics. Surface soils at NSY have been extensively disturbed. Aboriginal soils were the fine-grained silts, silty sands, and clay, typical of terrigenous tidal marsh environments. Lithologic descriptions of the soil samples are presented in Appendix A. Sand lenses are present in localized areas; however, these are generally only several feet thick. Much of the material, particularly in the southern portion of the base, has been filled using dredged spoil from the Cooper River and Shipyard Creek. The spoils are an unsorted mixture of sands, silts, and clays. Most of the remainder of the base has been either filled or reworked. Figures 2-6, 2-7, 2-8 and 2-9 are geologic cross-sections (taken from Ref. 12) through the caustic pond, the landfill, and the chemical disposal areas. These depict the nature and distribution of the sediments beneath these areas.

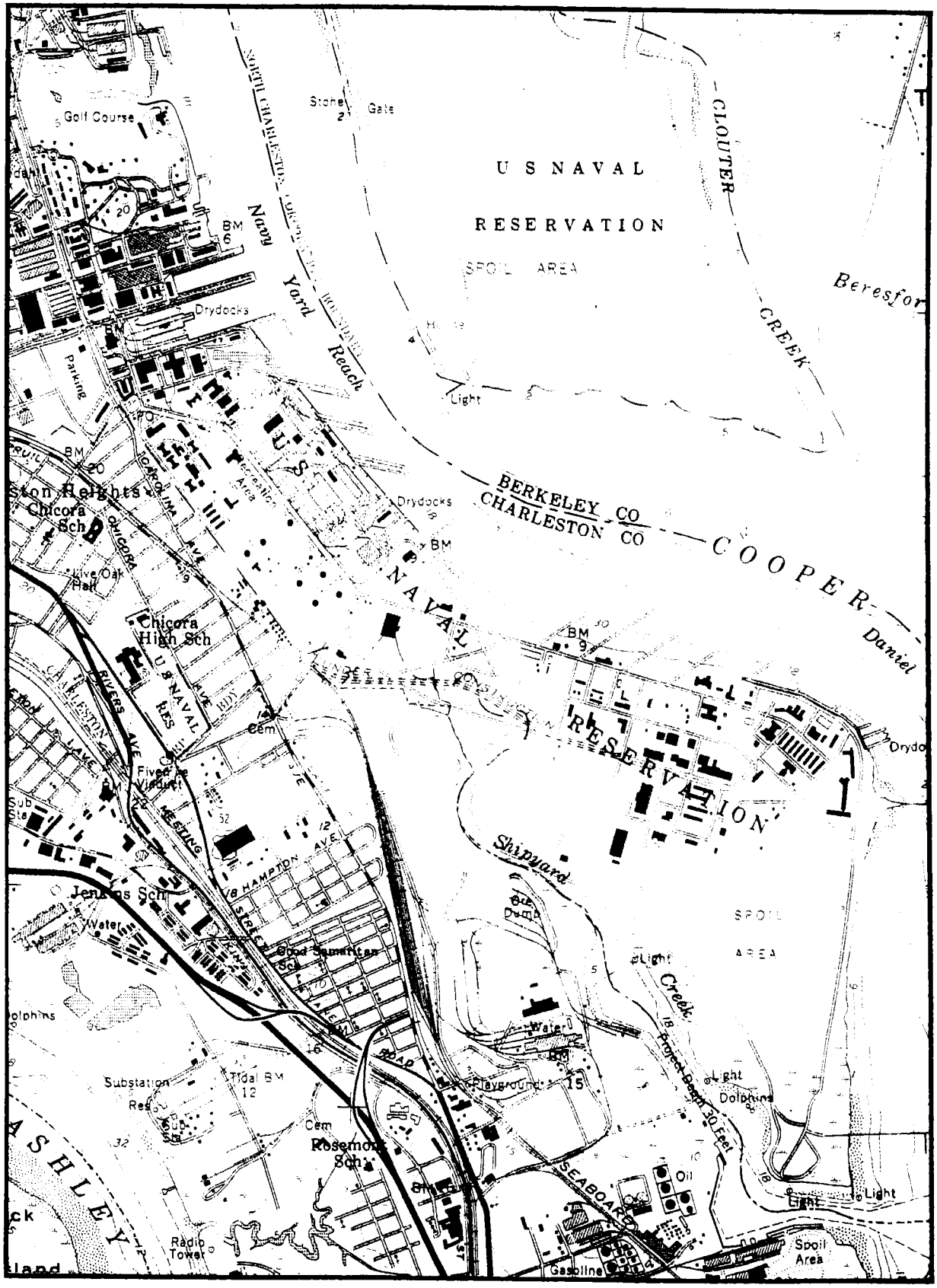

Figure 2-3. Vicinity map. Scale 1:24000
7.5 Minute USGS Charleston, SC Quadrangle.

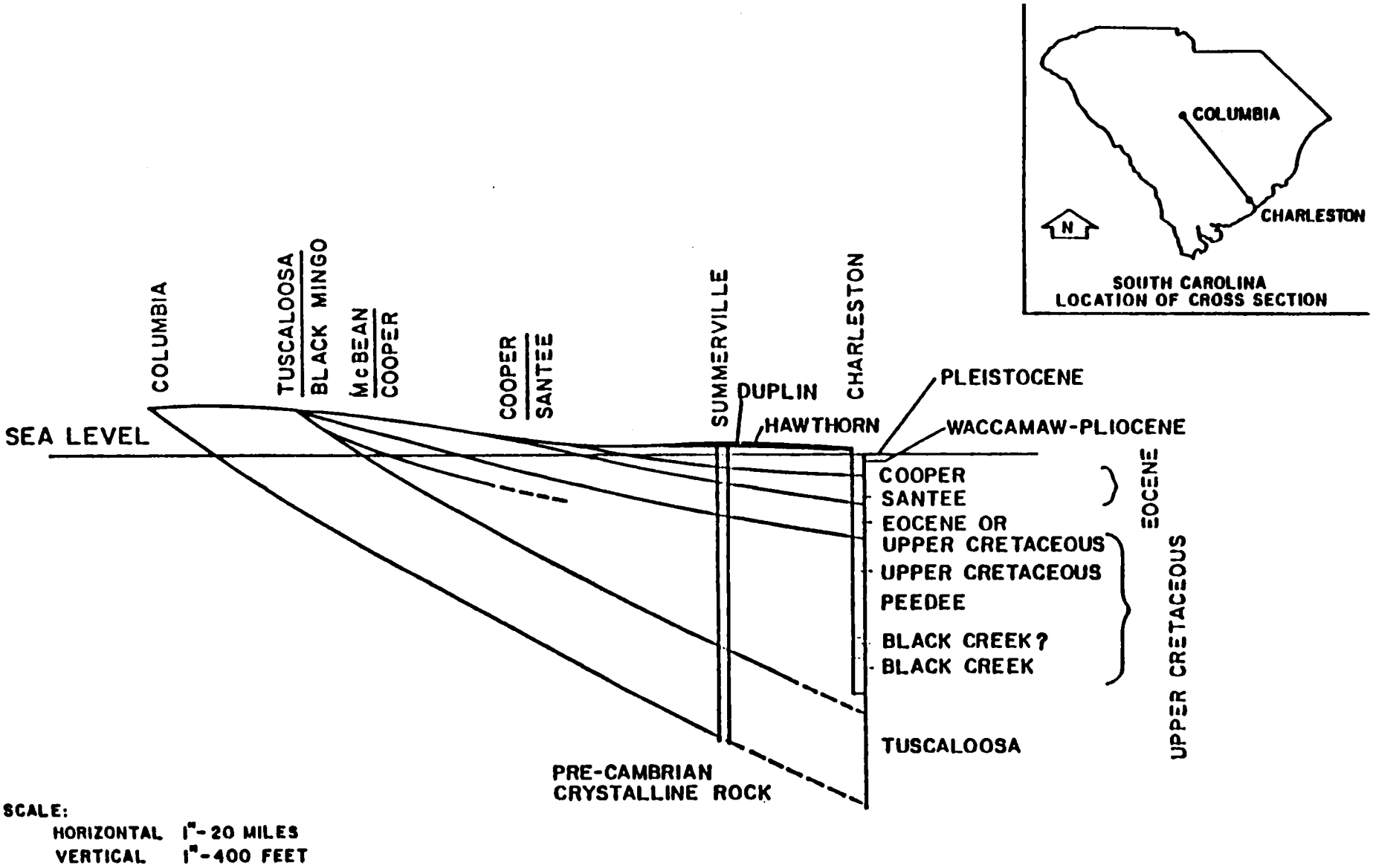

Figure 2-4. Geologic cross-section from Columbia to Charleston, South Carolina, including the NSY.

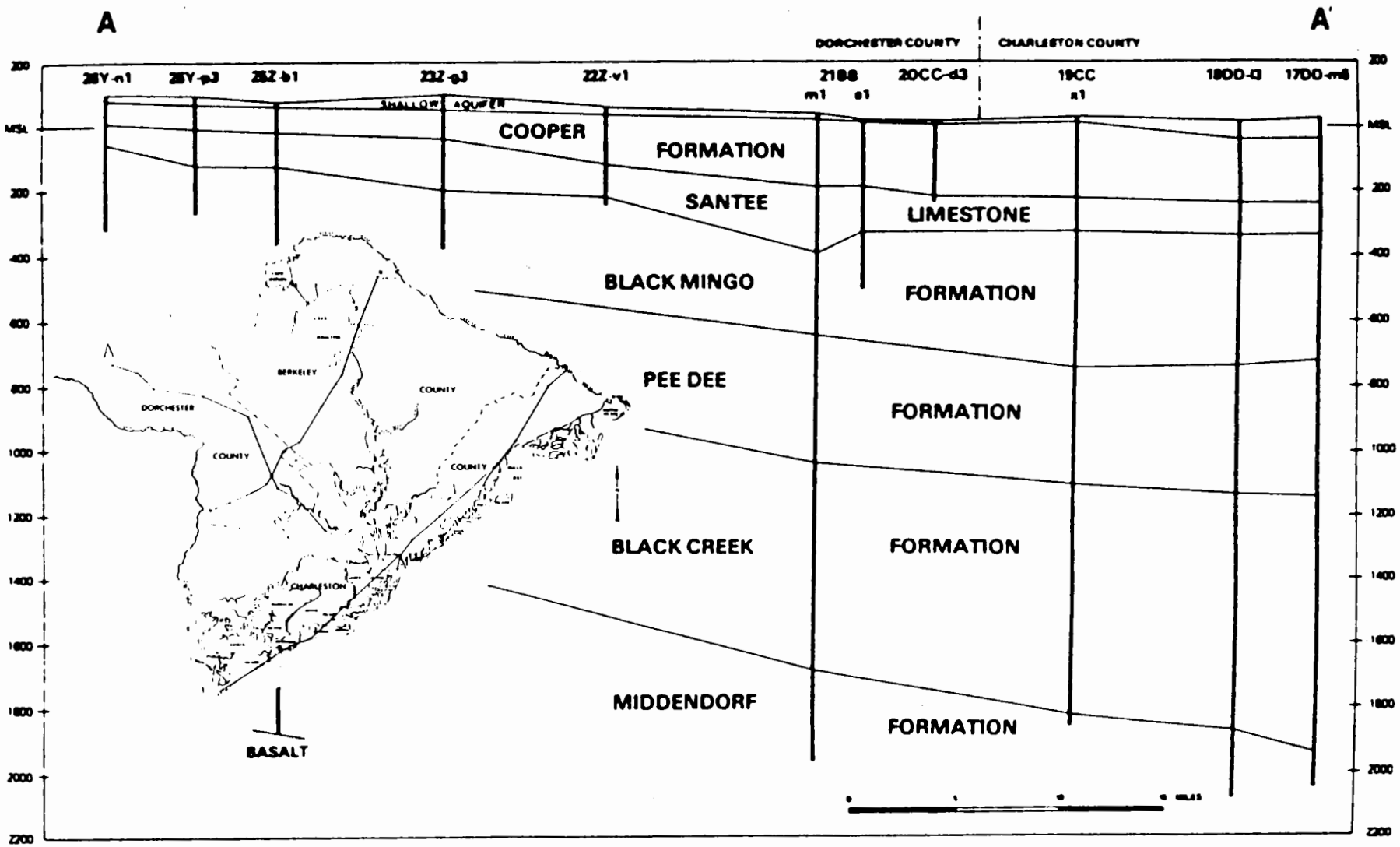

Figure 2-5. Geologic cross-section of Charleston County, South Carolina, including the NSY.

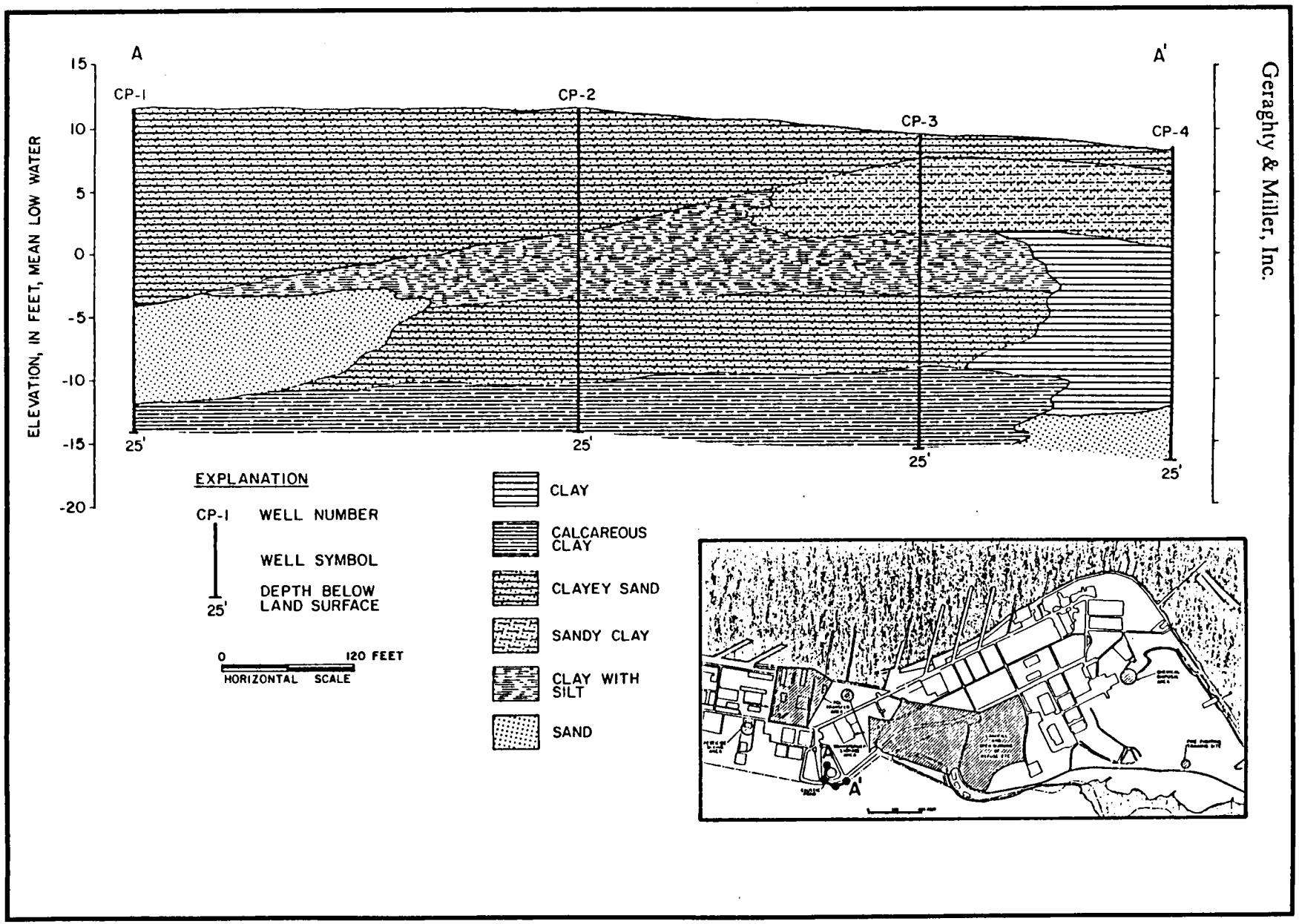

Figure 2-6. Geologic cross-section A–A' through the caustic pond area. (Figure taken from Reference 9).

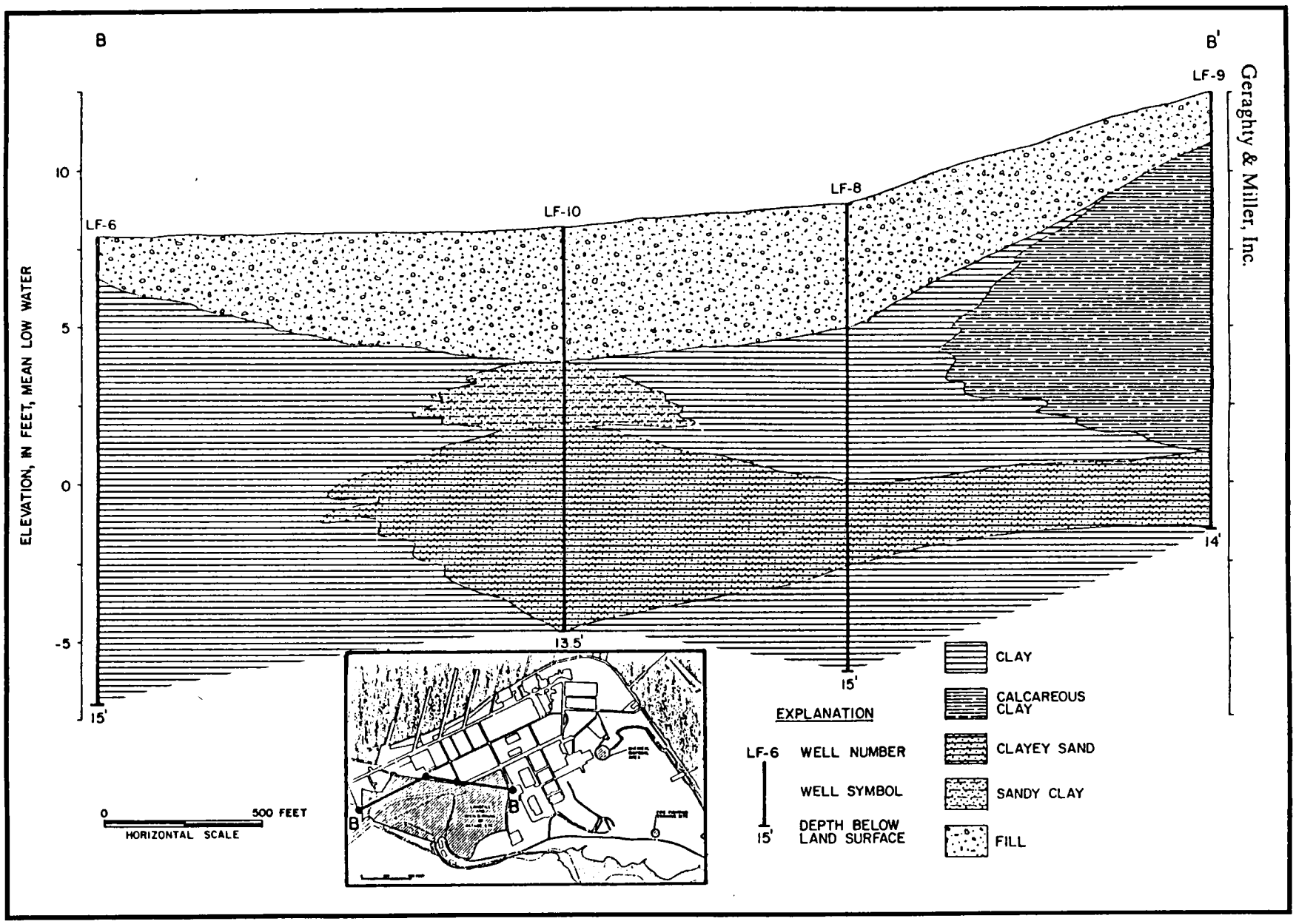

Figure 2-7. Geologic cross-section B–B' through the landfill area. (Figure taken from Reference 9).

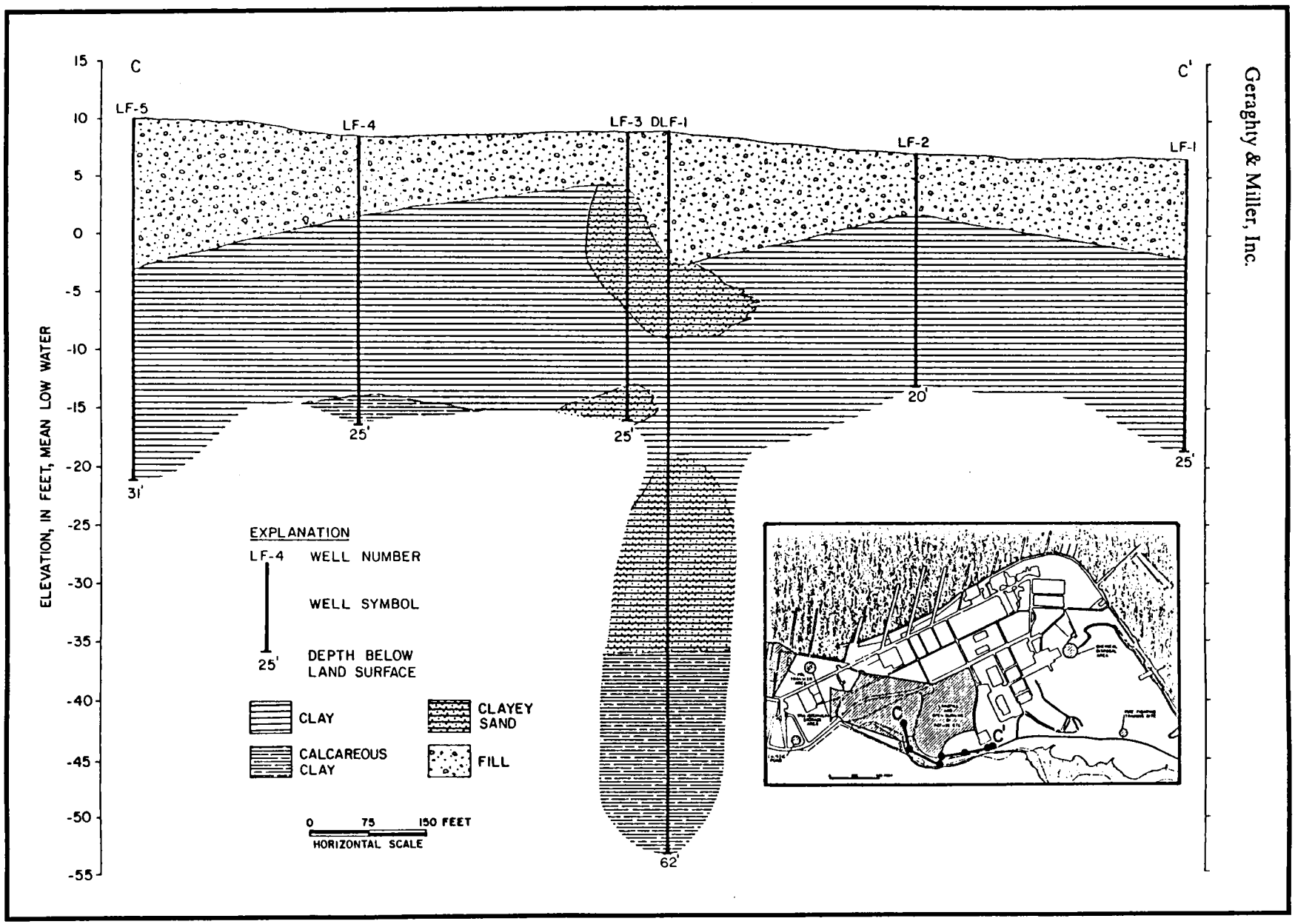

Figure 2-8. Geologic cross-section C–C' through the landfill area. (Figure taken from Reference 9).

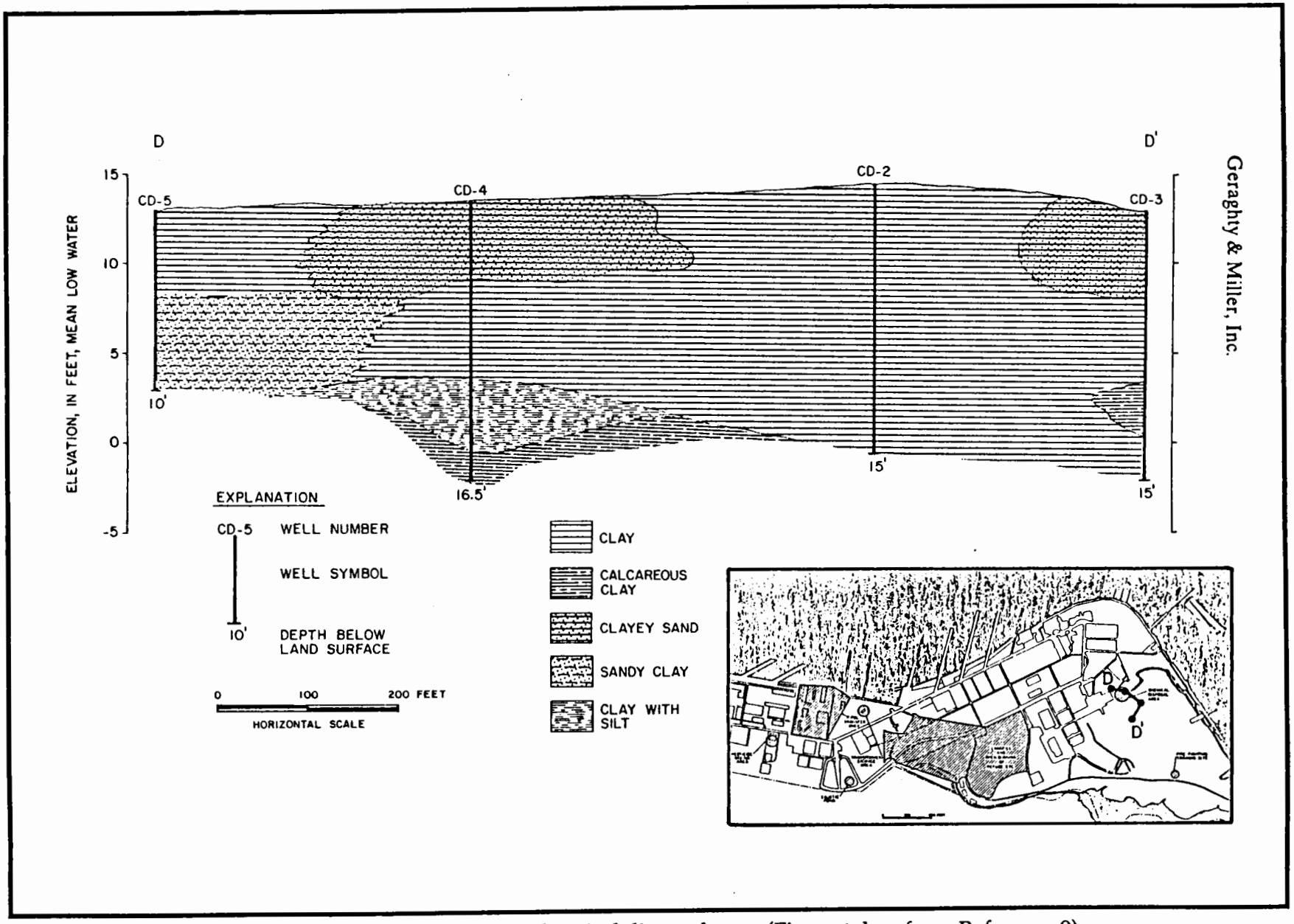

Figure 2-9. Geologic cross-section D–D' through the chemical disposal area. (Figure taken from Reference 9).

In monitor well DLF-1, which was drilled to a depth of 62 feet, the top of the Cooper Marl was found at a depth of 45 feet. The sediments between 45 and 62 feet consisted of a hard calcareous, slightly sandy clay. The permeability of the calcareous clay was estimated from the results of consolidation tests performed on two undisturbed samples. From these data, the permeabilities of these samples were calculated to be 1.3×10^{-4} and 3.2×10^{-5} cm/sec (Ref. 12).

Sieve analyses were performed on the fill material sampled at monitor well LF-1 and on a sample of the soft, gray clay that is found throughout the site. The permeabilities were calculated to be 1×10^{-2} to 1×10^{-3} cm/sec for the fill and 1×10^{-6} cm/sec for the gray clay (Ref. 12). The geotechnical data for the surficial soils are presented in Appendix B.

2.3.4 Surface Hydrology. Parts of the southern portion of NSY are drained by Shipyard Creek while some northern areas are drained by Noisette Creek. Both creeks are tributary to the Cooper River. Surface drainage over the remainder of NSY flows directly into the Cooper River. The Cooper discharges into Charleston Harbor.

Shipyard Creek is a small tidal tributary, about two miles in length, which flows to the southeast along the southwestern boundary of NSY to its confluence with the Cooper River, opposite the southern tip of Daniel Island (river mile 9). Docking facilities are located along the western shore of the lower mile of the channel, while the entire length of the eastern shore is bounded by tidal marshland.

Noisette Creek, which transects the northern portion of NSY, is a tidal tributary approximately 2.5 miles long. The creek flows nearly due east from its headwaters in the City of North Charleston and empties into the Cooper River at river mile 13.

2.3.5 Hydrogeology. Two distinct aquifers exist beneath the NSY site, a deep confined aquifer located within the Santee Limestone, and a shallow water table aquifer located within the near surface sediments. Both the shallow aquifer and the Santee Limestone function as potable aquifers in other locations. The shallow aquifer is not significantly developed in the NSY area and is not developed at all at NSY. In addition, the quality of the water from the Santee Limestone (in the vicinity of NSY) is not suitable for potable supply; total dissolved solids (TDS) range from 1,000 to 1,500 parts per million (ppm).

The Cooper Marl, in the Charleston area, is essentially impermeable and acts as a confining layer for the Santee Limestone. The top of the Santee Limestone, which occurs at about -250 feet MSL in the NSY area, has a groundwater potentiometric elevation of approximately 15 feet MSL. The hydraulic gradient is generally towards the southeast. Some wells in the vicinity of NSY are pumping from the Santee for industrial purposes. In July 1981, the water level of a deep water well in the Santee Limestone beneath NSY measured 15 feet MSL, indicating that the gradient across the confining Cooper Marl is artesian. Specifically, water from the confined aquifer of the Santee Limestone formation has an upward potential through the Cooper Marl.

Groundwater in the shallow aquifer beneath NSY flows north-northeast into the Cooper River and south-southeast into Shipyard Creek due to the gently sloping topography away from the center of NSY. Groundwaters in the immediate vicinity of Noisette Creek flow into it. The water table is within three to seven feet of the ground surface. The shallow groundwater table

continually but slowly discharges to the Cooper River and Shipyard Creek and, to a lesser extent, into Noisette Creek.

2.3.6 Migration Potential. Shallow groundwater beneath NSY eventually discharges to the Cooper River either directly or indirectly via its tributaries. Contaminants, if present in the shallow groundwater system, will eventually discharge into the Cooper River if not immobilized by subsurface soils or degraded or transformed by soil reactions. Flow rate in the shallow system, however, is expected to be rather slow due to the fine-grained nature of the sediments and the low groundwater gradient. Various contaminants, particularly metals, are likely to be attenuated by absorption onto clay minerals while organic compounds will be absorbed by the native organic matter in the soils. Minimal attenuation is assumed within the surficial aquifer since no data has been collected to identify the degree of attenuation for specific constituents.

No use is made of the shallow groundwater downgradient of NSY since the Cooper River and Shipyard Creek are the base boundaries as well as the downgradient boundaries of the shallow groundwater system. Residential wells using the shallow aquifer upgradient of NSY are unlikely but have not been ruled out. Such wells, if present, would not be threatened by contaminant migration from NSY, since they are upgradient from the base and reversal of the natural gradient by pumpage from shallow residential wells would be extremely unlikely due to the very small capacity of this type of well and aquifer parameters which effectively limit the capture zone of such wells. A survey of shallow groundwater users in and around the NSY is planned to ascertain the extent, if any, of shallow groundwater usage in the area. Currently, there is no evidence of shallow groundwater usage at the NSY.

In summary, potential contaminants from installation operations entering the shallow groundwater system do not threaten the health of on-base personnel, since the shallow system is not developed for use at NSY. Likewise, possible offsite contaminant migration via the shallow groundwater system does not threaten human health, since shallow groundwater flow is intercepted by surface waters at the installation boundaries. Contaminants entering the shallow groundwater system at NSY do, however, represent a potential threat to the environment, since contaminants have the potential to migrate via the shallow system to adjacent surface waters. Although aquatic habitats in the Cooper River, Noisette Creek, and Shipyard Creek may be threatened, human health is not directly threatened by contaminant migration, since these surface bodies do not function as potable supplies. Due to low rates of flow in the surficial aquifer and the much higher rates of flow in adjacent surface waters, only concentrated, high level contamination poses this threat to aquatic habitats.

The deeper aquifer (Santee Limestone) is not threatened by potential contamination from NSY. The Cooper Marl is a well-documented confining unit of the Santee Limestone and is essentially impermeable. In addition, metals would likely be absorbed by clays present in the Cooper Marl while organic compounds (such as PCBs) would likely be tightly bound and therefore immobilized by native organic carbon materials abundant in the Cooper Marl. The Cooper Marl is approximately 250 feet thick in the NSY area. In any case, water in the Santee Limestone aquifer is not of potable quality in the vicinity of NSY; the aquifer is significantly developed only for non-potable uses.

Migration pathways must also be considered for surface contaminants at NSY since constituents could migrate beyond installation boundaries via stormwater drainage. Stormwater is conveyed by natural and manmade drainage channels to the Cooper River or its tidal tributaries. The northern end of the base drains to Noisette Creek or the Cooper River. The heavily industrialized central portion of NSY drains to the Cooper River. Developed portions of NSY drain stormwater to the Cooper River via storm sewers. Undeveloped areas of NSY are drained by surface flow to either the Cooper River or Shipyard Creek, depending on the drainage patterns of the area. Thus, surface contaminants at NSY have the potential to migrate off the installation and into the Cooper River either directly or through its tributaries. Surface contaminants, therefore, represent a potential threat to aquatic habitats in the Cooper River, Noisette Creek, and Shipyard Creek although they do not directly threaten human health.

2.4 INDUSTRIAL OPERATIONS AND WASTE GENERATION. NSY is an extensive industrial complex containing virtually all shipyard and dockside operations necessary to provide logistical and labor task force support in conversion, overhaul, repair, alteration, dry docking and outfitting of ships, submarines, and service crafts. Currently NSY operates 18 major industrial shops. Operations performed by these shops and industrial wastes generated from these operations are described in detail in both The Industrial Process and The Waste Treatment Investigation (Ref. 13) and the Initial Assessment Study Report (Ref. 9). The RFA Report (Ref. 2) summarizes the industrial processes, waste generation, and treatment at the facility and should be referred to if further information is needed.

Although the types of wastes generated by industrial operations essentially have remained the same over the years, waste generation rates may have fluctuated as a result of varying production requirements. No historical information is available regarding past generation rates and only the current quantities are identified for most industrial operations in the RFA Report.

NSY has established an Environmental Compliance Inspection (ECI) Program to insure that all operations are being conducted in compliance with applicable regulations. The program provides a mechanism for periodic inspection of ongoing activities at pertinent areas at the shipyard. The ECI program consists of two components: Zone Inspections and Hazardous Waste Storage Area Inspections.

- Zone Inspections: The base has been divided into 34 separate zones for inspection. NSY personnel are required to inspect activities and sites in one zone every day. This procedure allows coverage of all zones on a regular basis. The highest priority of inspections will be in zones having immediate or recent problems. In the event a deficiency is identified, a report is written detailing the problem and describing the corrective measures to be undertaken. The report is signed by the manager of the individual shop or unit of concern. The area is then re-inspected on the following day to ensure that corrective measures have been implemented.

- Hazardous Waste Storage Area Inspections: All hazardous waste storage areas and satellite waste accumulation areas are inspected using the procedures described in the Zone Inspections section above. The primary goal at these sites is to insure that hazardous wastes are properly stored for a time period not exceeding 90 days.

2.5 NATURE AND EXTENT OF CONTAMINATION. There are 24 SWMUs identified in the RFA (Ref. 2) and 11 additional SWMUs added by SOUTHDIV's RFA Addendum (Ref. 14). A list of the 35 SWMUs is presented in Table 2-1 and the location of each is illustrated in Figure 2-10. Site and waste characteristics of each were described and explained accurately and in detail in the RFA reports (Refs. 2 and 14). The extent and magnitude of contamination from each SWMU were concisely summarized. Additional data, not available for the RFA, and data developed during attempted interim status closure of SWMUs #1, #5, #6, #21 and #22, are discussed in Refs. 4 to 7 and Ref. 16. Summaries of the previous findings are incorporated into this RFI Workplan.

2.6 SWMU DESCRIPTIONS AND INTERIM CORRECTIVE MEASURES. On 4 May 1990 EPA and DHEC issued NSY a RCRA permit which allowed storage of hazardous waste in containers in Building 246 and the DRMO-Building 1606. Consequently, as of 4 June 1990, interim status for all previous interim status facilities (SWMUs #1, #5, #6, #21 and #22) was terminated. The following sections describe each SWMU identified in the RFAs. Completed and ongoing interim corrective measures are also described for each unit. Closure work by EnSafe on SWMUs #1, #5, #6, #21, and #22 is summarized.

Early in this project, SWMUs #1, #5, #6, #21 and #22 were considered to be regulated units under interim status. (SWMUs #5 and #22 were later determined to be elementary neutralization or wastewater treatment units under 40 CFR §270.1(c)(2)(v), 270.2 and 260.10, and hence, not subject to Part 270 permitting requirements.) NSY did not seek to have these units covered by its Part B permit, but rather, attempted clean closure under interim status. Closure plans were developed by EnSafe and approved by DHEC.

Implementation of the closure plans resulted in substantial clean up of the most significant contamination. Much of the difficulty in achieving clean closure developed from the way "clean" was defined. For the purposes of these closures, DHEC and NSY agreed to define "clean" as within some number of standard deviations of the mean background concentration. The number of standard deviations was set as equal to the Student's t value associated with a 95% confidence interval and with the degrees of freedom dependent on the number of background samples collected.

A number of difficulties occurred in using this definition. The most significant difficulty, in the context of this RFI Workplan, concerned determining mean background concentrations. The procedures used to establish background concentrations are presented in Ensafe's reports (Refs. 4 to 8). All five SWMUs are located on made land composed of heterogeneous fill. Background samples could not be collected because there was no way to find identical strata sufficiently removed from the sites to preclude contamination. Samples analyzed as background came from soils which were chemically distinct from the SWMU soils.

"Background" pH and concentrations of barium, cadmium, chromium, nickel and silver were near the low end of the range typically found in uncontaminated soils. This lead to the erroneous conclusion that SWMU soils were contaminated when in fact the concentrations observed are typical for naturally occurring soils. Consequently, where soils were involved, clean closure could not be achieved.

Table 2-1. Solid Waste Management Units (SWMU).

SWMU #1.	DRMO Building 1617
SWMU #2	Lead Contaminated Area
SWMU #3.	Pesticide Mixing Area
SWMU #4	Pesticide Storage Building
SWMU #5.	Battery Electrolyte Treatment Area
SWMU #6.	Public Works Storage Yard (Old Corral)
SWMU #7.	PCB Transformer Storage Area
SWMU #8.	Oil Sludge Pit Area
SWMU #9.	Closed Landfill
SWMU #10.	Hazardous Waste Storage Facility
SWMU #11.	Caustic Pond
SWMU #12.	Old Fire Fighting Training Area
SWMU #13.	Current Fire Fighting Training Area
SWMU #14.	Chemical Disposal Area
SWMU #15.	Incinerator
SWMU #16.	Paint Storage Bunker
SWMU #17.	Oil Spill Area
SWMU #18.	PCB Spill Area
SWMU #19.	Solid Waste Transfer Station
SWMU #20.	Waste Disposal Area
SWMU #21.	Old Paint Storage Area
SWMU #22.	Old Plating Shop Waste Treatment System
SWMU #23.	New Plating Shop WWTS
SWMU #24.	Waste Oil Reclamation Facility
SWMU #25.	Building 44, Old Plating Operation
SWMU #26.	Waste Storage Area, Building 64-40, Pier C
SWMU #27.	Waste Storage Area, East End, Pier C
SWMU #28.	Waste Paint Storage Area, West End, Pier C
SWMU #29	Building X-10
SWMU #30.	Satellite Accumulation Area, Building 13
SWMU #31.	Waste Paint Storage Area, Dry Dock No. 5
SWMU #32.	Waste Paint Storage Area, Building 195
SWMU #33.	Waste Paint Storage Area, West End, Dry Dock No. 2
SWMU #34.	MWR, SW of Building X-10
SWMU #35.	Building X-12

A risk assessment and development of health-based soil cleanup goals was performed by Gradient Corporation in June of 1991 at the DRMO Storage Shed (SWMU #1) and the Public Works Storage Yard (SWMU #6, Ref. 16). To achieve clean closure for these two sites, the study assessed metals contamination at each site and developed target average soil concentrations for metals and a geometric mean concentration for lead. The risk assessment is currently in review at USEPA Region IV and South Carolina DHEC and has not been approved.

The USEPA proposed action levels are referenced for evaluation of on-site contamination in this Workplan. The proposed action levels were issued by USEPA in the Federal Register (55 FR 30798) and established target cleanup levels for releases at permitted RCRA facilities. This approach is broadly parallel to USEPA's current approach under CERCLA and with regard to clean-up levels in other situations. Action levels are set for various media along with criteria for making situational adjustments. These action levels, excerpted from Appendices A through F of the Federal Register, are presented in Appendix C.

Each of the five interim status units is a SWMU in the context of this RFI Workplan and has been evaluated by standards consistent with those used on other SWMUs by NSY. By these standards, much, but not all, of the reported contamination at the interim status units can be due to the normal elemental composition of uncontaminated soil. Actual contamination exists in the following areas:

- The DRMO (SWMU #1) where lead concentrations exceed normal levels in the surficial strata. This is apparently due to migration from the adjacent lead bin #3 (SWMU #2). The NSY is currently seeking clean closure of this unit under the risk assessment performed by Gradient Corporation (Ref. 16).

- The battery electrolyte treatment area (SWMU #5) where substantial lead contamination has been detected in nearby soils. The horizontal and vertical extent of this contamination has not yet been determined.

- The public works storage yard (SWMU #6) contains three isolated areas near the surface of the ground containing slightly elevated lead levels. This unit is also currently being assessed for clean closure status under the risk assessment (Ref. 16).

- The waste paint storage pad (SWMU #21) was approved for clean closure by EnSafe after samples of paint chips were collected, analyzed and reported as non-hazardous. An isolated spill and subsequent clean up activities that occurred in the same area sometime later is discussed in Section 2.6.21. However, the clean closure was not approved by DHEC since the soils and groundwater had not been characterized. Soil and groundwater from the surrounding area of this SWMU will require an additional investigation.

- Soils surrounding the old plating treatment system (SWMU #22) have an elevated pH and, in some places, elevated cadmium and chromium levels.

2.6.1 DRMO Staging Area. This area (SWMU #1) has been used since 1974 by the Defense Reutilization and Marketing Office (DRMO) to store property. The property is that which is no longer needed for the purpose for which it was purchased and has been turned in to DRMO by various branches of the Armed Forces within the region of the Naval Base. The stored property handled by DRMO includes some products which cannot be reutilized by other commands and that have consequently become classified as wastes. Those which become hazardous wastes were stored until recently in a covered storage shed formerly known as Building #1617. The storage shed was a wood framed and roofed structure. Part of the floor consisted of an asphalt pad; the remainder of the floor was unpaved. Hazardous wastes were stored in containers and segregated according to waste type.

No spills at the site have been documented. EnSafe conducted two sample events to delineate contamination at the DRMO Storage Shed (Refs. 5 and 7). A total of 53 surface samples (0 to 6 inches) and 159 subsurface samples (1, 2, and 3 feet) were collected and analyzed. Figure 2-11 shows the sample locations at the DRMO Storage Shed and Appendix D presents the analytical data. Diethyl ether was the only organic compound detected with a concentration below 50 g/kg. Except for surface concentrations of lead, metals were detected in most of the samples were at very low concentrations. As presented in the previous section, EnSafe established values from background samples, based on the Student's t test, to determine threshold values for cleanup. Based on the threshold values, clean closure could not be achieved.

To determine what were acceptable concentrations of metals contamination in soils, the EPA's proposed action levels in the Federal Regulations (July 27, 1990 P.30798) were compared with the analytical results for metals in EnSafe's reports. Most of the concentrations of metals were well below the action levels proposed by the EPA except for surface samples ST-1 (barium, 4880 ppm) E8 (chromium, 436 ppm), and E1 (nickel, 2270 ppm). Lead and selenium concentrations are not presented in the proposed action levels. The selenium concentrations were below the level of detection and cleanup criteria for lead have not yet been established. A review of the analytical data indicates that only the surface soils are contaminated. The area has become contaminated with lead dust which spread from nearby salvage bin #3 (SWMU #2). Although lead levels detected in soil samples exhibited a wide range of concentrations, significant concentrations are limited to the near surface (Refs. 4, 5, 6 and 10). The spread of lead dust resulted primarily from vehicular traffic during routine operations at the site. Wind-blown dust may also have contributed to the contamination.

The site was under interim status until DHEC issued the Final RCRA Permit to the NSY. Interim status for the DRMO and other SWMUs was therefore terminated on 4 June 1990.

In September of 1989, the inventory of containers was removed from this site and Building #1617 demolished. Empty drums, which have been triple rinsed, are now stored in this area.

The DRMO is currently under review for clean closure based on the risk assessment (Ref. 16). A geometric mean soil lead level of 481.5 ppm has been proposed for lead at this site. However, this is a mean soil concentration and not referenced as a "not-to-be exceeded concentration for this site.

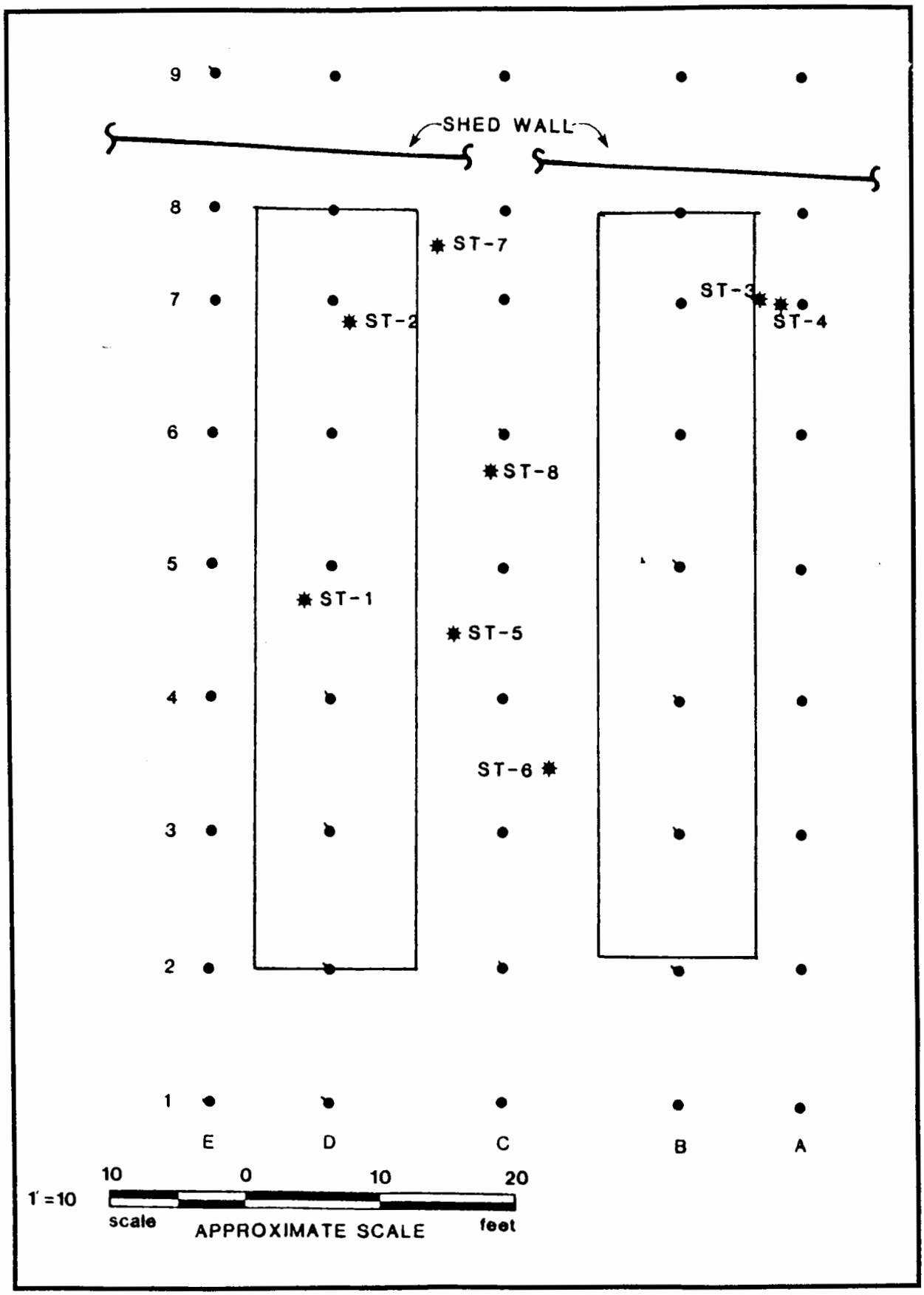

Figure 2-11. DRMO storage shed sample locations. (Figure taken from Reference 5.)

The site has been extensively studied in connection with its closure. Because the only significant contamination of SWMU #1 is the lead which migrated from SWMU #2, it would be appropriate to address SWMU #1 as part of SWMU #2 under this RFI Workplan. No further action is planned for SWMU #1, however if any additional investigations relative to SWMU #1 are proposed, they will be handled under SWMU #2.

2.6.2 Lead Contamination Area. The lead contamination area (SWMU #2) consists of a salvage bin (#3) and adjacent paved ground surface. The area was used to store recovered lead from lead-acid submarine batteries from the mid-1960's until 1984. Electrodes and associated internal metallic components were removed from the battery jars in the battery electrolyte treatment area. Recovered materials were then placed on a railcar and transferred to the DRMO area for storage and eventual sale to a salvage contractor. Lead dust from the recovered materials was released to the salvage bin by handling.

Routine activities (vehicular traffic) in the DRMO yard area and natural processes (such as wind and stormwater flow) caused spreading of the lead contamination into an area which eventually encompassed approximately six acres. Extensive studies of soil and groundwater in the area have delineated the extent of lead contamination at the site (Refs. 10 and 11). A soil sampling investigation was conducted during the Contamination and Exposure Assessment for the lead contamination within DRMO. Seventy-one soil samples were collected from the DRMO site; 35 samples consisted of surficial soils (surface to 0.5 feet depth) and the remaining 36 samples were collected at various depth intervals from 10 individual soil borings (total depths of 7.5 to 10 feet below surface). The surficial soil samples were collected across a grid pattern to characterize the areal extent of lead contamination and the soil boring samples were collected to yield information on the extent to which lead had penetrated (migrated) vertically in the soils (Ref. 10). The locations of the soil sampling points in the DRMO Area are shown in Figure 2-12 and analytical results for the surficial soils are given in Table 2-2.

Lead concentrations in surficial soils vary widely, from less than 1.3 to 371,000 mg of lead per kg of soil. The lead data in Table 2-2 were plotted on a site map (Figure 2-12) to show the areal distribution of the lead contamination and to facilitate estimation of the area of contamination. As shown, lead concentrations are greatest in the area adjacent to and in front (north) of the former battery storage bin (sampling location Nos. SS26 to SS31). Lead concentrations decrease to background levels (10 to 100 mg/kg) over a distance of several hundred feet south of the bin area. The current activity (vehicles, etc.) in the materials storage area north of the bin has apparently spread the lead contaminated soil over a large area. The area encompassed by the 1,000 mg/kg isopleth shown in Figure 2-12 is estimated at six acres. Additionally, stormwater runoff of contaminated soil from the immediate vicinity of the former storage bin has spread the lead contamination along a surface drainage way located immediately south of the bin area and toward the stormwater catch basin at the eastern end of Building 1608A.

Soil borings were made in order to characterize the vertical extent of lead contamination in the soils. The results of lead analysis of the soil boring samples show the lead contamination is principally confined to the surface soils (surface to 0.5 feet) (Ref. 10). The lead concentration for each sample depth interval averaged over all 10 soil borings is as follows:

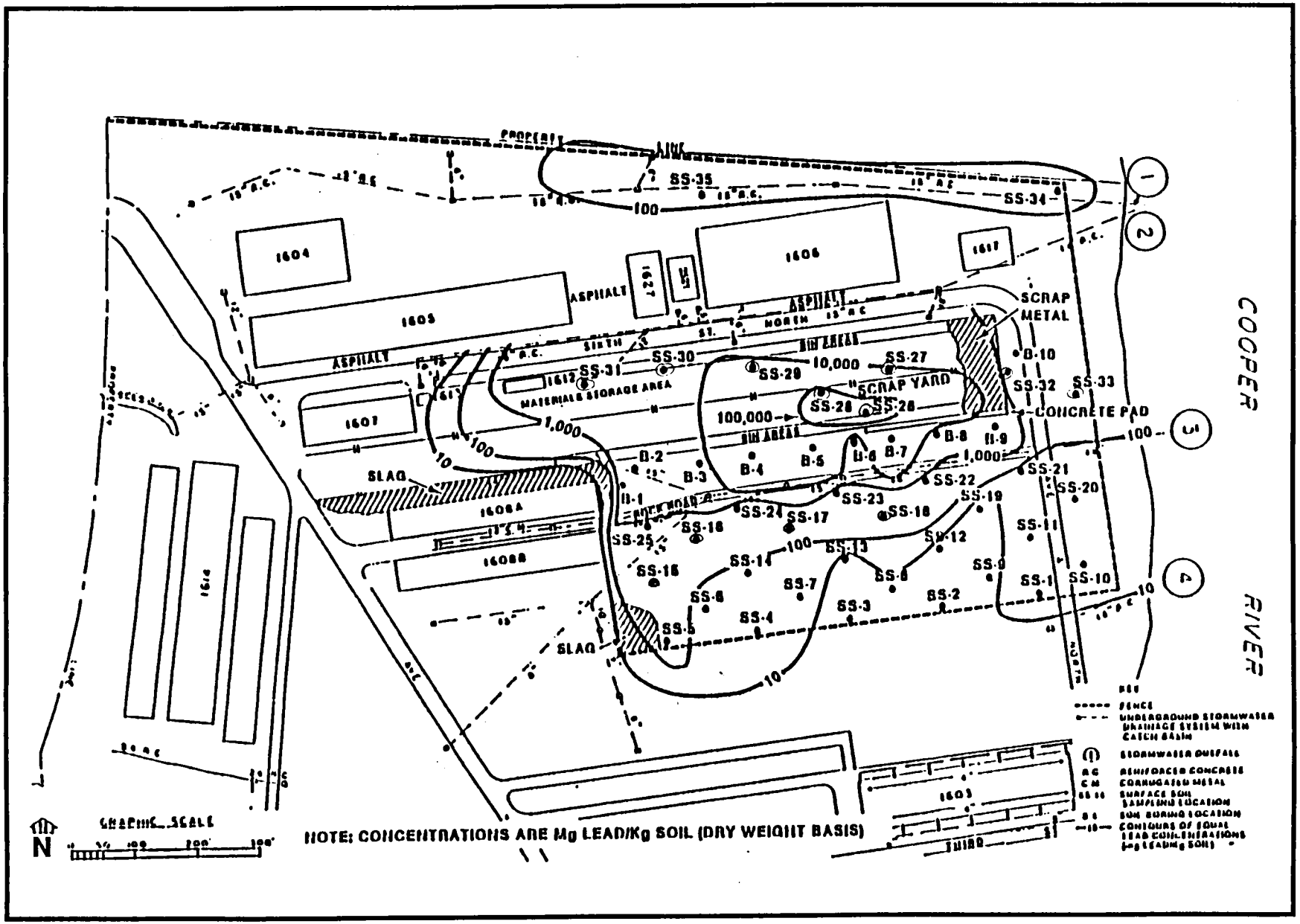

Figure 2-12. Surface soil lead concentration isopleths, SWMU #2. (Figure taken from Reference 10.)

Table 2-2

Lead concentrations in surfical
(surface to 0.5 ft.)
Soil in the DRMO area

(Table taken from Reference 10.)

Sample Matrix	Soil Sampling Locations	Lead Concentration (mg lead/kg soil)*
Surficial Soil	SS1	69.2
Surficial Soil	SS2	2.72
Surficial Soil	SS3	<1.3
Surficial Soil	SS4	28.5
Surficial Soil	SS5	137
Surficial Soil	SS6	<1.3
Surficial Soil	SS7	20.7
Surficial Soil	SS8	6.70
Surficial Soil	SS9	8.17
Surficial Soil	SS10	68.7
Surficial Soil	SS11	126
Surficial Soil	SS12	<1.3
Surficial Soil	SS13	<1.3
Surficial Soil	SS14	43
Surficial Soil	SS15	371
Surficial Soil	SS16	286
Surficial Soil	SS17	266
Surficial Soil	SS18	424
Surficial Soil	SS19	<1.3
Surficial Soil	SS20	40.4
Surficial Soil	SS21	54
Surficial Soil	SS22	328
Surficial Soil	SS23	717
Surficial Soil	SS24	488
Surficial Soil	SS25	32.7
Surficial Soil	SS26	371,000
Surficial Soil	SS27	10,500
Surficial Soil	SS28	107,000
Surficial Soil	SS29	1,260
Surficial Soil	SS30	9,320
Surficial Soil	SS31	2,810
Surficial Soil	SS32	907
Surficial Soil	SS33	298
Surficial Soil	SS34	533
Surficial Soil	SS35	411

*Dry-weight basis

Depth Interval	Lead Concentration (mg/kg)
Surface to 0.5 feet	16,103
3 to 4.5 feet	255
6 to 7.5 feet	274
8.5 to 10 feet	509

Detailed and specific analytical results were not available for preparation of this Workplan. These summary results indicate that, while there are very high lead levels in the surficial soils, the lead apparently is not migrating vertically through the soil column. Due to its ionic nature, lead is strongly adsorbed to soils, especially soils exhibiting a high clay content (Ref. 10).

EP Toxicity tests were conducted on two soil samples with the highest total lead concentrations. The leachate produced from the testing contained lead levels above the regulatory limit of 5 mg/l. The soils in this area are, therefore, characterized as hazardous waste.

Ambient air sampling was conducted during the contamination and exposure assessment for lead contamination within DRMO. Samples were taken outdoors, in the materials storage shed area, and indoors, within seven buildings located within the DRMO site. The results of the ambient air sampling are given in Table 2-3. The lead concentrations are expressed in units of micrograms of lead per cubic meter of air. As shown by the data in Table 2-3, the measured ambient air lead levels did not exceed OSHA, NIOSH, or ACGIH recommended occupational criteria (30 to 50 g/m). One outdoor Hi-Vol sample (HVD2-1) did exhibit a lead level (2 g/m) slightly above the National Ambient Air Quality Standard (1.5 g/m). Apparently, lead contaminated dust is being dispersed from the primary contamination source (bin #3) and is accumulating in dust in the adjacent buildings. The levels in the air, however, were (at the time of sampling) within occupational criteria (Ref. 10).

High lead levels in the surficial soils warrant an extended site investigation for this SWMU under the RFI Workplan. Data gaps in characterizing stormwater runoff, river sediments, and groundwater are addressed in Section 3.2 of the RFI Workplan.

2.6.3 Pesticide Mixing Area. The pesticide mixing area (SWMU #3) is approximately 50 feet by 25 feet in size. Part of the area (approximately 20 square yards) is devoid of vegetation. However, the bare area is subject to substantial vehicular traffic. The area is contaminated with low concentrations of various pesticides (and associated degradation products) which were handled at the site in the past.

Table 2-4 lists pesticides used at the NSY. Prior to 1971, pesticides were mixed in a small shed south of the denuded area. However, equipment used for spraying and mixing of pesticides was rinsed on the grounds outside. Rinseate was allowed to drain into the soils. During the Confirmation Study conducted at NSY, water quality analyses were performed at the Pesticide Mixing Area. Water samples were collected from monitoring wells WPA-1 and WPA-2 (see Figure 2-13) to determine whether past practices of pesticide mixing and equipment rinsing had affected the shallow groundwater. The samples were analyzed for pesticides, herbicides, PCBs, and arsenic. The laboratory results, which are presented in Appendix E, show that the concentrations of all of the above parameters were below method detection limits and that the pH of the groundwater is approximately six (Ref. 12).

Table 2-3

Lead concentrations in indoor and outdoor ambient air DRMO area

(Table taken from Reference 10.)

Sample Matrix	Sample No.	Lead Concentration (ug/m^3)
Outside-Air	HVD1-1	<1
Outside-Air	HVD1-2	<1
Outside-Air	HVD2-1	2
Outside-Air	HVD2-2	1
Building-Air	AA1606 (Office)	<20
Building-Air	AA1606 (Warehouse)	<20
Building-Air	AA1607	<20
Building-Air	AA1608A	<20
Building-Air	AA1612	<20
Building-Air	AA1613	<20
Building-Air	AA1627	<20
Building-Air	AA2521	<20

Table 2-4

Pesticides used at NAVBASE Charleston

(Table taken from Reference 9.)

Item
<u>Insecticides (Bldg. 381)</u>
Carbaryl, 80 percent WP
Chlordane, 72 percent EC
Diazinon, 2 percent
Diazinon, 47.5 percent EC
Dichlorvos, 5 percent
Dimethoate (Cygon), 23.4 percent ECl
Dursban, 41.2 percent ECl
Malathion, 57 percent EC
Malathion, 95 percent
Propoxur (Baygon), 2 percent
Propoxur (Baygon), 15.9 percent EC
Pyrethrin, 6 percent
Pyrethrin, 3 percent
Pentokel
Repellant, 71 percent (2-oz bottles)tles
<u>Rodenticides (Bldg. 381)</u>
Anticogaulant, 5 percent
Anticoagulant, 3 percent
Calcium cyanide, 42 percent
Zinc phosphide, 80 percent
<u>Herbicides (Bldg. 1316)</u>
Bromacil, 80 percent WP
Dalapon, 85 percent
Diquat, 35.3 percent EC
Spike
2,4-D, 4 lb/gal
2,4,5-T, 6 lb/gal

Note: WP = Wettable powder.
lbs = pounds.
EC = Emulsifiable concentrate.
gal = gallons.
oz = ounce.
lb/gal = pounds per gallon.

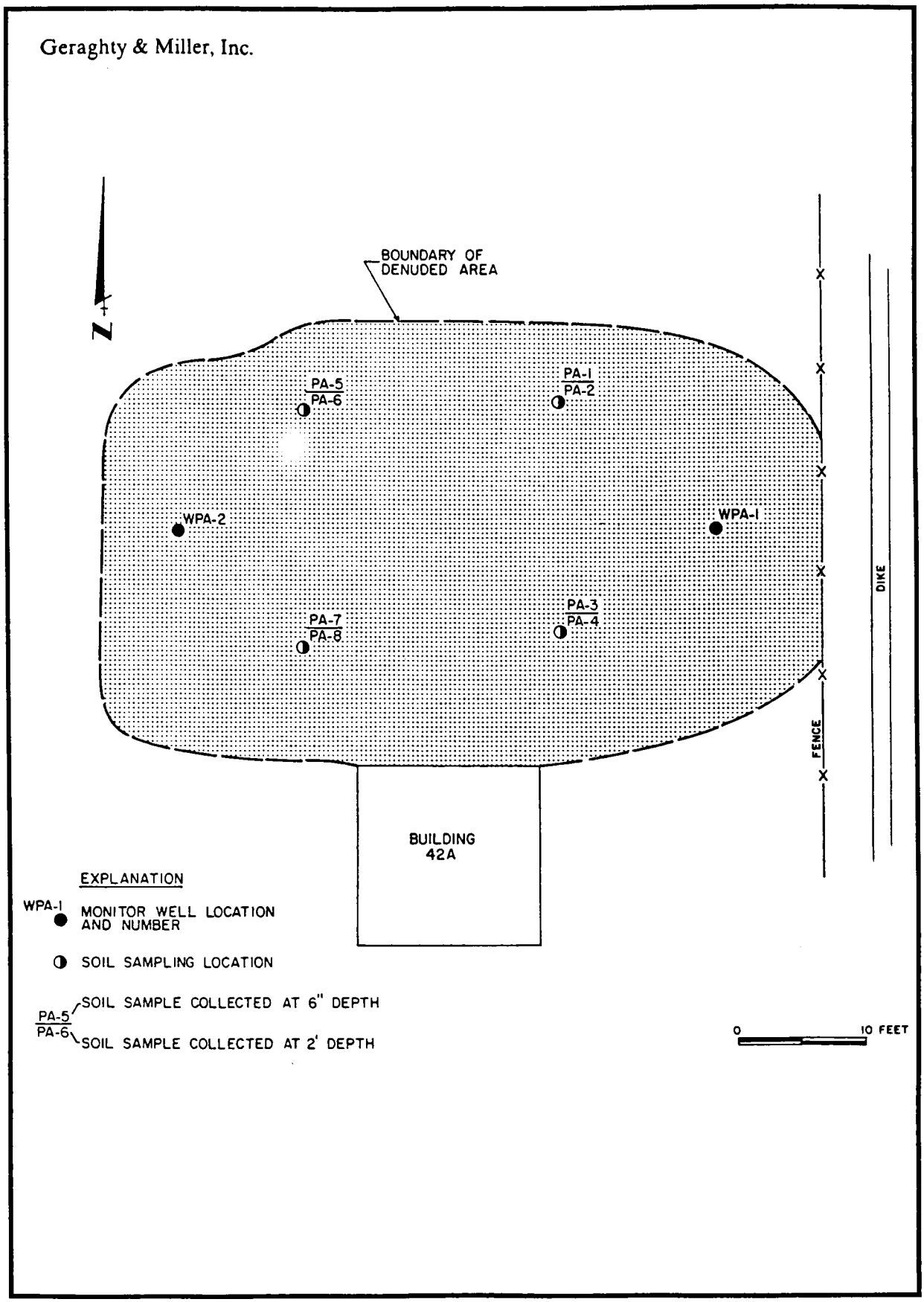

Figure 2-13. SWMU #3 Monitoring well and soil sample locations. (Figure taken from Reference 12.)

A soil sampling program was conducted at the pesticide mixing area in February, 1982. A total of eight samples were collected at the four locations shown in Figure 2-13 and analyzed for arsenic, herbicides, pesticides, and PCBs. The results of the analyses are presented in Appendix E. Odd numbered samples were collected at a depth of six inches, and even numbered samples were collected at a depth of two feet.

Concentrations of arsenic in the soil ranged from 1.1 g/gm (micrograms per gram) in PA-4 to a high of 6.3 g/gm in PA-1, and analyses for herbicides 2,4-D and 2,4,5-TP indicated that the levels of these constituents in the soil were less than the detection limit.

The eight soil samples were each analyzed for 18 pesticides, and up to six pesticides were detected. Three of the six pesticides are interrelated in that DDD and DDE are metabolites of DDT and are formed during the biodegradation of DDT. The fact that these were found in all eight samples is significant since DDT has not been in general use for about 15 years; therefore, they represent compounds that may have been present in the soil for a long period of time. Three other pesticides were found in samples PA-3 and PA-7, including heptachlor, beta BHC, and delta BHC.

The eight soil samples were also analyzed for seven PCB compounds, and six of the samples were found to contain one of these compounds, Aroclor 1260.

In May 1982, personnel from the Navy collected two samples of the uppermost soil within the pesticide mixing area. The results of 1.48 g/g and 5.3 g/g (see Appendix E) indicate that the greatest concentration of DDT in the soil is in near surface soils. These data, along with the previous data collected at the pesticide mixing area, show that the concentration of DDT in the soil is highest at land surface and decreases rapidly with depth (Ref. 12). The only contaminants of concern are arsenic and DDT. The actions levels established in the Federal Register (Appendix C) for arsenic is 80 ppm and DDT is 3 ppm. The maximum concentration for arsenic 5.3 ppm is well below the action level. DDT and its metabolites (DDD and DDE) were assayed in eleven soil samples and two water samples.

Only one DDT grab sample collected from the surface (0-2 inches) had a concentration of 5.3 ppm, exceeding the action level. All other samples collected were below 1 ppm. Residual pesticide concentrations in the soil are low and slightly exceed the action level. Also, no contaminants were detected in the groundwater samples. Therefore, no additional investigations are recommended under this RFI Workplan.

2.6.4 Pesticide Storage Building. The pesticide storage building (SWMU #4) has been used to store various insecticides and rodenticides since 1980. It is a steel building with a concrete floor. The building is equipped with a formulation and mixing room. Sink and floor drains within the building are connected to the sanitary sewer system or to blind sumps (sumps with no outlets). An equipment rinse area/wash rack is located adjacent to the storage administration facility. No evidence of contamination were found or have been reported for this site. The building and concrete floor have since been removed and the area is now a paved parking lot. No additional investigations are recommended under this RFI Workplan.

2.6.5 Battery Electrolyte Treatment Area. The battery electrolyte treatment unit (SWMU #5) was part of the battery salvaging, restoring, and recharging operation. It was the unit used for neutralization of submarine battery acid. Current used battery management practices at NSY are limited to shipment of intact batteries offsite for salvage.

The battery electrolyte treatment tank is not required to undergo closure pursuant to 40 CFR Part 265, Subpart G since it was not a regulated unit. It discharged to a Publicly Owned Treatment Works (POTW). However, the battery electrolyte treatment area (soils surrounding the tank) will be included in the RFI since interim status was terminated. Final closure activities for this area will include remediation of contaminated soils.

EnSafe performed a subsurface investigation and tank decontamination in October of 1987. Twelve sample stations were hand augered around the perimeter, to a depth corresponding to that of the floor of the treatment unit (5.5 feet below ground surface). Figure 2-14 shows the soil sample locations. Three vertically successive, 6-inch soil samples were collected from the base of each auger hole, analyzed, and found to contain elevated levels of lead. Results of the analyses are presented in Table 2-5.

During the subsurface investigation, the interior of the tank was decontaminated. Observations as to the integrity of the tank with respect to groundwater infiltration were made over a period of several days. No leakage into the tank had occurred.

Originally, the lead levels were evaluated with the threshold values established by EnSafe from background samples using statistical procedures (Student's t Test) to determine if the unit could be clean closed. Cleanup levels for lead have not been established under the proposed EPA action levels, nor has a cleanup standard for lead been approved by EPA Region IV. However, high lead concentrations warrant further investigation of soil and groundwater.

The prior investigations in this area focused primarily on the soil adjacent to the treatment tank. To remediate this SWMU and avoid possible recontamination, additional delineation of the surrounding area will be required. In addition, the area identified during the DHEC and EPA site inspection, where a leaking drum labelled "sulfuric acid" was observed, will be part of the study area. For the purposes of this Workplan, SWMU #5 is being redefined to include the entire fenced compound within which battery wrecking activities occurred.

2.6.6 Public Works Storage Yard. The Public Works storage yard (SWMU #6), also known as the "old corral area," is a fenced open area where routinely generated, containerized wastes were stored prior to shipment offsite. Among the wastes stored at the site were hazardous wastes generated from vehicle maintenance, building maintenance and pest control operations. Wastes generated by vehicle maintenance consisted of cleaning solvents and waste oil. Spent solvents were disposed of by a contractor. Waste oils were recycled through NSY's waste oil reclamation facility. Building maintenance operations generated paint waste which was disposed of by a contractor along with waste from the paint shop. The storage yard ceased operation as a hazardous waste storage area when construction of the new temporary hazardous waste storage and transfer facility was completed.

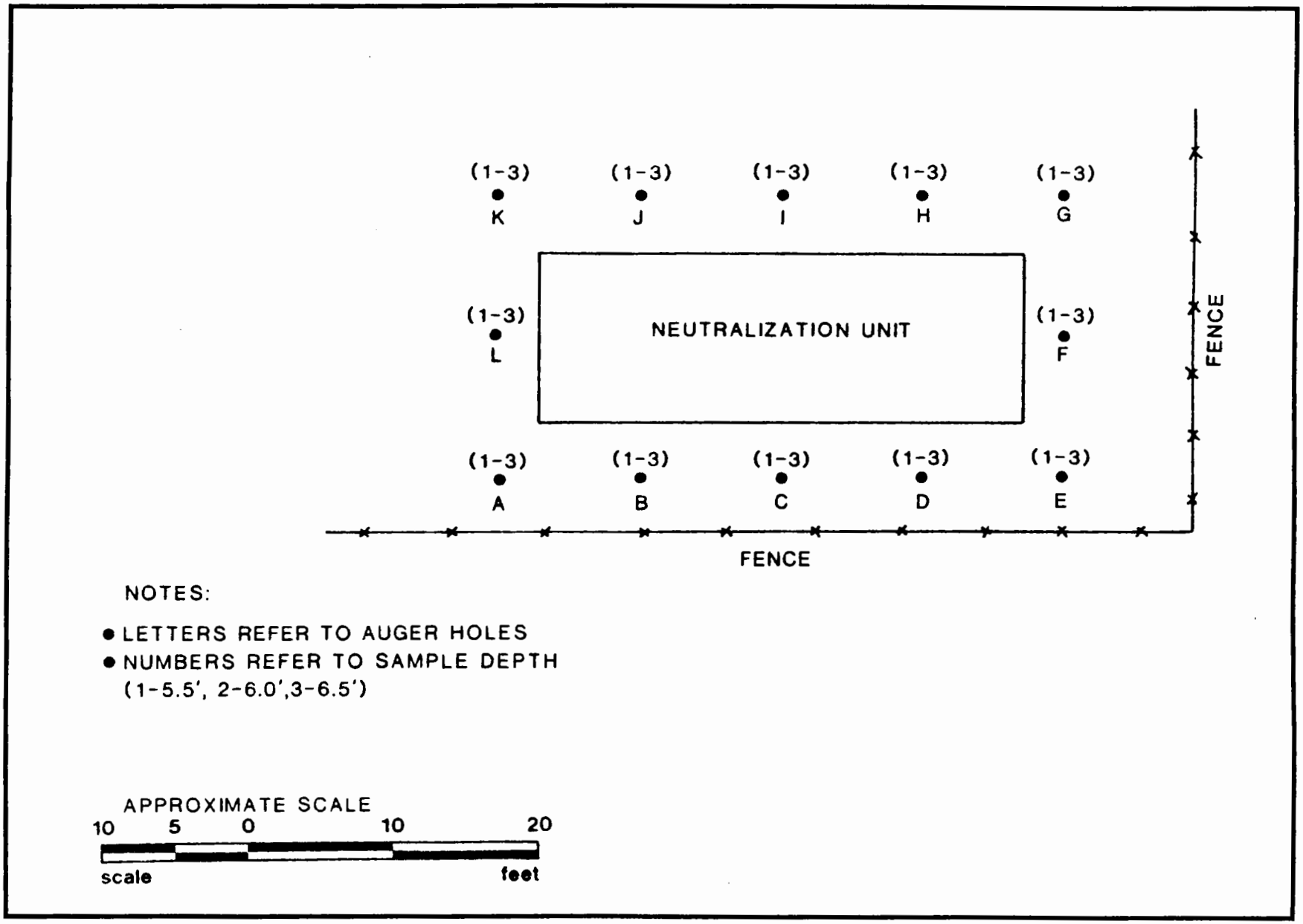

Figure 2-14. Sampling stations – Battery Electrolyte Neutralization Unit. (Figure taken from Reference 5.)

Table 2-5

Evaluation of soil contamination-
Battery Electrolyte Treatment Unit

(Table taken from Reference 5.)

	LEAD	LEAD	LEAD
THRESHOLD	146.92	146.92	146.92
LEVEL	1 *	2	3
STATION			
A	241.0 X	222.0 X	253.0 X
B	468.0 X	534.0 X	1056.0 X
C	131.0	91.0	130.0
D	322.0 X	246.0 X	255.0 X
E	386.0 X	245.0 X	477.0 X
F	488.0 X	356.0 X	483.0 X
G	21722.0 X	1629.0 X	150.0 X
H	195.0 X	367.0 X	204.0 X
I	233.0 X	254.0 X	157.0 X
J	211.0 X	304.0 X	424.0 X
K	382.0 X	50.4	106.0
L	502.0 X	856.0 X	847.0 X

* NOTE: LEVEL 1 IS AT ELEVATION OF BOTTOM OF TANK FOUNDATION

A partial closure of this unit was completed in 1986 when a renovation and expansion of the cold storage warehouse (Building #193) was extended into the eastern boundary of the public works storage yard (Figure 2-15). A soil sampling program was completed in March, 1987 as part of the requirements for the closure of this unit. Because of the wide variety of hazardous wastes stored within the compound during interim status, it was necessary to perform a screening analysis of each soil sample to identify any contaminants present and to define the extent of soil contamination (Table 2-6). The soil sampling program is described in the NSY Closure Plans for Interim Status Facilities dated May 27, 1986 (Ref. 3). Results of the analyses indicate that soils in the Public Works Storage Yard are contaminated with metals including barium, cadmium, chromium and lead. Concentrations of PCBs were found to be less than 1 ppm. Results of the soil sampling program are presented in Appendix F. A site sketch of the sample locations is presented as part of the Appendix F-1 data.

Final closure activities in the remaining portion of this unit consisted of removing the final inventory of drums and material, and excavation of any residual contaminated soils. EnSafe implemented a subsurface investigation in 1987. Samples were collected on a 50-foot grid system and areas of obvious staining were independently sampled. The grid system is illustrated in Figure 2-16. Thirty-six sample points were established for sample collection from surface to six inches. The new grid system is an extension of the grid established during partial closure of the southern portion of the Public Works Storage Yard. Row AA duplicates row A from the original grid. The soil along row AA was excavated and backfilled during partial closure activities. An investigation by Southern Division and EnSafe representatives identified 15 additional stained areas or areas of suspected spills and leaks (SP-13 to SP-27). The analytical results for samples collected for the final closure activities are presented in Appendix F-2, EnSafe's Table 3, "Evaluation of Soil Contamination Public Works Storage Yard." The threshold values for background samples are presented with the metals data.

A supplemental sampling phase was added to further define the vertical extent of contamination in subsurface soils to a depth of three feet. Supplemental samples were collected at 1-, 2- and 3-foot intervals, at the 51 stations exhibiting any contamination in the prior surface sampling investigation. The supplemental samples were analyzed for pH and each metal exceeding the threshold limit in surface samples. At 9 of the 51 stations, at least one constituent exceeded the threshold value. Results of this supplemental soil sampling program are presented in Appendix F-3.

In summary, based upon the considerable amount of soil analytical data available from previous sampling events, three limited areas of elevated lead levels were identified (Figure 2-16). The data suggest that contamination attenuated within the upper three feet of soils. Please note that the data were previously analyzed in terms of threshold levels.

This unit was undergoing closure under interim status until the RCRA permit was issued on 4 June 1990. Currently, the Public Works Storage Yard has been investigated under a risk assessment (Ref. 16). Approval of the risk assessment by the USEPA and South Carolina DHEC will determine if the soils can be clean closed. However, groundwater has not been characterized for this site. The RFI Workplan will address the data gaps by characterizing the hydrogeology of this site and determining if groundwater is contaminated.

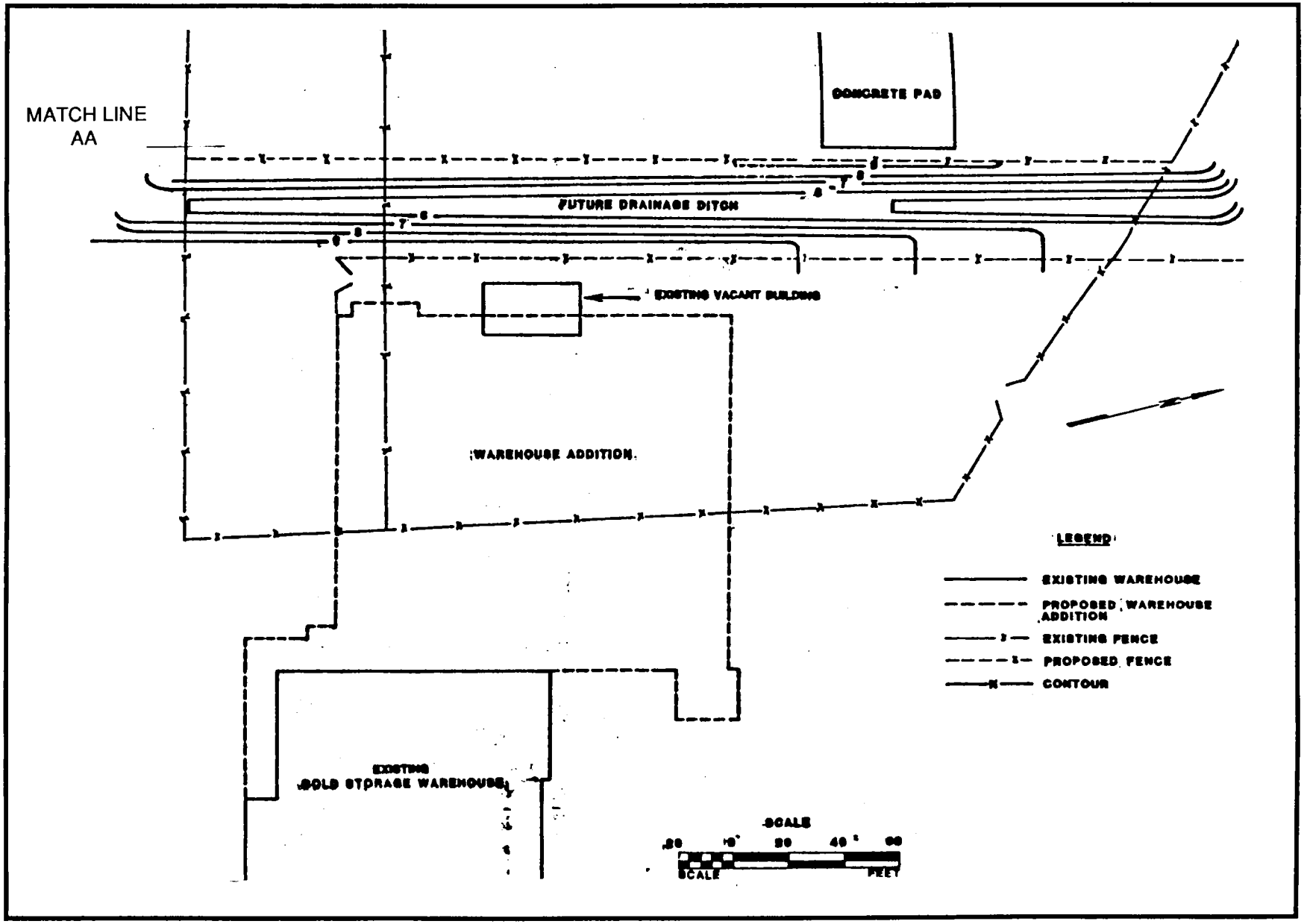

Figure 2-15. Construction-affected portion, public works storage yard. (Figure taken from Reference 3.)

Table 2-6

Parameters for analysis*-
Soil contamination assessment

(Table taken from Reference 3.)

GC/MS	METALS (TOTAL)	OTHER
Aminopyridine	Barium	Total cyanides
Carbon tetrachloride	Beryllium	Total sulfides
Chloroform	Cadmium	pH
Cresol	Chromium	Ignitability
Dichlorofluoromethane	Lead	
Diethyl ether	Mercury	
Ethylene dichloride	Nickel	
Ethylene oxide	Selenium	
Formaldehyde	Silver	
Methyl ethyl ketone		
Methyl isobutyl ketone		
Methylene chloride		
Pentachlorophenol		
Pyridine		
Toluene		
Trichloroethane		
Trichloroethylene		
Trichlorofluoroethane		
Trichlorofluoromethane		
Tetrachloroethylene		
Hydrazine		

*NOTE: Analytical methods for all parameters except hydrazine are specified in USEPA Publication SW 846; those methods will be followed. Method 625, specified at 40 CFR 136 under the Clean Water Act will be used for the analysis of hydrazine.

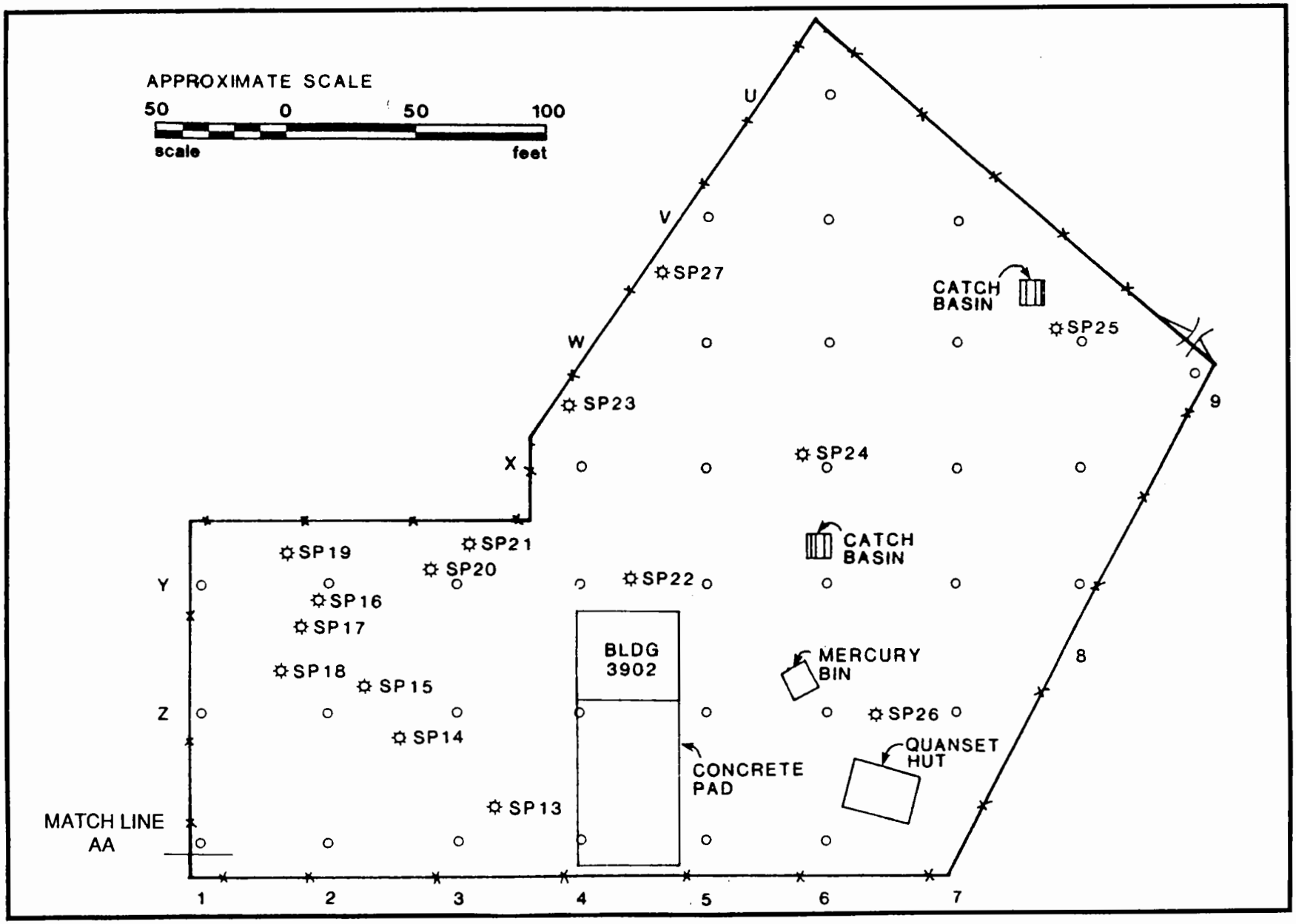

Figure 2-16. Sampling stations, public works storage yard. (Figure taken from Reference 5.)

2.6.7 PCB Transformer Storage Area. The PCB Transformer Storage Area (SWMU #7) consists of Building 3902 located within the Public Works Storage Yard, the adjacent concrete slab located outside the building, and surrounding areas that were used for storage of transformers and associated electrical equipment. Transformers no longer in service were brought to the concrete pad on the south side of the building prior to transportation off base between 1970 and 1976. Transformers were either sold intact or drained near the concrete pad prior to sale. The area around this concrete pad shows evidence of previous oil spills. The total amount of PCBs released to the soil and the concentrations in particular areas have not been adequately characterized. Transformers have been stored in a new hazardous waste storage and transfer facility since 1986. The site is abandoned with no material storage or activity in the area. The building is locked and a perimeter fence restricts access into the area.

The site was sampled in 1981 and 1982 to determine the presence of contaminants in soil and groundwater. As part of the Confirmation Study two groundwater monitoring wells (WOC-1 and WOC-2) were installed during 1982. The wells were installed to determine whether groundwater quality in the uppermost aquifer has been impacted by previous site activities. Water samples were analyzed for arsenic, pesticides, and PCBs (see Appendix G). Water from well WOC-1 contained 19 g/l of arsenic, 0.2 g/l of DDT, and 0.2 g/l of PCB (Aroclor 1260). Water from well WOC-2 contained 13 g/l of arsenic, 0.1 g/l of DDT, 1 g/l each of alpha, beta, and gamma benzene hexachloride (BHC) and 0.6 g/l of PCB (Aroclor 1260).

During the Confirmation Study, a soil sampling program was also conducted to determine the effects of past storage practices in the area. The sampling program was carried out in two phases. The first phase, conducted in July of 1981, consisted of collecting composite samples along lines running parallel to the sides of Building 3902 and the attached concrete slab (Figure 2-17). Four composite samples, A through D, were collected at a depth of six inches, one from each side of the building.

The second sampling phase was conducted in February, 1982 to better define the horizontal distribution of PCBs in the soil. Composite soil samples, OC-1 through OC-12, were collected on sampling lines paralleling each side of the building and attached slab at distances of 10 ft, 25 feet, and 40 away from the building and slab (Figure 2-17). As in Phase I, these samples were collected every 3 feet at a depth of six inches. A total of 12 composite soil samples, OC-1 through OC-12, were collected in the electrical transformer storage area during Phase II. These samples were analyzed for pesticide content, PCBs, and arsenic (Appendix G). The pesticide and PCB results are presented in Table 2-7.

The arsenic concentrations in the composite soil samples ranged from 1.3 g/gm in sample OC-12 to 15.5 g/gm in sample OC-3. The concentrations of PCBs in samples immediately adjacent to the building and slab, and the fence line (Phase I sampling lines A through D) were estimated to be less than 10 g/gm. Ten of the other 12 composite samples were found to contain one of the seven PCB compounds, Aroclor 1260. Samples OC-2, OC-3, and OC-11 contained the greatest concentrations of Aroclor 1260, 62.0, 37.0, and 11.0 g/gm, respectively. Samples OC-6, OC-7, and OC-8 contained 3.2, 3.0, and 1.1 g/gm. No Aroclor 1260 was detected in sample OC-1 or OC-12, and the other samples, OC-4, OC-5, OC-9, and OC-10, contained 0.675 g/gm or less. In general, the greatest concentrations of Aroclor 1260, were found east of Building 3902 at distances of 25 and 40 feet east of Building 3902.

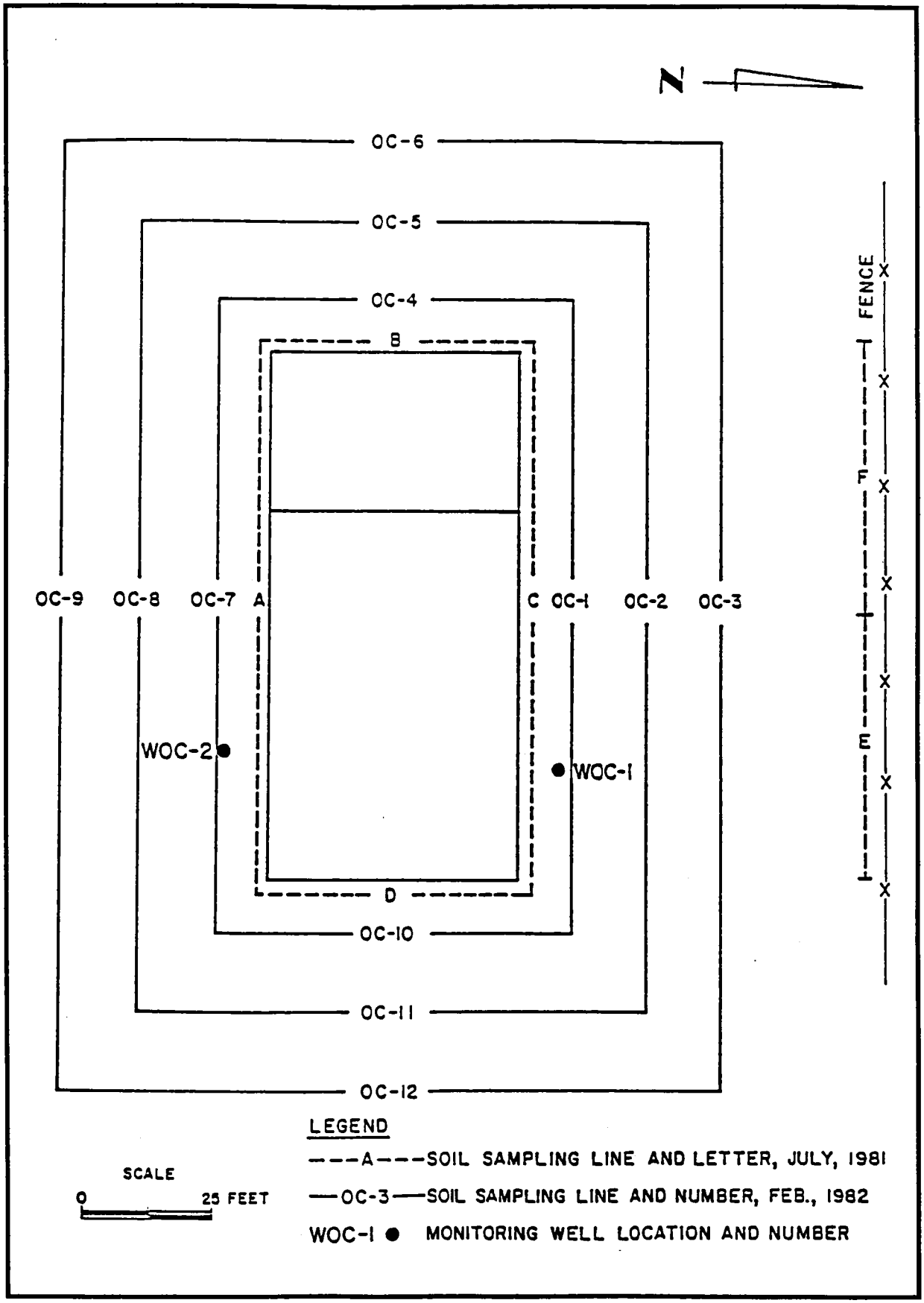

Figure 2-17. SWMU #7 Monitoring well and soil sample locations. (Figure taken from Reference 12.)

Table 2-7.

Concentration of PCBs and pesticides in samples from the electrical transformer storage area.
(Table compiled from Reference 12.)

SOIL SAMPLE	PCB	PESTICIDES
A	<10	
B	<10	
C	<10	
D	<10	
OC-1	ND	45
OC-2	62	9.4
OC-3	37	3.62
OC-4	0.675	0.337
OC-5	0.15	0.017
OC-6	3.2	1.75
OC-7	3	19
OC-8	1.1	5.2
OC-9	0.17	0.064
OC-10	0.53	16.5
OC-11	11	55.1
OC-12	ND	2.17

ND = Not Detected
Concentrations in µg/gm.
Pesticides are DDT, DDE and DDD combined

Residual concentrations of DDT and its daughter compounds were also found in the soil at the site. Samples OC-1, OC-2, OC-3, OC-6, OC-7, OC-8, OC-10, OC-11, and OC-12 all had DDT concentrations in excess of 1 g/gm with the highest concentrations, 28 and 40 g/gm in samples OC-1 and OC-11, respectively.

The soil samples also contained benzene hexachloride compounds (BHC), although the concentrations of these were generally much less than those found for DDT. PCBs and DDT were found at levels that pose a threat to human health or the environment. Arsenic and BHC are constituents that were commonly found in the formulation process of pesticides.

Because the samples were composited over large areas, delineation of the DDT and PCB contamination requires a more detailed sampling of the area prior to selection of an appropriate remedial action. The area east of the concrete pad was remediated during expansion of the cold storage warehouse in 1986 (see Section 2.6.6). The necessary additional delineation at this unit is described in Section 3.5 of this RFI Workplan.

2.6.8 Oil Sludge Pit. Oil sludges produced by industrial activities at NSY from 1944 to 1971 were disposed of in three unlined pits near the Warehouse Administrative Building. These pits are visible in aerial photographs taken in 1944 and 1951 and are collectively known as SWMU #8. Heavy rains occasionally caused the pits to overflow, creating oil spills in low areas adjacent to the pits. Two of the pits had been covered with fill by 1956, potentially trapping oil within the subsoils. Free oil is known to have been pumped from the remaining pit in 1974. Clean fill was then brought in and compacted within the pit. Portions of the area have now been converted into a parking lot. A ditch dug at this site in 1982 intercepted free oil floating on the water table. The ditch was dammed immediately afterwards and later filled to prevent migration of oil into Shipyard Creek.

During the Confirmation Study, two soil boring investigations were conducted. During Phase I, shallow borings were installed in the reported vicinity of the abandoned oil-sludge pits. The field investigation was expanded during Phase II after oil was discovered in a section of a newly-dug ditch located as shown in Figure 2-18.

Monitoring wells were installed by Geraghty and Miller in 1982 to assess the extent of oil in the subsurface (Ref. 12). A substantial quantity of free phase oil was floating on the water table. Water samples were collected from two of the wells installed in the area, wells OPW-1 and OPW-3 (Figure 2-18). Well OPW-2 was not sampled due to the presence of free phase oil. Samples were analyzed for sulfate content, 14 volatile organic compounds, and PCBs (see Appendix H). Wells OPW-1 and OPW-3 contained less than 1 and 780 mg/l of sulfate and 0.84 and 0.17 mg/l of methylene chloride, respectively. Methylene chloride is a common laboratory artifact. PCBs were not detected in the water sampled from OPW-3. However, the well OPW-1 sample contained 0.04 g/l of PCB (aroclor 1260).

Within the area of the abandoned oil-sludge pits, a total of 87 shallow borings were drilled to determine the areal extent of oil in the ground. Six borings were also drilled along the Cooper River to determine if oil seeping from these pits had moved toward the river. Because oil floats on top of the water table, the borings were drilled to the top of the water table which occurs in the area at an average depth of approximately four feet.

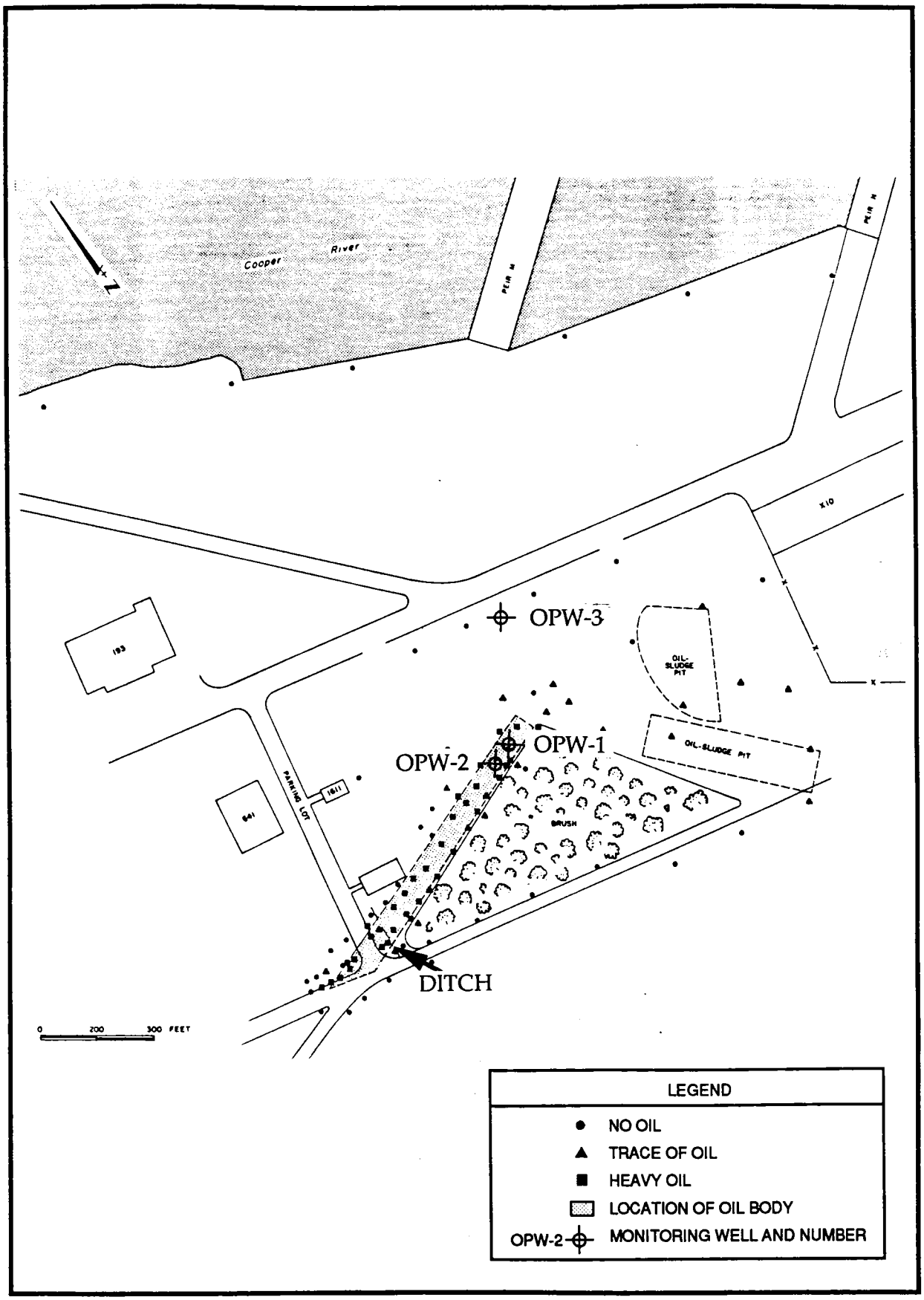

Figure 2-18. SWMU #8 Monitoring well and boring locations. (Figure taken from Reference 12.)

From the results of the boring program, it was determined that a long, narrow plume of free oil exists in the southwestern portion of the oil-sludge area. This area is approximately 50 ft wide by 600 ft long and trends in a northeast-southwest direction. Measurements taken in borings and in well OPW-2 indicate that the oil ranges in thickness from about two to four inches. East of the free floating oil plume is a small area containing oily residues. The remaining portions of the oil-sludge area were found to be free of oil (Ref. 12). Morphology of this plume reflects the shape of the underlying abandoned pit. The low hydraulic gradient, the low permeability of the surrounding soils, and the high viscosity of the oil within the soils may have limited the potential for oil migration.

This SWMU has been covered with fill and a portion of the area is currently being used for a parking lot. However, oil is reportedly trapped in the subsoil and could potentially migrate towards the Cooper River or Shipyard Creek. The data provided by Geraghty and Miller (Ref.12) characterize only the free floating oil in the groundwater. The free floating oil plume, dissolved phase plume, and constituents of the oil from each pit have not been characterized, nor have the site hydrogeologic conditions been adequately defined. Since potential migration of this plume to nearby surface waters could create a sheen in violation of applicable water quality criteria, the soil and groundwater contamination should be delineated and remediated. A soil and groundwater sampling plan designed to accomplish this goal is described in Section 3.0.

2.6.9 Closed Landfill. From the 1930's until 1973, many solid wastes generated at NSY were disposed of onsite in a landfill located in the southwestern portion of the peninsula (SWMU #9). Originally, the area was marshland. Items reportedly disposed of in the landfill include: asbestos, acids, PCBs, waste oils, waste solvents, waste paints, paint sludges, mercury, metal sludge, acid neutralization sludge, various inorganic and organic chemicals, sanitary wastes, office wastes and rubbish. Table 2-8 is a list of the industrial waste disposed of in the closed landfill. The largest volume of wastes consisted of office wastes and rubbish. Liquid wastes were placed in drums before disposal and combustible wastes were burned daily. Residue from the burning was pushed into the marsh as fill along with concrete rubble, metal scrap, and other non-combustible materials. Waste materials were covered with soils when they were available. Soils from onsite building excavations, soil dredged from the river, and bottom ash from the power plant were used as cover materials. Much of the site is currently paved and used as a parking lot.

NSY has installed 17 groundwater monitoring wells in and around the landfill to characterize the chemical quality of the groundwater in the vicinity. Some of the wells were initially sampled during July, 1981. The samples were analyzed for several physical and chemical parameters. Additional sampling was performed in February, 1982, and analyses were conducted for inorganic and organic priority pollutants. The complete results of these sampling efforts are reported in Appendix I-1. Table 2-9 summarizes the data for constituents reported above analytical detection limits in all monitoring wells. Several trace metals and chlorinated organic compounds are present in the groundwater in the vicinity of the landfill. These constituents likely reflect past disposal of metal plating sludges, waste chemicals, and industrial degreasing solvents disposed in the landfill (Ref. 9).

Table 2-8

Industrial waste disposed in closed landfill

(Table taken from Reference 9.)

Waste	Origin	Current Annual Generation Rate	Years of Disposal
Asbestos	Boiler Shop	1,000 lbs	70
Asbestos	SIMA	2 yds	15
Varnish Sludge	Electrical Shop	300 gal	70
Mercury	Electrical Shop	25 lbs	70
Acid Neutralization Sludge	Electrical Shop	400 gal	70
Paint Sludge	Electronics Shop	200 gal	70
Metal Sludge	Machine Shop 31	50,000 lbs	70
PCB Fluids	Central Tool Shop	None	40
Paint Wastes	Paint Shop	226 tons	70
Toxic NRP Water Chemicals	NSC	1,330 lbs	10

Table 2-9

Summary of trace metal and organics data for the closed landfill monitoring wells

(Table taken from Reference 9.)

Constituent	Concentration Range (ug/l)
Metals	
Arsenic (As)	<10-70
Barium (Ba)	370-4,620
Chromium (Cr)	<5-8.2
Mercury (Hg)	<0.1-0.4
Lead (Pb)	<5-22
Acid Organics	
Pentachlorophenol	ND-15
Phenol	--
2,4,6-Trichlorophenol	--
2,4-Dichlorophenol	--
4,6-Dinitro-o-cresol	--
Base/Neutral Organics	
1,4 Dichlorobenzene	--
2,4 Dinitrotoluene	--
N-nitrosodiphenylamine	--
Bis(2-ethylhexyl) phthalate	ND-90
Diethyl phthalate	--
Di-n-butyl phthalate	--
Naphthalene	--
Acenaphthene	--
Anthracene/Phenanthrene	--
Indeno(1,2,3-cd)pyrene	--
Volatile Organics	
Methylene chloride	ND-1,600
Chlorobenzene	ND-50
Chloroform	ND-5.4
Dibromochloromethane	ND-3.4

ug/l = micrograms per liter.
ND = Not detected.
-- = 1 to 9 ug/l.

A second geotechnical and environmental investigation for the proposed new Fire Fighting Training Facility was performed by Westinghouse Environmental and Geotechnical Services (Ref. 17) in April, 1991. Five test pits and four shallow groundwater monitor wells were constructed at the proposed new training facility site (Figure 2-19). Soil and groundwater samples were analyzed for volatile organic and semi-volatile organic compounds, RCRA metals, and pH.

The laboratory results of the soil samples indicated elevated levels of some metals and organics in all soil samples collected. A summary of the soil sample results which were identified above the method detection limits are identified in Table 2-10. Appendix I-2 presents the test pit observation logs and analytical data. Lead was found to be elevated in all five samples. Other metals which were found to be elevated included chromium, arsenic and barium. The highest metals concentrations were detected in test pits TP-2 and TP-2A. The other test pits were found to contain only lead, with the exception of test pit TP-8 where 49 mg/kg of chromium were detected. The organics which were detected were, for the most part, petroleum derivatives. In addition, some constituents which are typically found in plastics were also identified. The petroleum constituents which were identified were typical of heavier products. This could indicate either that the wastes contained heavier product types (fuel oil, waste oil, bilge water, etc.) or that the light constituents (i.e., gasoline) have volatilized over time. The plastics constituents identified are typical of landfilled wastes (plastic bags, rubber, etc.).

The laboratory results of the groundwater samples (Table 2-11) indicated that the groundwater has been impacted. As with the soil samples, most of the organic constituents detected were petroleum derivatives. However, some chlorinated solvents were also detected including 1,1,1-Trichloroethane and Trichloroethene. Of the organic constituents detected in the groundwater, of most concern is benzene. Benzene is identified in monitoring wells CSY-FMW-2 (20 g/l) and CSY-FMW-4 (6.9 g/l) which are both above the drinking water standard of 5 g/l. The other organic constituents were found at relatively low levels. Various metals including copper, zinc, antimony nickel, lead, and selenium were detected above the method detection limits in the groundwater samples although none of the established drinking water standards were exceeded.

Monitoring well gauging results from 10 February 1982 suggest that a groundwater ridge exists along an east to west trending axis across the central portion of the site. Hence, groundwater flow appears to be northerly within the northern part of the closed landfill area and southerly over the southern portion of the site (Figure 2-19). A comparison of the landfill soil and groundwater analytical data with the EPA proposed action levels and MCLs shows that most of the constituents are below the proposed action levels. However, the previous investigation was of limited scope. Additional delineation of soil and groundwater contamination is proposed in Section 3.7 of this RFI Workplan.

2.6.10 Hazardous Waste Storage Facility. The new hazardous waste container storage and transfer facility (SWMU #10) was completed in October 1986. The facility was constructed to serve the entire base and is managed by the shipyard. Current status of the unit is that of a permitted storage facility with permission to store wastes for a maximum of 90 days. The building contains seven storage bays. Each bay has separate spill containment berms to allow flexibility in segregating incompatible wastes.

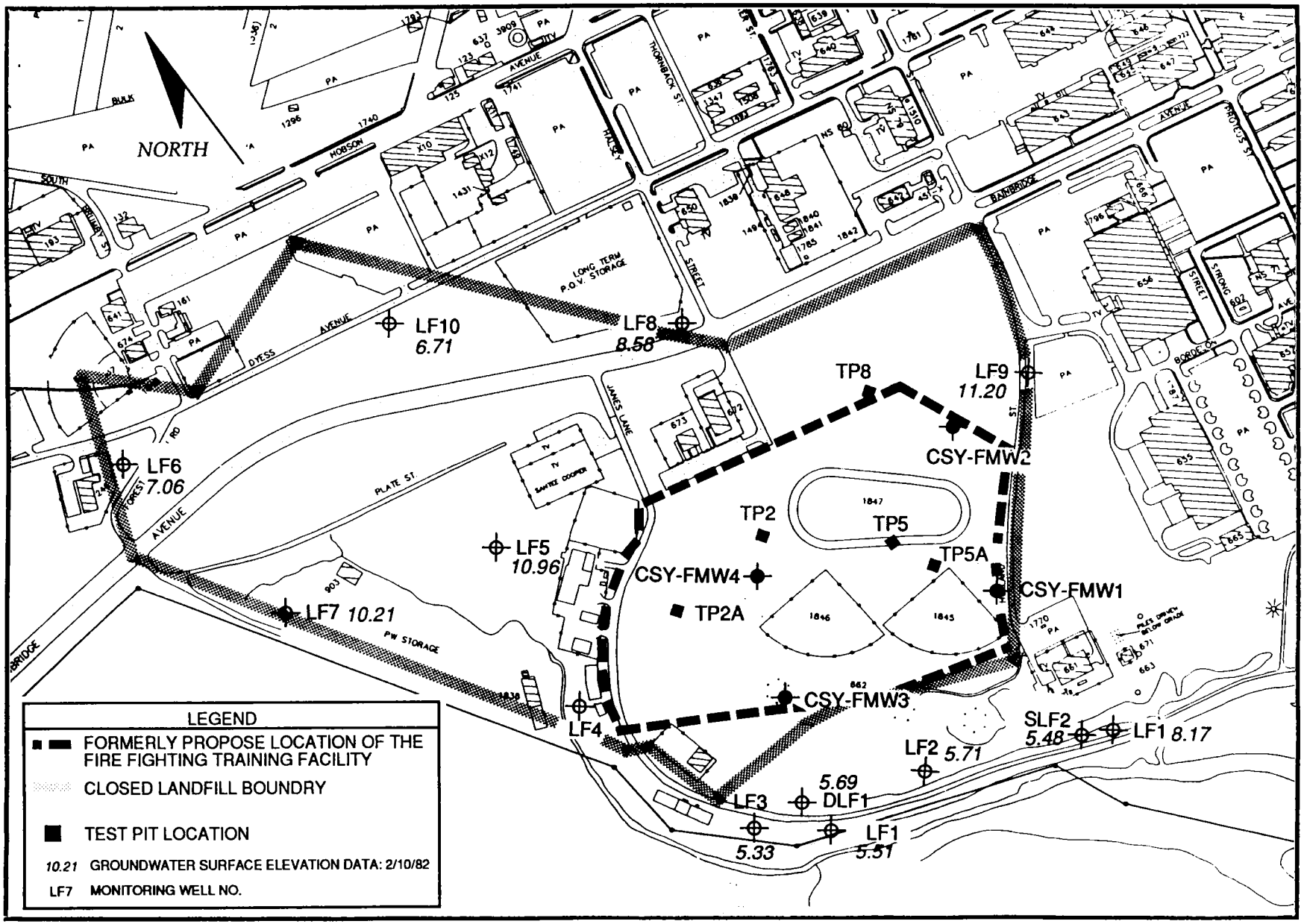

Figure 2-19. Closed landfill area plan. (Figure compiled from References 12,17.)

Table 2-10.

Summary of soil sample results
Fire Fighter Training Facility
(Table taken from Reference 17.)

TEST PIT NUMBER	CONSTITUENT IDENTIFIED ABOVE DETECTION LIMIT	CONCENTRATION	
TP-2	Lead	170	mg/kg
	Chromium	11	mg/kg
	Butylbenzylphthalate	358	µg/l
	1-Methylnaphthalene	380	µg/l
	2-Methylnaphthalene	560	µg/l
	Naphthalene	400	µg/l
	Pyrene	500	µg/l
	Fluoranthene	580	µg/l
TP-5	Lead	15	mg/kg
	p Dichlorobenzene	17.9	µg/l
	Naphthalene	390	µg/l
TP-8	Lead	3210	mg/kg
	Chromium	49	mg/kg
	Chlorobenzene	154	µg/l
	o-Dichlorobenzene	23.3	µg/l
	p-Dichlorobenzene	97.0	µg/l
	Acenaphthene	160	µg/l
	Acenaphthylene	165	µg/l
	Benzo(a)anthracene	260	µg/l
	Benzo(b)fluoranthene	470	µg/l
	Benzo(k)fluoranthene	470	µg/l
	Benzo(a)pyrene	240	µg/l
	Bis(2-Ethylhexyl)phthalate	8690	µg/l
	Buthylbenzylphthalate	3330	µg/l
	Chrysene	420	µg/l
	1, 4 Dichlorobenzene	100	µg/l
	Fluorene	210	µg/l
	1-Methylnaphthalene	330	µg/l
	2-Methylnaphthalene	630	µg/l
	Naphthalene	580	µg/l
	Phenanthrene	1800	µg/l
	Pyrene	1290	µg/l
	Fluoranthene	1920	µg/l

Table 2-10. (continued)

Summary of soil sample results
Fire Fighter Training Facility
(Table taken from Reference 17.)

TEST PIT NUMBER	CONSTITUENT IDENTIFIED ABOVE DETECTION LIMIT	CONCENTRATION	
TP-2A	Lead	22	mg/kg
	Arsenic	11	mg/kg
	Barium	110	mg/kg
	Chromium	15	mg/kg
	Total Xylenes	6.3	µg/l
	Anthracene	100	µg/l
	Benzo(a)anthracene	230	µg/l
	Bis(2-Ethylhexyl)phthalate	630	µg/l
	Butylbenzylphthalate	130	µg/l
	Chrysene	120	µg/l
	Naphthalene	560	µg/l
	Phenanthrene	180	µg/l
	Pyrene	430	µg/l
	Fluoranthene	550	µg/l
TP-5A	Lead	10	mg/kg
	Butylbenzylphthalate	2130	µg/l
	1-Methylnaphthalene	380	µg/l
	2-Methylnaphthalene	560	µg/l
	Naphthalene	720	µg/l

Table 2-11.

Summary of groundwater analyses
Fire Fighter Training Facility
(Table taken from Reference 17.)

MONITORING WELL	CONSTITUENT IDENTIFIED ABOVE DETECTION LIMIT	CONCENTRATION	
CSY-FMW-1	Benzene	1.9	µg/l
	Chlorobenzene	1.7	µg/l
	p-Dichlorobenzene	0.3	µg/l
	Toluene	2.2	µg/l
	Anthracene	1.1	µg/l
	Phenanthrene	1.1	µg/l
	Copper	0.040	mg/l
	Zinc	0.060	mg/l
	Antimony	0.003	mg/l
	Nickel	0.040	mg/l
CSY-FMW-2	Benzene	5 ppb 20.0	µg/l
	Chlorobenzene	700 µg 13.6	µg/l
	p-Dichlorobenzene	7.5	µg/l
	Ethylbenzene	2.7	µg/l
	Toluene	4.6	ug/l
	1,1,1-Trichloroethane	0.80	µg/l
	Trichloroethene	0.40	µg/l
	Acenaphthene	1.3	µg/l
	1,4-Dichlorobenzene	7.2	µg/l
	Naphthalene	2.2	µg/l
	2 Methylnaphthalene	5.5	µg/l
	Copper	0.030	mg/l
	Lead	0.002	mg/l
	Selenium	0.002	mg/l
	Zinc	0.07	mg/l
	Antimony	0.004	mg/l
	Nickel	0.06	mg/l
CSY-FMW-3	Benzene	1.5	µg/l
	Chlorobenzene	7.5	µg/l
	p-Dichlorobenzene	1.1	µg/l
	Toluene	1.7	µg/l
	1,1,1-Thrichloroethane	0.6	µg/l
	Copper	0.020	mg/l
	Zinc	0.06	mg/l
	Nickel	0.04	mg/l

Table 2-11. (continued)

Summary of groundwater analyses
Fire Fighter Training Facility
(Table taken from Reference 17.)

MONITORING WELL	CONSTITUENT IDENTIFIED ABOVE DETECTION LIMIT	CONCENTRATION	
CSY-FMW-4	Benzene	5µg/l 5.9	µg/l
	Chlorobenzene	9.6	µg/l
	o-Dichlorobenzene	0.4	µg/l
	p-Dichlorobenzene	4.8	µg/l
	Toluene	0.9	µg/l
	1,1,1-Trichloroethane	0.6	µg/l
	Acenaphthene	4.3	µg/l
	Anthracene	3.0	µg/l
	1-4, Dichlorobenzene	4.5	µg/l
	Fluorene	2.2	µg/l
	Naphthalene	1.2	µg/l
	Phenanthrene	3.0	µg/l
	2-Methylnaphthalene	3.9	µg/l
	Copper	0.020	mg/l
	Selenium	0.003	mg/l
	Zinc	0.05	mg/l
	Nickel	0.05	mg/l

The hazardous waste storage facility is designed to store hazardous materials/wastes until time of proper disposal. A 6-inch high concrete ramp is located at the entrance to each storage bay for spill containment. Storage bays are separated by interior partition walls. A catch basin for spill and storm drainage is located in the exterior load/unload area. Wastes stored in the facility are grouped into eight categories: (1) flammable liquids, (2) acids, (3) alkalis, (4) chlorinated hydrocarbons, (5) oxidizers, (6) reducers, (7) general wastes, and (8) PCBs. These general classifications are reflected on signs used to identify the contents of each storage bay. The unit is constructed of concrete with sloped floors bounded by curbs in order to isolate leaks or spills within each storage bay.

There is no evidence of a release from this unit. No action is planned in this Workplan to be taken at this unit.

2.6.11 Caustic Pond. The caustic pond (SWMU #11), located near the junction of Bainbridge Avenue and Viaduct Road, was used for the disposal of calcium hydroxide $Ca(OH)_2$ from the early 1940's through the early 1970's. The site and adjoining areas are currently covered with vegetation. No signs of impairment can be observed in the area.

Calcium hydroxide was generated as a byproduct during the reaction of water with calcium carbide to produce acetylene gas. Water saturated with $Ca(OH)_2$ was discharged to and allowed to settle in the pond during operations. Supernatant was discharged to Shipyard Creek. The quantity and areal extent of the original $Ca(OH)_2$ deposits are not precisely known. Soil borings conducted during the initial assessment studies found sludge depths of up to one foot (Ref. 9). Water infiltrating into the surficial groundwater through $Ca(OH)_2$ should have a high pH. Samples collected from the monitoring wells around the site, however, show that groundwater is neutral in pH (Ref. 12).

Four monitoring wells were installed in the area of the caustic pond during the Confirmation Study conducted at NSY. Water samples were collected from each of the four monitoring wells (Figure 2-20) to assess the impact of the disposal of calcium hydroxide on the shallow groundwater environment. The samples collected were analyzed in the field for pH and specific conductance and, in a water quality laboratory, for calcium, chloride and sulfate content (Appendix J). The results indicate that the pH is slightly acid to slightly basic, ranging from 6.3 to 7.3. The calcium and chloride contents and specific conductance are somewhat elevated, ranging, respectively, from 101 to 490 mg/l, from 423 to 823 mg/l, and from 1,970 to 7,400 mhos/cm (micromhos per centimeter). The relatively neutral pH values suggest that the normally high pH of the caustic water infiltrating from the pond has been lowered due to the naturally occurring acidic soils at the site (Ref. 12).

Calcium hydroxide does not occur naturally and cannot persist for extended periods when released to the environment. It reacts with carbon dioxide which diffuses from the air or is carried by infiltrating rainwater to form calcium carbonate (limestone). The groundwater data indicate that this process has gone to completion and that no calcium hydroxide remains.

Calcium hydroxide contains no hazardous constituents but is hazardous by definition (40 CFR 261.22(a)(1).) only when it is in solution and causes the pH to be greater than 12.5 standard units. This rarely occurs outside of laboratory conditions but is possible with saturated solutions

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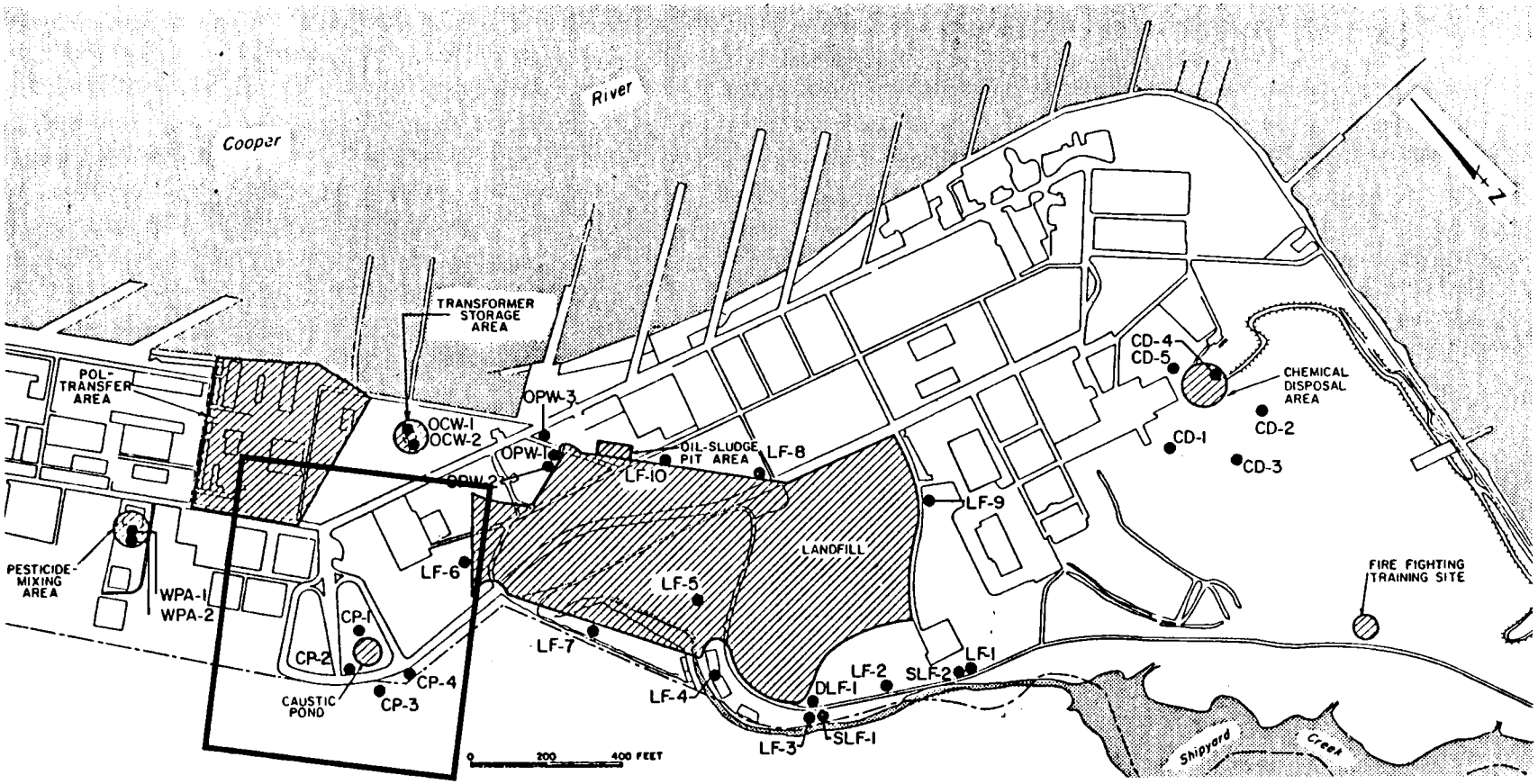

Figure 2-20. Location of monitoring wells – Caustic Pond Area. (Figure taken from Reference 12.)

of relatively pure $Ca(OH)_2$ at temperatures below 23.6 C. In any case, groundwaters beneath SWMU #11 are not even slightly elevated in pH. Consequently, no further investigation is planned at this site.

2.6.12 Old Fire Fighting Training Area. The old fire fighting training area (SWMU #12) consisted of a pit located at the southern end of NSY. The pit reportedly measured between 30 and 50 feet in diameter. It was used between 1966 and 1971 for training purposes. Oil, gasoline, and alcohol were poured into the pit, ignited, and subsequently extinguished during fire fighting training exercises.

The pit area is no longer discernible from the surrounding surface topography. The location of the pit is now known only from old aerial photographs. The pit area is currently separated from Shipyard Creek by a dense zone of shrubs, hardwoods, and a roadbed.

The pit was cited by the U.S. Coast Guard in 1971 for an oil spill. The spill occurred following a heavy rainfall which caused the oil in the pit to overflow into Shipyard Creek. The pit was closed, filled with bottom ash, and leveled in 1972.

The approximate location of the pit was determined by NSY personnel. Three soil borings were drilled at the fire fighting pit: one in the center of the pit, and the other two along the road bordering Shipyard Creek (Figure 2-21). Soil boring sample results at the site showed no trace of petroleum contamination (Ref. 12). No investigative action is planned for this site.

2.6.13 Current Fire Fighting Training Area. Fire fighting training for both surface and submarine fleet personnel is currently conducted at the Fleet and Mine Warfare Training Center on Dyess Avenue. The training center (SWMU #13), in use since 1973, uses approximately 20,000 gallons of No. 2 diesel fuel and 2,000 gallons of gasoline per year in training operations. Training exercises include extinguishing ignited diesel fuel and gasoline. Fuel, floating on water in tanks or sprayed onto mock buildings, is ignited in a controlled area consisting of a paved ground with bermed perimeters.

Wastewater from the area is routed through a gravity oil-water separator, prior to discharge into a sanitary sewer system leading to the North Charleston Consolidated Public Service Department (NCCPSD) sewage treatment plant. Recovered fuels are recycled. Effluent from the operation is well below discharge limits imposed by NCCPSD.

There is no evidence of releases from this unit. No investigative activity is planned for this SWMU.

2.6.14 Chemical Disposal Area. The chemical disposal area (SWMU #14) is located at the southern end of the active portion of NSY in the vicinity of the skeet and pistol ranges. The precise locations of chemical burials are unknown. Unknown amounts of various chemicals, including Decontaminating Agent Non-Corrosive (DANC) and DS-2 have reportedly been disposed of at the site. DANC consists of separately packaged components of tetrachloroethane and dichlorodimethyl-hydrantoin. DS-2 is a mixture of 70% diethylene triamine, 28% methyl cellosolve, and 3% sodium hydroxide. Other chemicals may have been buried either at the skeet range or behind the dike at the pistol range or both. Ten 5-gallon canisters of DS-2 were

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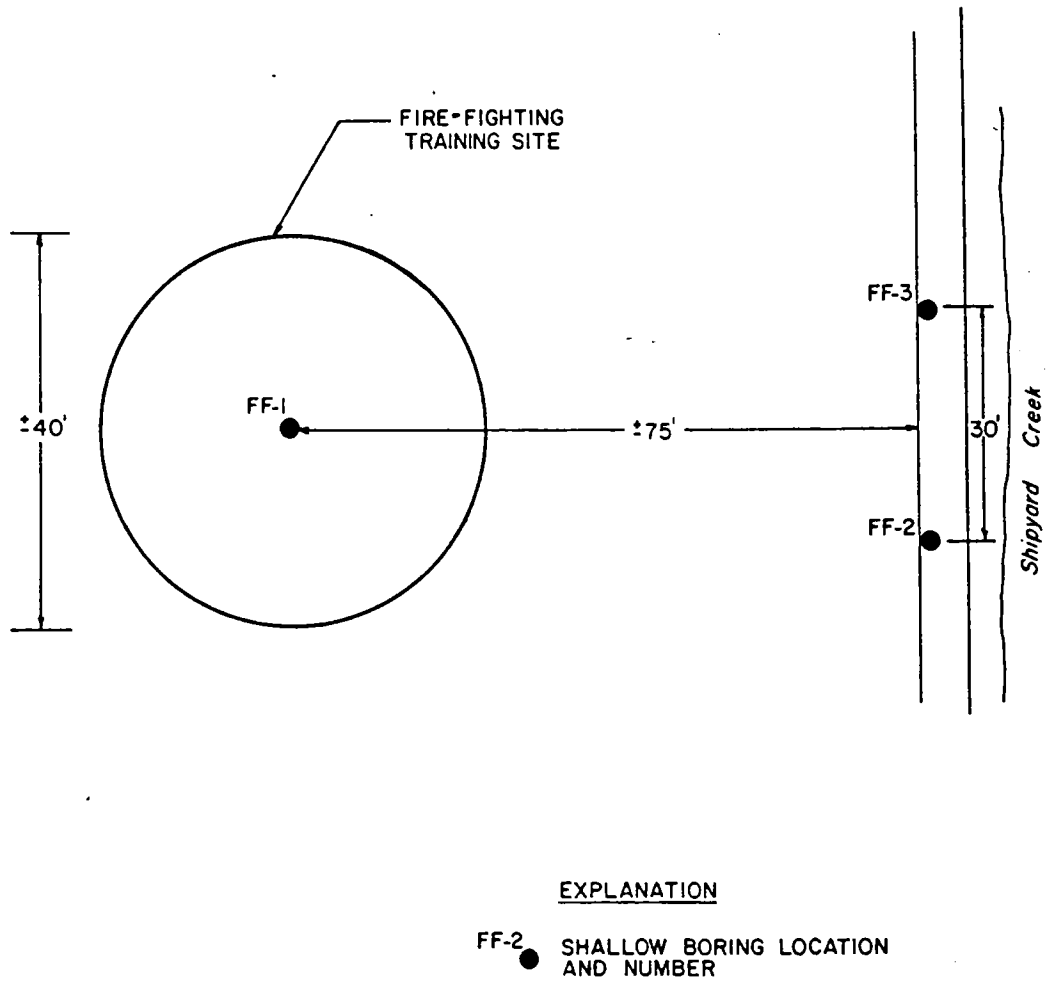

Figure 2-21. Former Fire-Fighting Pit – Boring Locations. (Figure taken from Reference 12.)

reported buried at the skeet range in 1977. Construction crews unearthed drums of chemicals at the skeet range in 1972 and 1974. Some workers suffered minor chemical burns in the excavation episodes.

During the Confirmation Study conducted at NSY, five groundwater monitoring wells were installed in the vicinity of the chemical disposal area (Figure 2-22). Water samples collected from these wells were analyzed for pH, cadmium, iron, lead, magnesium, mercury, sodium, fluoride, nitrate, sulfate, total organic carbon, specific conductance, chloride, base-neutral compounds and volatile organic compounds. The results of these analyses are presented in Appendix K.

The data show that shallow groundwater in the chemical disposal area has conductivities ranging from 1,900 to 27,000 mhos/cm, a pH from 6.68 to 8.63, and is mineralized. The levels of cadmium, lead, and mercury were below their detection limits, the iron content was less than 1.2 mg/l, and the fluoride content was less than 1 mg/l. No quantifiable amounts of base-neutral compounds were found except for 15 and 34 g/l of bis(2-ethylhexyl) phthalate in wells CD-4 and CD-2, respectively. This compound is common around industrial areas and is present in sediments of all rivers receiving municipal or industrial effluent. Either Navy industrial activity or the presence of dredged material could account for its presence (Ref. 12).

The water samples analyzed for volatile organic compounds indicated that chlorobenzene was present at levels of 0.14 and 10.68 mg/l in wells CD-3 and CD-5, respectively. During a second sampling episode, well CD-3 contained 1.5 g/l of chloroform and methylene chloride was found in all five wells at levels up to 2.0 mg/l. Methylene chloride is frequently used as a degreasing agent, and the data suggest that waste materials containing methylene chloride may have also been deposited in the chemical disposal area (Ref. 12).

The water samples were also analyzed for 1,1,2,2-tetrachloroethane during the scan for volatile organic compounds. The results show that 1,1,2,2-tetrachloroethane was not present in any of the five monitoring wells.

Construction activities are proposed for the site. This area represents a potential safety hazard, because the type, quantity, and exact location of the chemical disposal areas are unknown. Also, the potential for impacts via groundwater pathways has not been adequately characterized. Section 3.0 of this RFI Workplan includes a description for further investigation to be performed at this site.

2.6.15 Incinerator. The incinerator (SWMU #15) is located adjacent to the pistol range and consists of a primary burning chamber and a 30-foot high stack. The unit is used only for burning of classified documents. Incineration activities occur approximately twice per week. Residues from incineration operations are placed in waste disposal containers and disposed of along with other NSY solid waste. The unit is situated on a concrete pad. Since the incinerator burns only paper, no hazardous residues are generated. No releases have occurred at this unit. No additional investigations are planned for this RFI Workplan.

2.6.16 Paint Storage Bunker. The paint storage bunker (SWMU #16) was used briefly, and without proper authorization, for paint container and miscellaneous material storage piles. It was located at an ammunition magazine adjacent to the Cooper River. The storage piles

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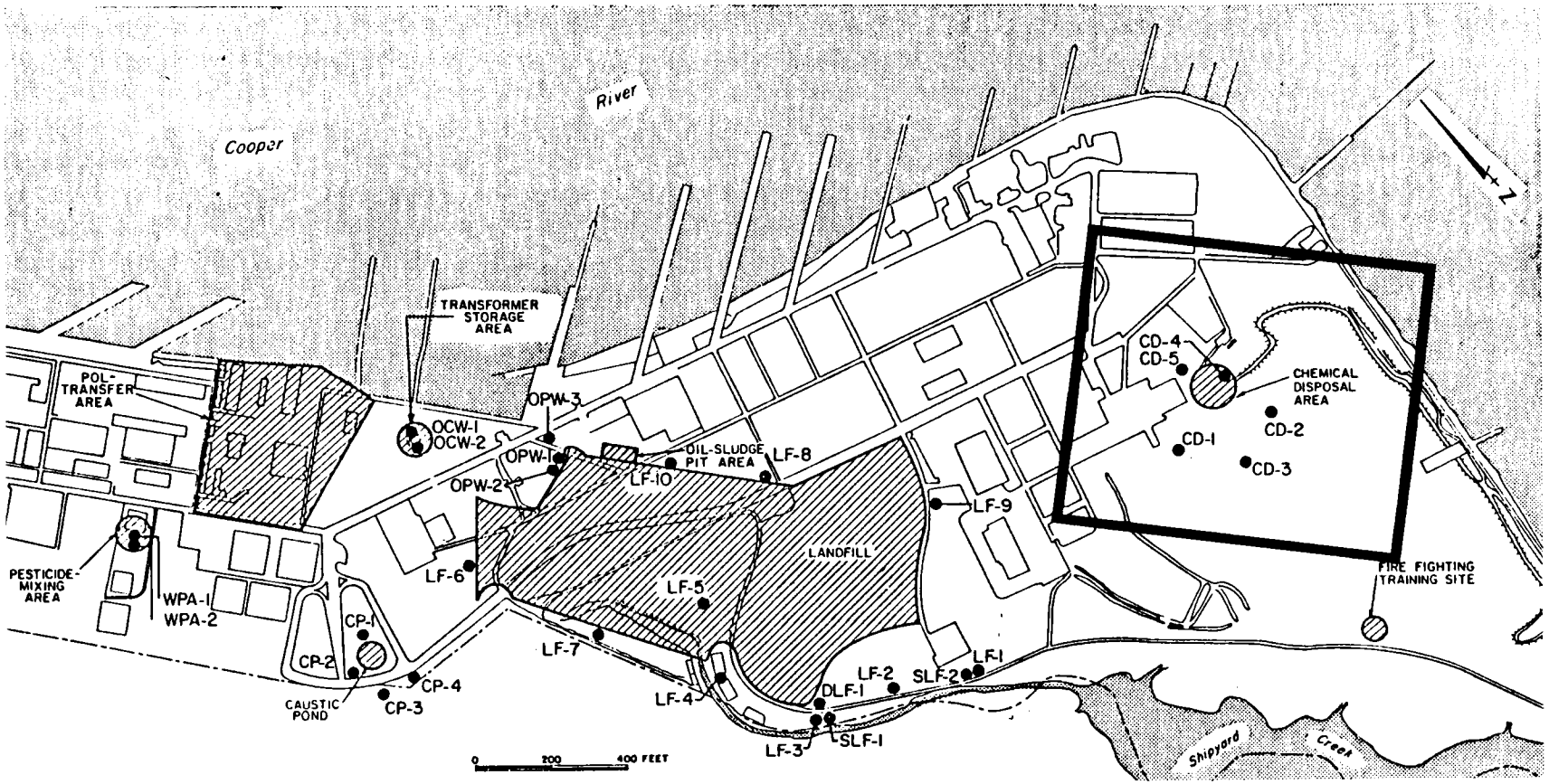

Figure 2-22. Location of monitoring wells–Chemical Disposal Area. (Figure taken from Reference 12.)

contained paint, paint thinner, oil containment booms, wooden crates, and buoys (Ref. 2). The site was clean closed on the day it was brought to management attention, during a DHEC site inspection. No additional investigation is planned.

2.6.17 Oil Spill Area. The oil spill area (SWMU #17) is located beneath Building FBM61 (Figure 2-22A). The spill occurred in June 1987 when an underground pipe supplying No. 2 diesel fuel to the boiler in Building FBM61 ruptured, spilling a small amount of its contents into the basement of the building and several thousand gallons into soils beneath the building. Some of the oil entered drainage sumps beneath the building, entered the storm drainage system, and discharged into the Cooper River. The resulting slick was promptly contained. Remediation efforts subsequently removed all floating oils from the water table.

Building FBM61 was built in 1961 as a Submarine Training Center. Electrical transformers were installed to serve the center at that time. Several samples collected from the spill area were found to contain PCBs (see Figure 2-22A and Table 2-11A). The quantity and source of PCBs beneath the building remain uncertain. PCBs from the transformers were probably released many years ago before the area was paved. The entire area is capped either by the building or an adjacent paved parking lot. Consequently, there is no current potential for exposure. However, data gaps exist concerning the full extent of subsurface impacts resulting from the spill. Section 3.9 of this RFI Workplan describes additional soil and groundwater sampling planned for this unit.

2.6.18 PCB Spill Area. The PCB spill (SWMU #18) occurred at Building 1278 on 12 June 1987 while a PCB-containing transformer destined for disposal was being loaded onto a truck. The loading accident resulted in discharge approximately 75 gallons of insulating fluid (Pyranol) from the unit onto unprotected ground. The contractor immediately placed a drip pan under the transformer to catch the flow of additional fluid. Three 55 gallon drums of fluid were drained from the transformer by response personnel. Steps were then taken to contain the spill area via installation of trenches and construction of a clay absorbent berm north of the spill to prevent migration of liquids into the storm drain. The spill area and other features are shown in Figure 2-22B. Twenty-two drums of oil saturated soils/absorbents and asphalt were excavated and hauled offsite for disposal. The spill area was covered with plastic sheeting.

Visibly contaminated soils were removed directly after the spill. Subsequent sampling of the area, however, showed additional excavation of soil was necessary. An additional 85,000 pounds of soil were removed from the spill site and disposed of in June 1987. Soils were resampled following this excavation and again revealed unacceptable levels of contamination. On 5 August 1987, additional soils were excavated and disposed of. Five confirmation samples were retrieved and analyzed for PCB's. These results indicated that additional excavation was required. These laboratory results are included in Appendix O. The site has been completely remediated (Ref. 1) under the Toxic Substances Control Act. The area is currently used for storage of empty drums and used oil. No further investigation of the site is planned under this RFI Workplan.

2.6.19 Solid Waste Transfer Station. The Solid Waste Transfer Station (SWMU #19) consists of a staging area for temporary storage of solid waste, prior to transport and disposal off-site. The solid waste is compacted after collection and temporarily stored at the site in containers. No

hazardous wastes have been stored at the site and the unit is only used for temporary storage of solid waste. No releases of hazardous constituents have occurred at this SWMU. No additional investigations are planned for this RFI Workplan.

2.6.20 Waste Disposal Area. The Waste Disposal Area (SWMU #20) occupies an open area adjacent to the solid waste transfer station and has been in operation since 1985. Solid wastes consisting of cardboard boxes, wood, concrete blocks, tree stumps, sandblasting residues, and a small number of vehicle batteries were disposed of in this area. The few batteries disposed of at the site are the sole concern. This SWMU overlies the old sanitary landfill (SWMU #9).

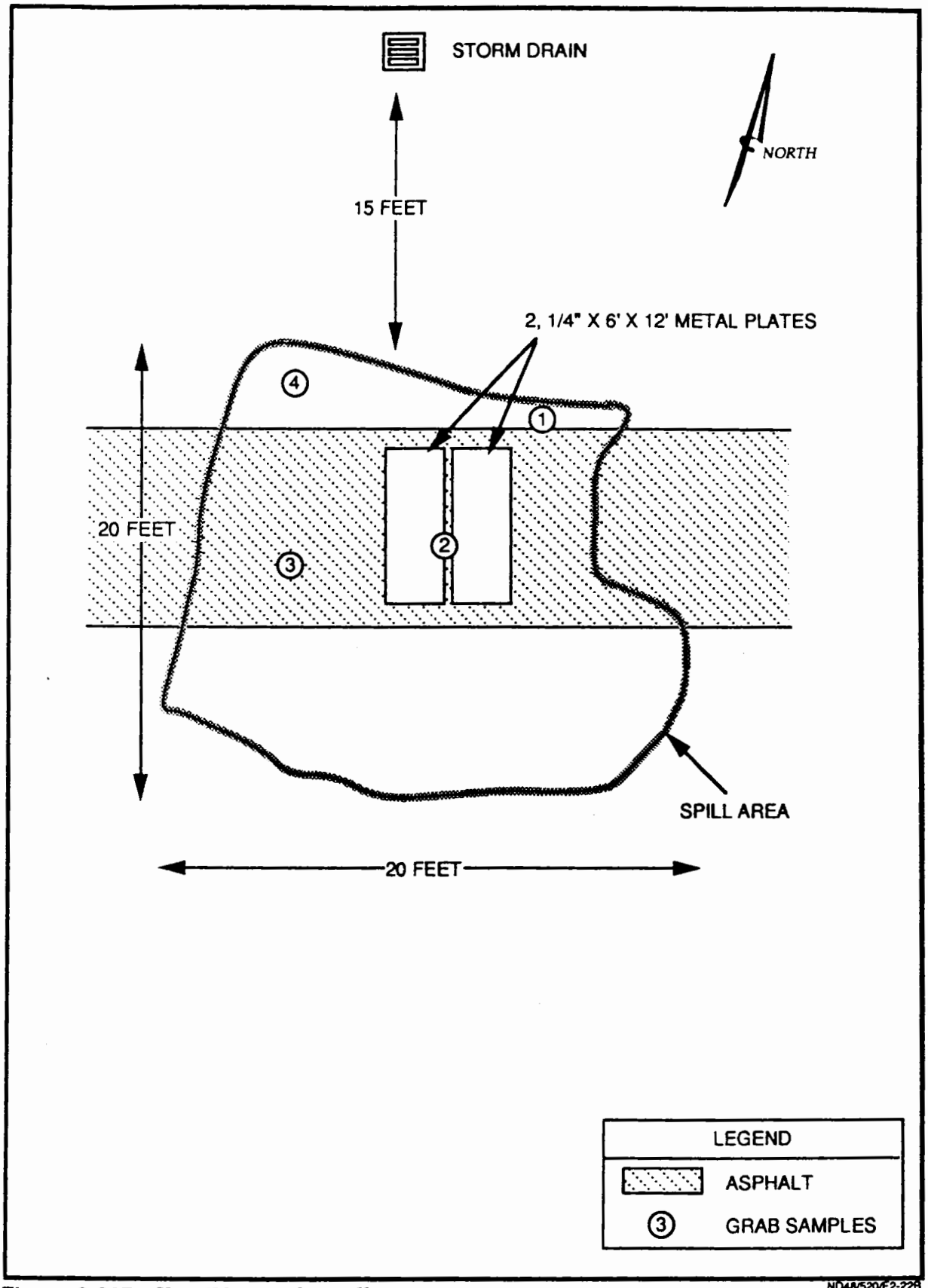

Figure 2-22B. SWMU #18 PCB spill area.

SAMPLING POINTS AT FBM-61

Soil

#69 TV Northside
#70 Dirt Pile Southside from diging
#71 Drummed dirt from Southside diging

Oil Recovered From River

#81 - 95

Oil Sampling Point

65 - Tank 25B
66 - NS 600
67 - 19B
68 - Unknown (NSC 700)
72 - 5800 gal tank car
73 - NSC 700
74 - North sump
75 - Southeast sump
76 - South center sump
77 - Southwest sump
78 - 19B
79 - 25B
80 - NS 600
96 - Inside sump

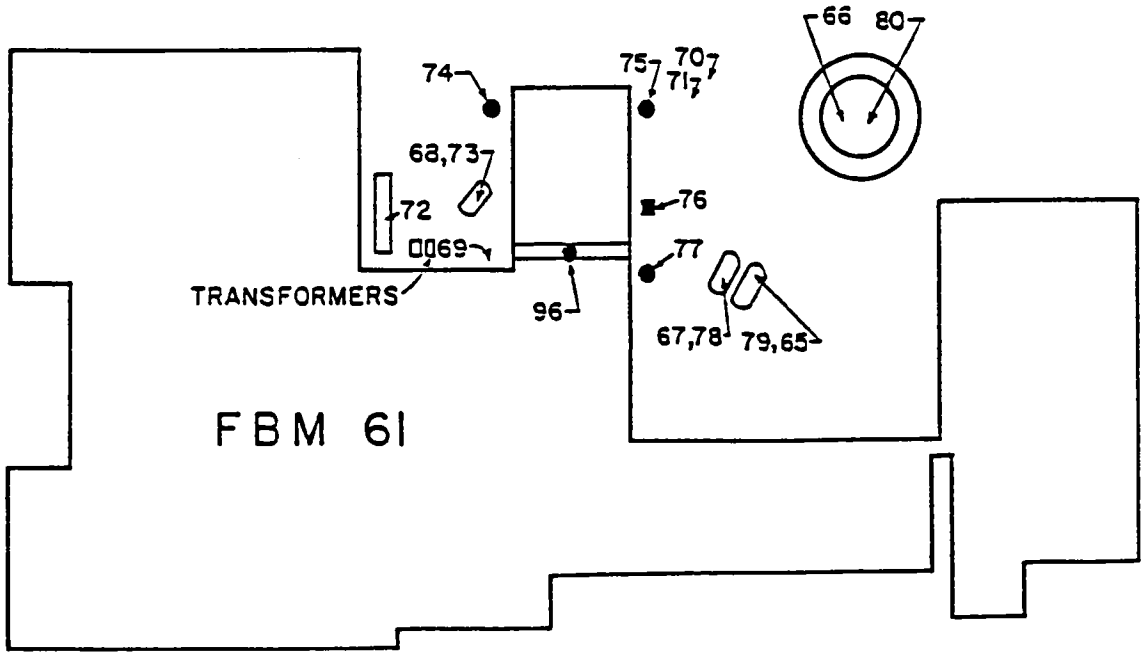

Figure 2-22A. SWMU #17, Oil Spill Area. (Figure taken from Reference 2.)

Table 2-11A.

Sampling points and PCB concentrations
at FBM-61
Oil Spill Area
(Table taken from Reference 2.)

Sample Point		PCB Concentration (ppm)
#65	Tank 25B	<10
#66	NS 600	<10
#67	19B	T 118 B <1
#68	Unknown tank (NSC700)	T 306 B <1
#69	TV north side (soil)	139
#70	Dirt pile southside from diging	1
#71	Drummed dirt from south side digging	6
#72	5800 gal tank car	<1
#73	NSC 700	T 476 B <1
#74	North sump	T 639 B <1
#75	Southeast sump	T <1 B <1
#76	South center sump	T <1 B <1
#77	Southwest sump	T <1 B <1
#78	19B	T 146 B <1
#79	25B	T <1 B <1
#80	NS 600	<1
#81	Drum #1	<1
#82	Drum #2	<1
#83	Drum #3	<1
#84	Drum #4	<1
#85	Drum #5	<1
#86	Drum #6	<1
#87	Drum #7	<1
#88	Drum #8	<1
#89	Drum #9	<1
#90	Drum #10	<1
#91	Drum #11	<1
#92	Drum #12	<1
#93	Drum #13	<1
#94	Drum #14	<1
#95	Drum #15	<1
#96	Chase inside FBM-61	78

*T = Top layer
B = Bottom layer

The RFA recommends that this unit be considered part of the sanitary landfill and be addressed accordingly. Groundwater monitoring in the surrounding area has found widespread but low level contamination which cannot be remediated without much greater expense than potential benefits might justify. No evidence of a release of hazardous constituents to air, water or soil was observed (Ref. 2). No impacts to human health or the environment area anticipated. No additional investigation or remediation is planned for this unit.

2.6.21 Old Paint Storage Area. The old paint storage area (SWMU #21) is located inside the Controlled Industrial Area (CIA) near the waterfront adjacent to the Cooper River. The unit was used for temporary storage of containerized paint wastes from ships returning to NSY and from ship repair and overhaul operations at the base. The waste containers were temporarily stored on a 20 x 180 feet concrete pad to await offsite transport. Sandblasting operations also occurred in this area.

Paint wastes stored at this unit contained cadmium, chromium, lead, cyanide, toluene and tetrachloroethylene. Sandblasting residues containing organo-tin paints were also generated at this unit. These residues were allowed to accumulate on the ground surface. A release from a 55-gallon container was observed during a site inspection by DHEC and EPA in August of 1990.

Leaking material (Oakite-PK144) from a hole in the bottom of the container was identified as kerosene. The spilled material was cleaned up immediately. In 1988, EnSafe decontaminated the concrete pad using scarification (rotary scraper) and sand blasting techniques. The residual sand and paint chips were collected from the pad and surrounding soils and containerized. Samples of the paint chips from the concrete pad and soil areas were analyzed using EP Toxicity characteristic leaching procedures for metals. Results of the sample analysis showed the paint chips were below the EP Toxic limits. Therefore, the material was characterized as non-hazardous and no further action was recommended. Table 2-12 is a summary of results for the EP Toxic metals content in the paint chips.

EnSafe certified that closure of the interim status unit was completed according to the conditions of the Closure Plan. A review of the closure activities by DHEC determined that the unit was not fully characterized and additional delineation would be required. Section 3.0 of the RFI Workplan includes detail on the additional investigation which will be required to delineate this unit.

2.6.22 Old Plating Shop Waste Treatment System. The old plating shop waste treatment system is located within the CIA. The unit (SWMU #22) was constructed in 1972 to process wastewater from the metal plating shop and continued in operation until the new non-cyanide plating process and treatment system were built (Figure 2-23). The treatment facility included two in-ground concrete tanks, one for chromic acid reduction and one for cyanide oxidation. Additional treatment was conducted in a "clarifier" where soda ash was manually added and mixed with the wastewater to adjust the pH to approximately 8.5 and precipitate any chromium or other metals. After settling for 48 hours, the clarified wastewater effluent was discharged to the sanitary sewer. Sludge in the bottom of the clarifier was removed and disposed of at the base sanitary landfill until 1973. After 1973, sludge was transported off base for disposal.

Table 2-12.

Evaluation of EP toxic metals content in paint
Waste Paint Storage Pad
(Table taken from Reference 5.)

	ARSENIC	BARIUM	CADMIUM	CHROMIUM	LEAD	MERCURY	SELENIUM	SILVER
EP TOXICITY THRESHOLD	5.0	100	1.0	5.0	5.0	0.2	1.0	5.0
SAMPLE								
PAINT CHIPS FROM PAD								
WPP-1	0.002	0.170	0.002	1.020	0.050	0.001	0.002	0.010
WWP-2	0.002	0.230	0.002	0.430	0.050	0.001	0.002	0.010
PAINT CHIPS FROM SURROUNDING SOIL								
PC-3	0.002	0.120	0.002	0.020	0.050	0.001	0.002	0.010
PC-4	0.002	0.350	0.002	0.250	0.050	0.001	0.002	0.010

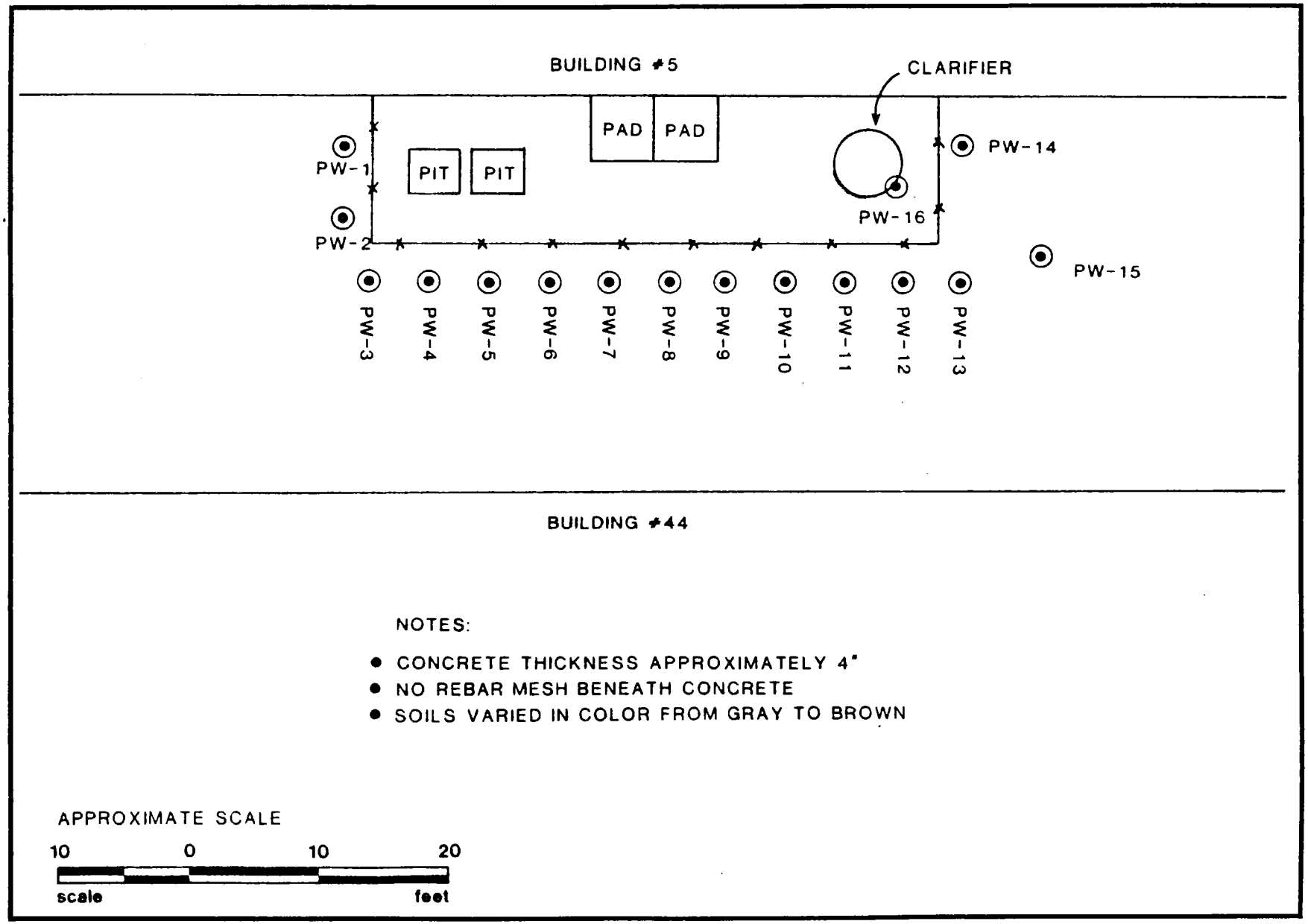

Figure 2-23. Sampling stations–Plating Waste Pretreatment Unit. (Figure taken from Reference 5.)

The unit has not been operated since 1982 when the new plating shop waste treatment system (SWMU #23) started up. The waste treatment system has been decontaminated. However, questions remain regarding subsurface contamination. Final rinseate samples were collected from the decontaminated plating waste treatment unit and analyzed for cyanide, cadmium, and chromium. The analytical results are presented in Table 2-13. The results of the rinseate samples indicated that all but one sample exceeded the threshold values established by EnSafe (Ref. 5). Most of the samples also exceed the EPA's maximum contaminant levels (MCLs) in the tables of proposed action levels (Appendix C). The pH values were exceeded in six of the ten samples.

Sixteen soil samples were collected around the perimeter of the treatment tank from directly below the surface of the concrete, as shown in Figure 2-23. The soil samples were analyzed for pH, cadmium, and chromium (Table 2-14). Forty-three of the 48 samples exceeded the threshold values. None of the sample results exceeded the action levels for cadmium or chromium.

Two additional subsurface soil sample investigations delineated the vertical extent of contamination around the plating waste treatment tank. Soil samples were collected from 1 foot to 6 feet below ground surface and analyzed for cadmium, chromium, and total cyanides. The highest concentrations of metals were detected in sample PW 13-2 (2 foot interval). The highest concentration for the constituents are as follows: cadmium, 47.7 ppm; chromium, 143 ppm; and cyanide, 6.28 ppm. Appendix L presents the analytical results.

The sample investigation performed at this SWMU indicates contamination has affected the near surface soils and is still present in the concrete of the treatment unit. However, no information is available on groundwater or subsurface soils beyond the perimeter of this SWMU. In addition, the potential for contamination affecting this area originating from the adjacent Old Plating Operation (SWMU #25) has not been investigated. A site investigation for the Old Plating Operation inside Building 44 has been added to the RFI Workplan. So as not to duplicate efforts for these two complementary units, SWMUs #22 and #25 will be addressed together under SWMU #25 for future investigative and remediation work.

2.6.23 New Plating Shop WWTS. The new plating shop WWTS unit (SWMU #23) is located inside the CIA. The system is currently used to treat wastewaters containing lead, chromium, cadmium, and acids or alkalis from metal plating operations. Treated effluent is discharged to a holding tank and tested prior to final discharge into the sanitary sewer system. Underflow from the clarifier is directed to a centrifuge for sludge thickening and then to a plate and frame filter press for dewatering. The sludge is hauled off base for disposal.

No evidence of a release from this operation has been found and no additional investigations are planned under this RFI Workplan.

2.6.24 Waste Oil Reclamation Facility. The waste oil reclamation facility (SWMU #24) is located in the central portion of the shipyard and has been in operation since 1980. This unit consists of two storage/separation tanks. Waste oils unloaded from ships or from base operations are pumped into this facility via underground pipelines. Gravity oil-water separation occurs inside the tanks which are operated in alternation. The water phase is drawn off and discharged to the sanitary sewer system. The oil is reused at the base. No evidence of a release from the site has

Table 2-13. Evaluation of rinse waters, Plating Waste Treatment Unit
(Table taken from Ref. 5)

	pH	Cyanide	Cadmium	Chromium
Maximum Contaminant Levels		.7	0.010	0.05
Threshold	7.4	0.027	0.002	0.02
	6.3			
SAMPLE				
Plating Waste Treatment Unit (Final Rinse - 10/1/87)				
Cyanide Side	6.9	N/S	2.580 X	0.90 X
Chromium Side	6.6	N/S	0.047 X	13.10 X
Clarifier*	6.5	N/S	0.015 X	1.01 X
Plating Waste Treatment Unit (Followup Rinse - 10/20/87)				
Cyanide Side	5.7 X	1.120 X	N/S	0.26 X
Chromium Side	5.9 X	0.093 X	N/S	20.00 X
Clarifier	6.0 X	0.024	N/S	1.85 X
Pad Rinse 1	1.0 X	N/S	9.830 X	141.00 X
Pad Rinse 2	4.0 X	N/S	0.602 X	5.75 X
Pad Rinse 3	6.0 X	N/S	0.136 X	7.25 X
Followup Rinse	6.4	0.033 X	N/S	3.36 X

NOTES: N/S - Not Sampled
* - No Meter Reading; pH estimated by pH paper
Results are in ppm.
X designates results exceeding threshold values.

Table 2-14. Evaluation of soil contamination, Plating Waste Treatment Unit
(Table taken from Ref. 5)

	pH	Cadmium	Chromium
Action Levels		40.00	400
Threshold	6.5 4.3	1.25	26.51
SAMPLE			
PW-1	12.3 X	16.00 X	56.1 X
PW-2	11.1 X	3.03 X	86.6 X
PW-3	10.8 X	2.43 X	87.0 X
PW-4	8.3 X	3.39 X	46.5 X
PW-5	12.2 X	1.74 X	20.9
PW-6	11.5 X	1.97 X	69.3 X
PW-7	12.0 X	1.69 X	19.8
PW-8	12.1 X	4.10 X	91.4 X
PW-9	12.2 X	1.71 X	32.7 X
PW-10	12.3 X	2.08 X	62.5 X
PW-11	12.4 X	2.87 X	229.0 X
PW-12	12.0 X	5.94 X	278.0 X
PW-13	12.7 X	1.84 X	31.6 X
PW-14	12.4 X	3.97 X	45.6 X
PW-15	12.5 X	0.20	15.1
PW-16	11.1 X	1.46 X	22.9

NOTES: Results are in ppm.
X designates results exceeding threshold values.

been found. All underground lines are cathodically protected and all tanks and lines are periodically pressure tested. No additional investigations are planned under this RFI Workplan.

2.6.25 Building 44, Old Plating Operation. The old plating operation (SWMU #25) occupies the northern portion of Building 44. Phased out of operation in 1983, the unit was replaced by a new (non-cyanide process) plating operation (SWMU #23). The interior of this unit still contains all operation equipment from the plating process (tanks, vats, ventilation hoods, mechanical and ancillary equipment). Before the plating operation was deactivated, all vats and tanks were emptied and the waste removed. Areas of concern for this SWMU are deteriorated concrete flooring, product accumulation around tanks, the floor drainage system, interior surface contamination, subsurface soils and groundwater.

An environmental study of the abandoned Building 44 Electroplating Facility was performed by Davis and Floyd, Inc. in April, 1991 (Ref. 15). The purpose of the study was to determine necessary actions prior to building demolition. Samples were collected primarily from the process tanks so that interim corrective measures to remove the tanks could begin. Several samples were also collected from an overhead structure, wall, floor and floor drain (Figure 2-24).

Sample results for each area contained high levels of metals contamination. These data are included in Appendix M. Total metals analysis ranges are:

Silver	<1.0 to 145 ppm
Cadmium	2.02 to 84340 ppm
Chromium	18 to 11940 ppm
Nickel	0.63 to 2.7 ppm
Mercury	6.7 to 446000 ppm
Lead	<0.08 to 6920 ppm
Cyanide	83 to 129100 ppm

TCLP analysis performed on samples also exceeded the regulatory limits for barium, cadmium, and chromium. Although this extensive sampling program has identified contamination in the building interior, contamination of subsoils and groundwater beneath the area of operation has not yet been documented. Visual observations of the floor and drainage system indicate a high potential for subsurface contamination.

Subsurface contamination around the waste treatment tank, SWMU #22, revealed high levels of chromium and cadmium contamination (See Section 2.6.22). However, although the treatment tank is the most obvious source, contributing factors may include spillage and leaks from Building 44, underground ancillary piping, or leakage and migration from the floor drain system.

An investigation and building decontamination is proposed for this SWMU. A phased approach delineating potential contamination on the building's concrete floor, subsurface soils, and groundwater will be required to determine the effort required for remediation. This SWMU is fully addressed in Section 3.11 of this RFI Workplan.

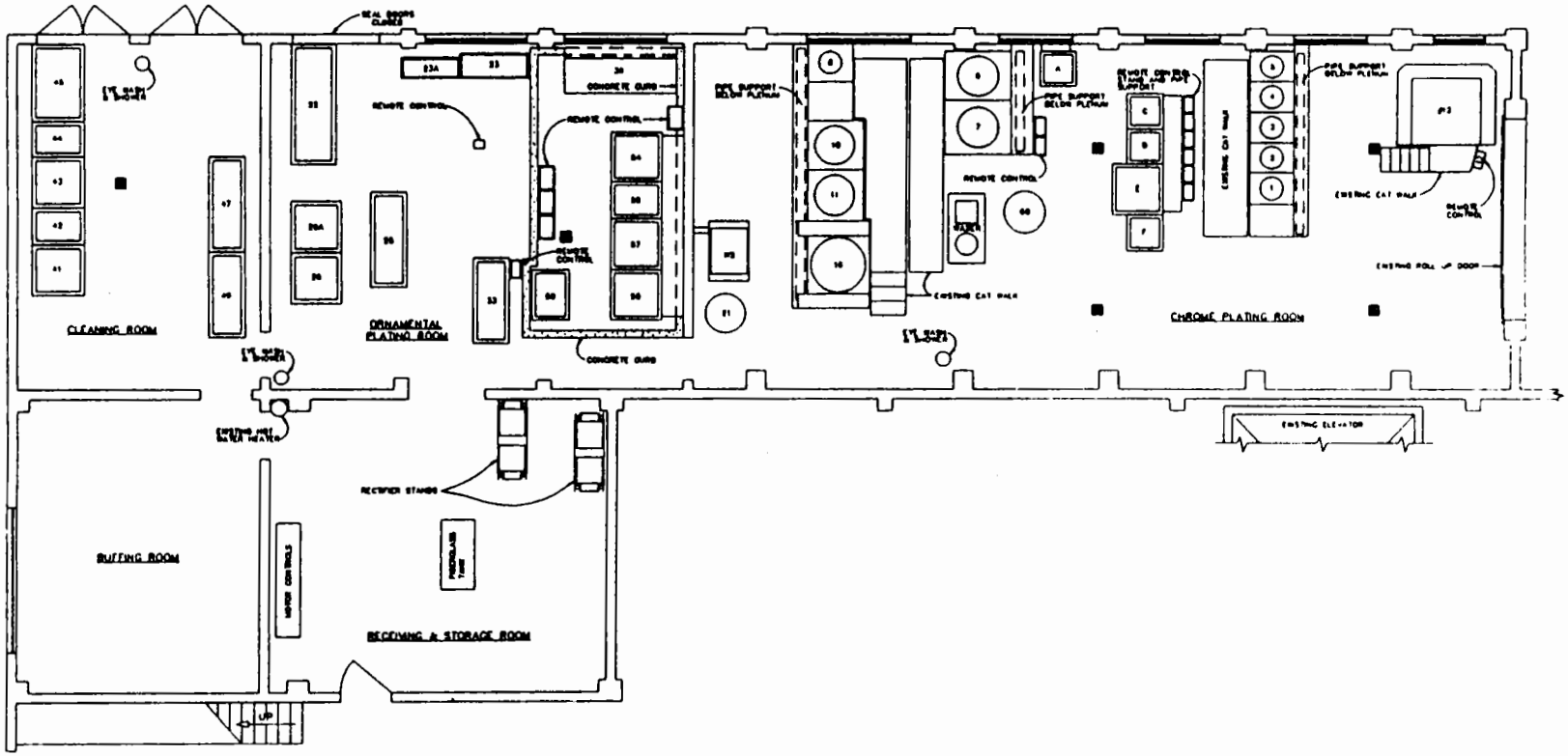

Figure 2-24. Building 44 Electro-Plating Facility tank locations. (Figure taken from Reference 15.)

2.6.26 Waste Storage Area, Building 64-40, Pier C. This area (SWMU #26) is approximately 100 square feet of asphalt pavement located on the east side of Building 74 in a heavily industrialized area near Pier C. Six 55-gallon drums of waste (seam filler, lead waste, adhesive waste, alcohol rags, and trichloroethane rags) were temporarily stored here without proper authorization. The area was clean closed on the day it was brought to management's attention, during the DHEC and EPA site inspection.

No releases occurred at this unit. No additional investigation is planned.

2.6.27 Waste Storage Area, East End, Pier C. This paint storage area (SWMU #27) is a satellite accumulation area located at the east end of Pier C. The unit comprises approximately 200 square feet of the concrete pier. A flammable storage shed and lockers store virgin paints, enamel thinners and fire retardants used for ship repair. Waste containers from the operation are accumulated beneath a canvas tent. The floor is canvas covered plywood surrounded by a berm. Bermed areas at this unit include 55 and 30-gallon drum containers and a storm drain.

During the DHEC and EPA site inspection, containers of hazardous wastes were either not labeled or had no accumulation dates. Also, there were no inspection records for the unit. As a result of the large number of shops and numerous employees in the shipyard, implementation of established hazardous waste procedures for handling waste material have been difficult to implement fully at some of the shops. Additional training and inspections are required for the areas in violation. The NSY Environmental Division has established a zone inspection system to regularly perform site inspections. Incident reports are written up and notification of deficiencies is submitted to the shop heads for corrective action.

There is no evidence of a release in this area. Although there are paint stains on the surface, none is in proximity to the storm drain. Additional measures to be taken to mitigate a release include expanding bermed areas, sealing off the storm drain, and adding drip pans. No additional investigations are planned under this RFI Workplan.

2.6.28 Waste Paint Storage Area, West End, Pier C. This unit (SWMU #28) was used as a one time waste accumulation area unbeknownst to the NSY Environmental Division. The unit is approximately 100 square feet in area and is surrounded by asphalt. Adjacent to the area is an empty flammable liquids storage shed. A storm sewer drain is located 30 feet downgradient of this unit. Paint spills from this accumulation area were confined to the small 100 square foot area.

The inspection by DHEC and EPA observed drums and bags of paint waste, waste thinners, and waste naptha/alcohol. Standard protocol for labelling, maintenance, and control measures were not being followed in handling the hazardous waste.

The unit was clean closed the day of the inspection. No evidence of a release was observed. No additional investigations are planned for this unit.

2.6.29 Building X-10. This unit (SWMU #29) is located south of Building X-10, near Building 1431. Used as a waste accumulation area, this unit received waste from submarine maintenance and repair. This area is primarily a large asphalt covered area with some soil and grassy areas

to the southwest and northeast. During our site visit, the area was clean and no evidence of surface staining was observed.

The inspection performed by DHEC and EPA revealed eleven 55-gallon containers (waste paint, waste monoethanolamine, and waste solvents), twenty-six 5-gallon containers of waste monoethanolamine and numerous 5-gallon and smaller containers of paint waste. Also stored in this unit were 20 pallets of waste stock (expired material) labelled corrosive along with other pallets of waste chemicals. Many of the containers failed to have the proper hazardous waste label, date of accumulation, or inspection records. Storage of incompatible waste and evidence of spills were also observed during the inspection. Currently this site is used to store non-hazardous material only. Asphalt and soil from previous spills have been removed and properly disposed of.

Historical information gathered from the past utilization of this area and the visual observations noted during the DHEC and EPA site inspection, warrants a preliminary subsurface investigation for this unit under this RFI Workplan.

2.6.30 Satellite Accumulation Area, Building 13. The Satellite Accumulation Area (SWMU #30) is used to receive waste generated from the laboratory in Building 13. Located between Buildings 13 and 187, outside the southeast wall of Building 13, the unit and surrounding area is asphalt with a storm sewer drain 20 feet downgradient.

This accumulation area contains a steel box for storage and containment of pails (5 gallons and smaller), trash bags, and a portable 300-gallon steel waste oil tank. Two 55-gallon drums of oil sludge labelled hazardous waste were also present only at the time of the DHEC and EPA site inspection. Spillage was observed around the drums, the result of someone recently adding waste to the containers. Comments from the DHEC and EPA site inspection included containers either did not have accumulation dates, proper labelling, inspection records, or spill control equipment to minimize release of hazardous waste to the environment.

Since this area will continue to be used as a satellite accumulation area, additional construction, operation, and maintenance measures are planned for this unit. Spill control measures and equipment such as concrete bermed area with roof, drip pans, signs, inspection records, and waste pickup schedule are planned. Beyond implementation of operational and maintenance procedures, no further action is planned for this unit under the RFI Workplan.

2.6.31 Waste Paint Storage Area, Dry Dock No. 5. This unit (SWMU #31) is a satellite accumulation area located in Dry Dock No. 5. The area, 200 square feet in size, performs the same functions as SWMU #26. Located on the concrete floor of the drydock near the center of the north wall, the unit is used intermittently to service submarines in drydock. A tent is erected over canvas covered plywood with sand bag berms. Paints are thinned and placed in one gallon buckets with plastic liners for transport to the submarine. A trench drain directly behind the unit is part of the intake system to drain the drydock once the ship has entered.

2.6.33 Waste Paint Storage Area, West End, Dry Dock No. 2. The waste paint storage area (SWMU #33) was used as a one time waste accumulation area located at the western end of Dry Dock No. 2. This unit covers approximately 200 square feet of concrete pavement and is situated 40 feet from the edge of the dry dock. This heavily industrialized area is primarily asphalt with railroad tracks, overhead cranes, heavy equipment, and elevated offices surrounding the dry dock and SWMU area.

The inspection performed by DHEC and EPA revealed two 55-gallon drums of waste paint and waste thinner, numerous 5-gallon containers of paint waste, and trash bags containing solvent rags and paint waste. Spillage was observed in the area. Operation and maintenance procedures to minimize a release were not followed, labelling, accumulation dates, and securing containers were not performed properly as well.

During the time subsequent investigations were performed by SOUTHDIV and WAPORA, the waste material had been removed from the site. In fact, much of the asphalt and concrete had been excavated to overhaul the railroad tracks servicing the dry dock.

As stated earlier, increased zone inspections and enforcement of SOP will be essential for maintaining the proper handling of hazardous materials in the NSY. Because this is a one-time waste accumulation point, no further action is planned in the RFI Workplan for SWMU #32.

2.6.34 MWR, Southwest of Building X-10. The Morale, Welfare, and Recreation (MWR) (SWMU #34) was utilized as a one time waste accumulation area. This fenced compound, southwest of Building X-10, is 70 feet by 50 feet in size and is primarily soil and grass.

During the DHEC and EPA site inspection, four 55-gallon containers of paint were stored in this area. Several of the drums were reported as leaking with spillage apparent on the ground around them. The containers lacked the proper labelling, date of accumulation, inspection logs, and operations and maintenance procedures to guard against fire, explosion, or releases to the environment. A diesel tank in this area was also observed to be leaking. Closure of the diesel tank was completed immediately after the inspection. Diesel fuel contaminated soils and asphalt were removed and properly disposed of.

Although no surface staining or evidence of a release were observed in this area during the latter investigation, because the site is located on bare ground, a limited soil sampling investigation will be performed in concert with SWMU #29. SWMU #34 will be incorporated in to SWMU #29 to cover the area behind building X-10, since these are adjacent to one another. Run-off from the asphalt storage area behind building X-10 influences both areas.

2.6.35 Building X-12. The area on the east side of Building X-12 (SWMU #35) was used as a one time waste accumulation area. The unit measures approximately 100 square feet in size and is covered in gravel.

At the time of the DHEC and EPA site inspection, five 55-gallon containers and numerous smaller containers of waste paint were stored at this unit. None of the containers were properly labelled, had a date of accumulation, or inspection records. Numerous containers did not have secured lids and spill control equipment was not available.

All improperly stored containers were removed immediately after the site inspection. Each container was handled following the established SOP for hazardous waste transportation, storage, and disposal at the Naval Shipyard facility. No new containers had been added to the area or any evidence of spills observed during the subsequent inspections of this unit.

This unit was used as a one-time waste accumulation area and does not exhibit the characteristics of having had routine or systematic releases of hazardous waste to the environment. Therefore, SWMU #35 will not be included as a SWMU in Section 3.0 of this RFI Workplan.

CHAPTER 3. INVESTIGATIVE ACTIVITIES

This portion of the RFI Workplan details proposed field and laboratory investigations to be performed at the Charleston Naval Shipyard (NSY). The purpose of this work is to fill in gaps in the existing data, resulting in a sufficiently complete characterization of the site's environmental setting and the nature and extent of contamination. As described in Section 2.6, data gaps were identified for 11 of the 35 SWMUs. The sections below address the proposed additional investigations for each SWMU, including plans delineating specific sampling locations.

Investigation work elements will include soil test boring and sampling, monitoring well installation and groundwater sampling, treatability testing, geophysical survey, and analytical testing. The RFI field work will be performed in accordance with protocols outlined in the EPA Region IV Standard Operating Procedures and Quality Assurance Manual (SOP) (Ref. 18) and SW-846 (Ref. 21). Key elements of these protocols are highlighted in Section 4.4. The analytical program will similarly be implemented in accordance with accepted methods and a strict Quality Assurance/Quality Control program, as detailed in Sections 4.0 and 5.0. Section 7.0 addresses the Health and Safety Plan (HASP), providing health and safety guidance for all RFI site activities.

3.1 CORRECTIVE ACTION MANAGEMENT PLAN

A corrective action management plan will be submitted under separate cover. The plan provides a detailed time table for implementing the proposed additional investigative activities at each SWMU. In addition, it prioritizes the work schedules so that units having the most significant releases will be addressed first.

3.2 SWMU #2, LEAD CONTAMINATION AREA. Environmental conditions in SWMU #2 are described in Sections 2.6.1 and 2.6.2. Pertinent features of this area include a salvage bin (bin #3), surficial dust on adjacent paved areas, contaminated soils adjacent to the paved area, and surface contamination in the soils at SWMU #1 where Building 1617 was formerly located. Prior site investigations have adequately delineated total lead concentrations. Investigations at SWMUs #1 and #2 have included 282 samples of surface and subsurface soils. The NSY is currently seeking clean closure for SWMU #1 under a risk assessment performed in April, 1991 (Ref. 16). However, certain areas at the DRMO have not been completely delineated. In addition, the effects of Hurricane Hugo may have expanded the area of contamination or reduced the concentrations of the contaminants.

A phased sampling program is proposed to further delineate contamination of groundwater, soils and sediments. This delineation is required to permit accurate assessment of remedial alternatives. Remedial alternatives for this site could include capping the area of lead contamination with asphalt or concrete; treating soils and sediments on site by immobilization (stabilization/ solidification) techniques; or excavating the contaminated soils and transporting the material to a hazardous waste landfill. Clean-up levels for lead will have to be established before a feasible alternative can be selected. Lead appears to be present as a thin layer of dust covering most of the paved areas, and within the near surface soils around the paved area.

3.2.1 Soil Sampling. An extended sample investigation (ESI) will be required to complete the delineation of lead contamination at the DRMO facility. Verification soil samples will be collected from areas where high concentrations of lead were previously reported. Samples will also be collected from storm water sewers, storm water outfalls, river sediments, and areas where storm water runoff may have transported contaminants beyond the site boundaries.

Figure 3-1 shows the proposed soil sample locations; however, the field scientist will have authority to adjust these locations as conditions warrant. A total of ~~27~~ 24 soil sample stations are planned. Soil samples will be collected from the surface (0 to 6 inches) and one foot interval (6 inches to 1 foot). Data from previous studies (Refs. 5 and 10) show that lead contamination exists at extremely low concentrations below the surface interval. Therefore, subsurface samples (deeper than one foot) will not be collected. Seven sediment samples from Cooper River and five storm sewer samples will also be collected.

3 are off-site ~~will not~~ collect!

All samples will be analyzed for total lead, EPA method 239.2. Composite samples will also be collected from areas of high lead concentrations and submitted for treatability testing. Treatability testing will be performed to determine if the soils can be immobilized (by solidification/stabilization), enabling consideration of an insitu remedial treatment option.

Once the sample results have been reviewed, the need for additional delineation under a Phase II investigation will be evaluated. If high lead levels exist in the sediments of Cooper River, then bioassays will be required. In this case, a separate Workplan will be developed and submitted for ecological assessments prior to performance of bioassays. A study of the lead concentrations in biota will also necessitate additional sampling of the river sediments upstream and downstream of the site.

3.2.2 Groundwater Sampling. Six monitoring wells will be installed around the pad at the locations shown in Figure 3-1. The purpose of these wells is to determine if soil lead contamination has adversely impacted groundwater quality in the surficial aquifer. Monitoring well MW1 is designated as an upgradient well. MW2 will be placed in the area of known high lead concentrations. The remaining monitoring wells, MW3 through MW6, will be placed around the perimeter (north, east and south boundaries) of the site. The groundwater will be assayed for lead using EPA method 239.2.

Gauging of the monitoring wells should be conducted on a regular basis to allow construction of a series of groundwater surface contour maps for the site. These maps will show the direction(s) of groundwater flow in and near SWMU #2. Combining the hydrogeologic data and analytical results should allow a better understanding of the extent and magnitude of any groundwater contamination resulting from the lead contaminated area and the direction and migration rates of potential groundwater plumes. Once this information becomes available, then additional off-site monitoring wells will be proposed, if necessary, to complete the delineation effort.

3.2.3 Temporary Land Use Restrictions. The site's activities should be limited to those which do not disturb the soil surface or groundwater. Utility construction should be minimized and conducted with the proper preventive measures to prevent physical contact with potential

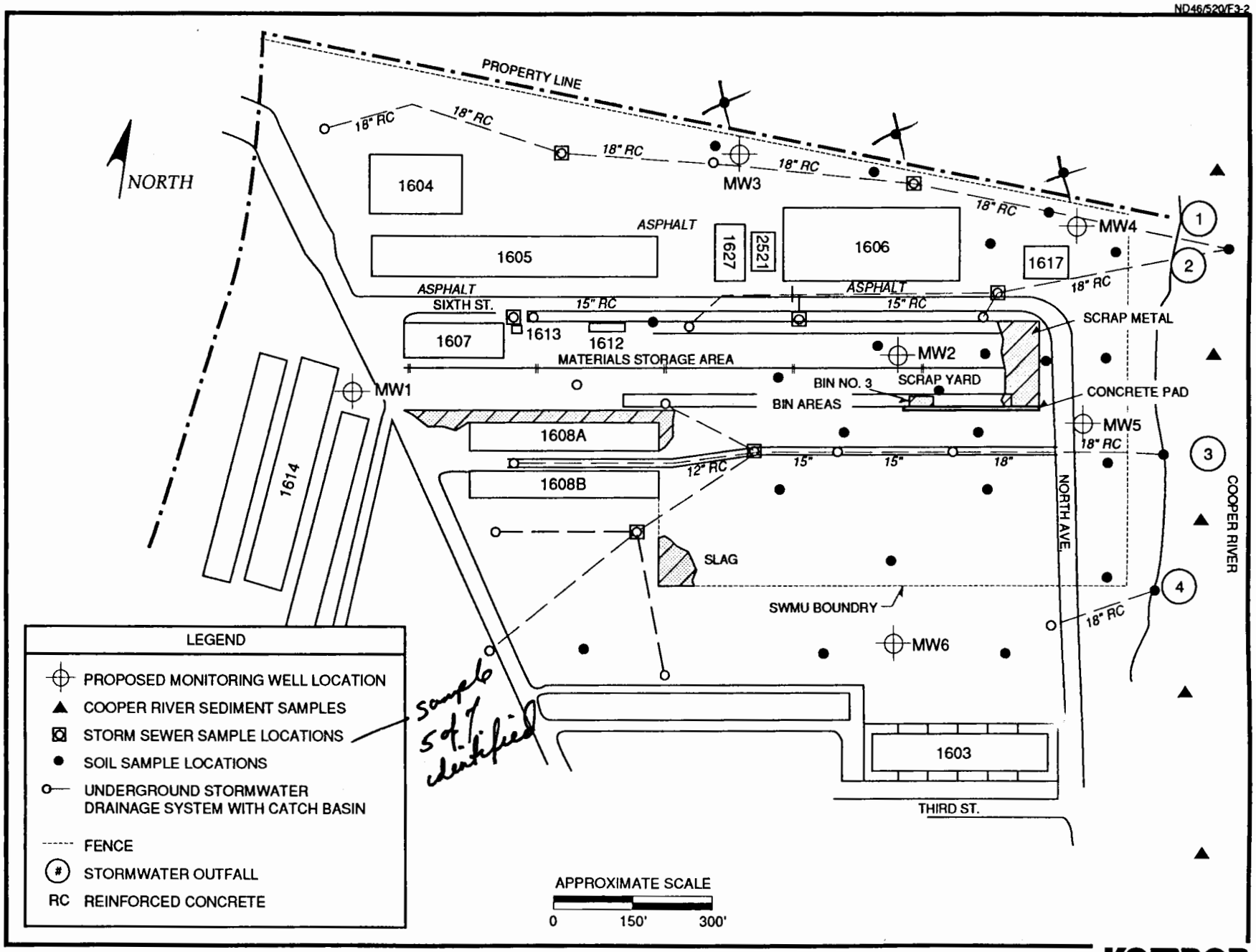

Figure 3-1. Proposed sampling locations at SWMU #2.

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contaminants. Restrictive access to the area should be enforced until remedial activities have been completed.

3.3 SWMU #5, BATTERY ELECTROLYTE TREATMENT AREA. The battery electrolyte treatment area is primarily the acid waste treatment tank and surrounding soils. EnSafe's sample investigation of this area (Ref. 5) identified lead contaminated soils around the treatment tank at a depth equal to the bottom of the tank (5.5 feet below ground surface). However, the investigation encompassed only a 5-foot perimeter around the treatment tank and did not delineate areas beyond that. Under this RFI Workplan, an expanded investigation of the area around the acid waste treatment tank and the area identified during the DHEC and EPA site inspection will be performed. The expanded sample investigation will be conducted in two phases. In Phase I, a set of initial borings and monitoring wells are planned to determine site hydrogeologic characteristics and identify soil and groundwater contamination. The second phase will then be used to more fully delineate the extent of contamination.

3.3.1 Soil Sampling. The previous investigation for SWMU #5 included 36 subsurface samples collected five feet from the perimeter of the treatment tank. This investigation is designed to expand the prior work by delineating the horizontal and vertical extent of contamination. Soil samples will be collected at a distance of 2 feet, 25 feet and 75 feet from the unit on each side of the acid waste treatment tank (Figure 3-2). Horizontal spacing of proposed sampling points was selected in view of the enhanced migration rates of metals under low pH conditions. To assist in delineation, field crews will test pH conditions in groundwater and soil samples and adjust sample locations accordingly.

The drum in the figure illustrates the leaking drum found during the DHEC and EPA site inspection. One additional sample will be collected at the reported spill area. Each sample location will be drilled and subsurface soil samples will be collected at 2-foot intervals from the surface to ten feet. The samples will be analyzed for total lead and pH.

A composite sample will be collected and a treatability study will be performed to determine if the lead can be immobilized in the soils. If significant lead contamination is detected in the soil boring samples, then a Phase II delineation will be performed based on the findings.

3.3.2 Groundwater Sampling. Four monitoring wells will be installed in the surficial aquifer at the locations shown in Figure 3-2. The purpose of these wells is to determine if subsurface releases from the acid waste treatment tank have adversely impacted groundwater quality in the surficial aquifer. Groundwater samples will be collected and assayed for total lead and pH. Field measurement of pH will also be conducted at the time of sample collection.

Gauging of the monitoring wells should be conducted on a regular basis to allow construction of a series of groundwater surface contour maps for the site. These maps will show the direction(s) of groundwater flow in and near SWMU #5. Combining the hydrogeologic data and analytical results should allow a better understanding of the extent and magnitude of any groundwater contamination resulting from the Battery Electrolyte Treatment Area and the transport direction and migration rates of potential groundwater plumes. Once this information becomes available, then additional off-site monitoring wells will be proposed, if necessary, to complete the delineation effort.

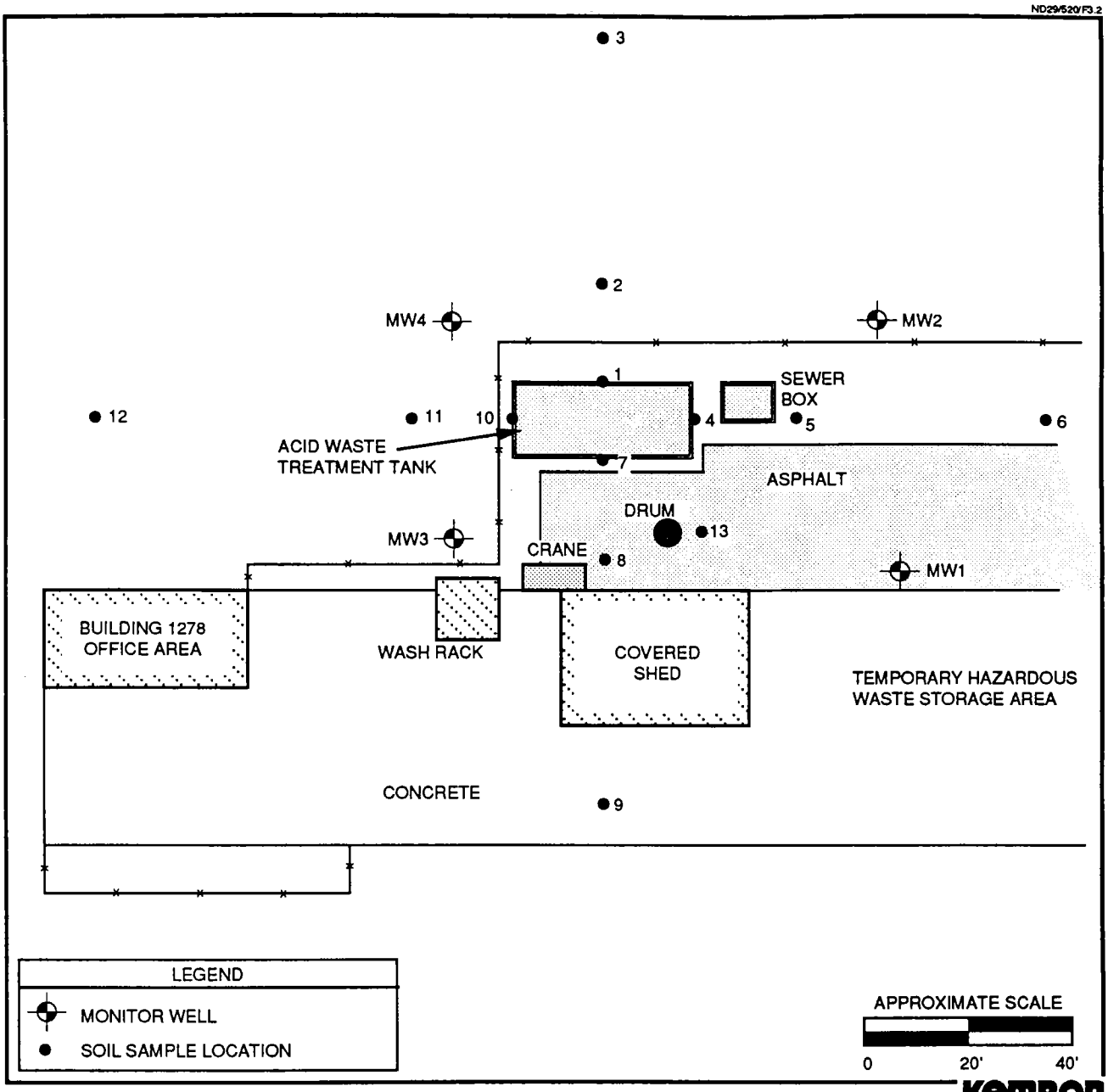

Figure 3-2. Proposed sample locations at SWMU #5.

3.3.3 Temporary Land Use Restrictions. The site activities should be limited to those which do not disturb the soil or groundwater. Utility construction should be minimized and conducted with proper preventive measures to prevent physical contact with potential contaminants.

3.4 SWMU #6, PUBLIC WORKS STORAGE YARD. The public works storage yard has been extensively investigated since March of 1988. Samples collected for this unit were collected on 50-foot centers to a depth of three feet. Results of the sample investigations indicated elevated levels of lead contamination in three areas of the site (see Section 2.6.6). These areas are well defined through previous studies and further soil investigation is therefore not proposed.

3.4.1 Groundwater Sampling. Concentrations for metals at the public works storage yard are low and, where hot spots exist, the high contaminations are at the surface interval only. The potential for contaminant migration from the soils to the groundwater is rather low.

We propose installing five monitoring wells at the site to cover potential releases from both SWMUs #6 and #7. SWMU #7 is Building 3902, shown on Figure 3-3. The location of the two original monitoring wells (WOC-1 and WOC-2) for SWMU #7 are also depicted. As a minimum, the five wells will be utilized to delineate the extent of groundwater contamination already detected at SWMU #7. The wells will also provide data concerning the potential impacts resulting from activities at SWMU #6. Samples collected for SWMU #6 will be assayed for RCRA metals. If elevated concentrations are detected, then the groundwater monitoring program will be expanded based on the preliminary data.

3.4.2 Temporary Land Use Restrictions. The site activities should be limited to those which do not disturb the soil or groundwater. Utility construction should be minimized and conducted with proper preventive measures to prevent physical contact with potential contaminants.

3.5 SWMU #7, PCB TRANSFORMER STORAGE AREA. This unit includes Building 3902 and the attached concrete pad. The site was used to store out-of-service electrical materials such as rectifiers, transformers, and capacitors. In addition to storage, a number of transformers were drained near the concrete pad on the south side of Building 3902 sometime before 1976. The total amount of PCBs released to the soil is uncertain due to the limited scope of prior studies.

Several studies of groundwater and soil contamination at the site have been conducted since 1981 (see Section 2.6.7). These studies found contaminants in both groundwater and soils. Detected constituents included PCBs, metals, and several chlorinated hydrocarbons, but except for the PCBs, only trace detections were found. Significant PCB concentrations were detected to the east and south of Building 3902. These significant detections were in composite soil samples collected along lines running parallel to the sides of Building 3902 and the attached concrete slab; therefore, the precise location of contaminated soils and concentrations in particular areas is unknown. Additional soil sampling will be conducted to delineate the extent and magnitude of PCB concentrations in the potentially contaminated area.

3.5.1 Soil Sampling. In order to delineate the magnitude and extent of PCB and pesticide contamination, a sampling grid has been prepared using procedures established by the EPA in the Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup (Ref. 22). The proposed grid and soil sample locations are shown in Figure 3-4. The boundaries for the sample grid were

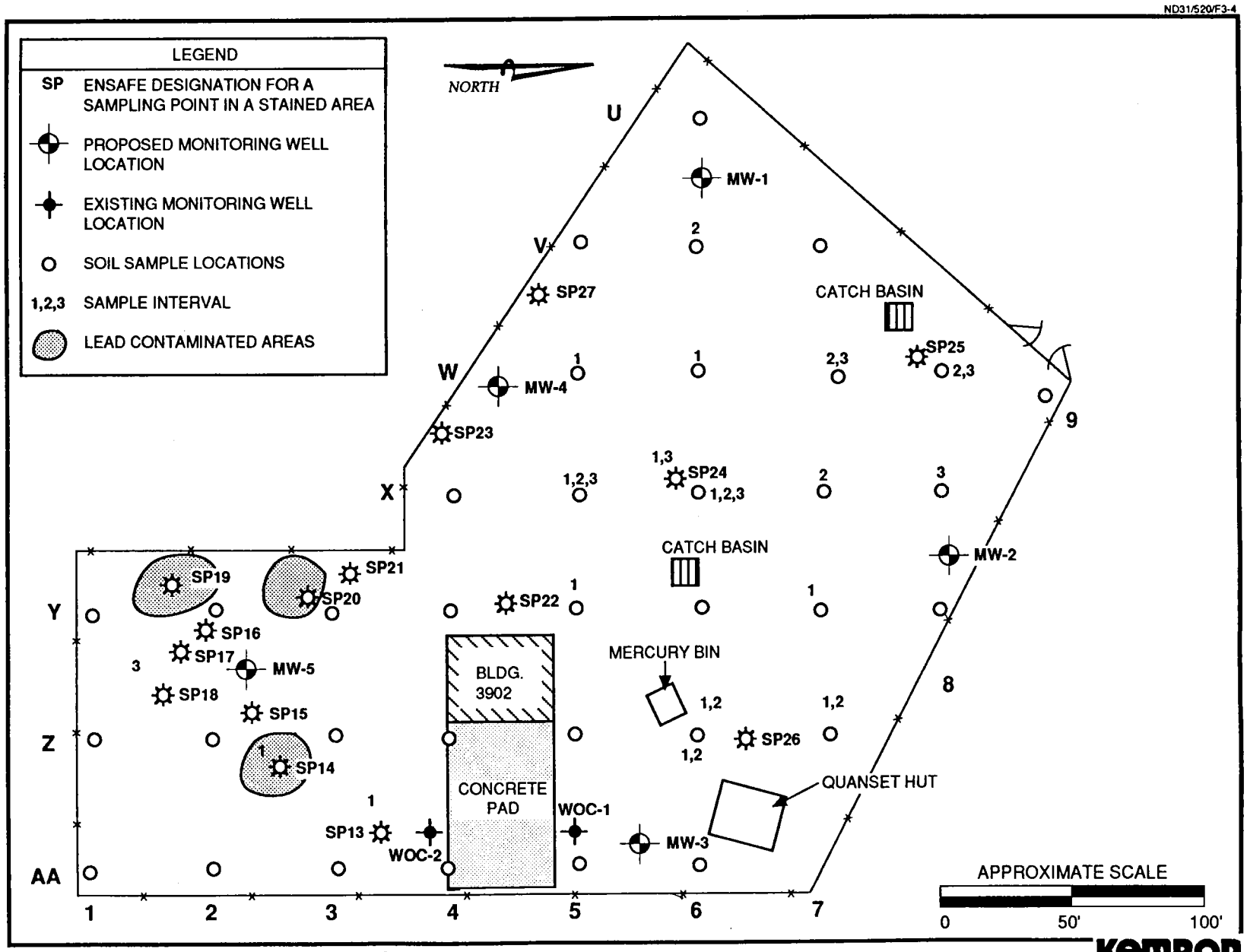

Figure 3-3. Lead contaminated areas at SWMU #6.

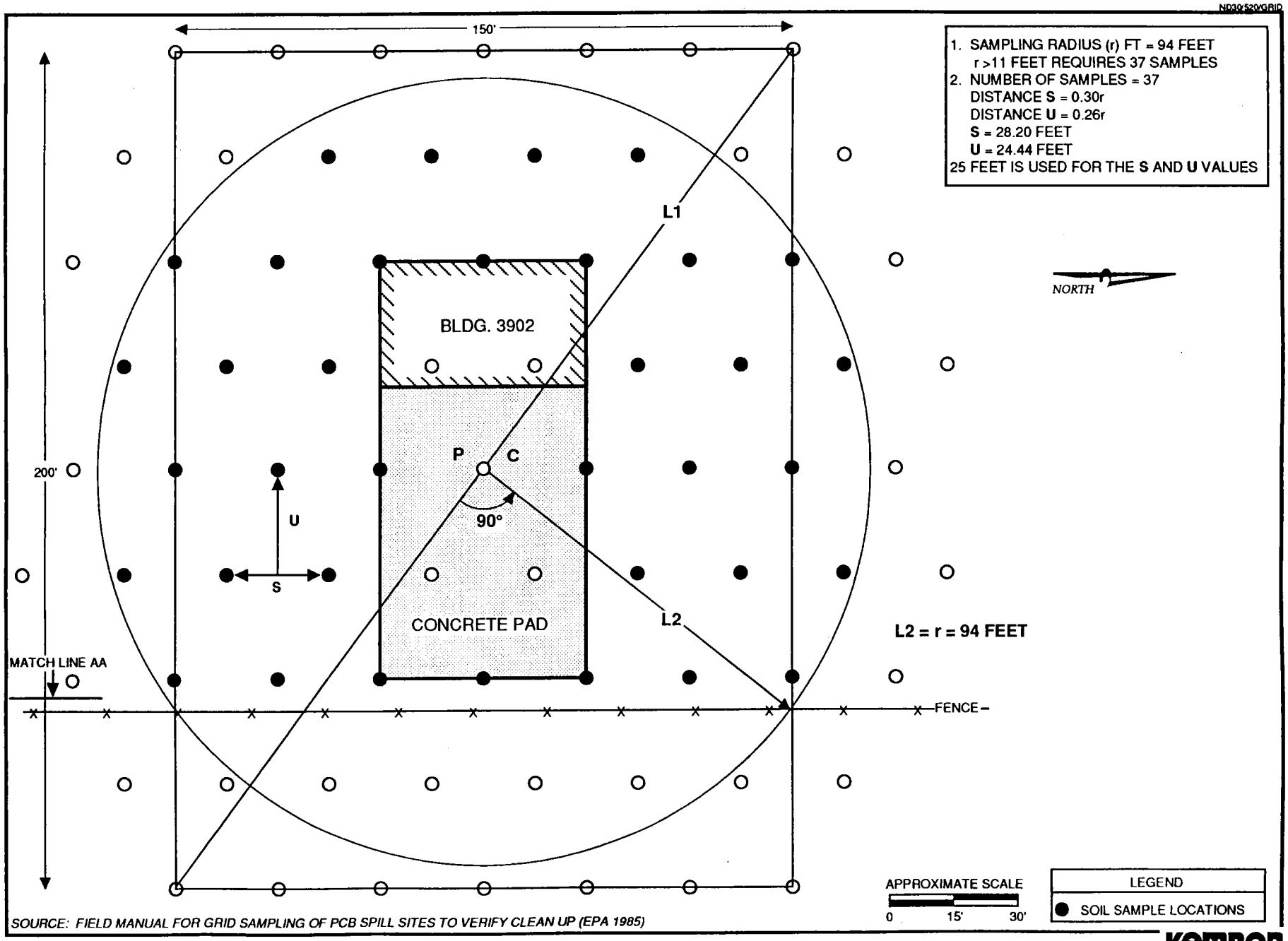

Figure 3-4. Proposed sample grid at SWMU #7.

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expanded using the results of the composite analysis in Ref. 12. Using the formulas established in the Field Manual, a 94-foot sample radius was calculated. Grid spacing between sample stations was averaged to 25 feet. The total number of stations to be sampled is 36.

The four stations east of the concrete pad and fence will not be sampled. This area was clean closed during construction of the cold storage warehouse (Section 2.6.6). Samples from each sample station will be collected at discrete vertical intervals from 0 to 1 foot, 1 to 2 feet and 2 to 3 feet below grade. Samples from the surface interval (0 to 1 foot) will be analyzed first for PCBs and pesticides using EPA method 8080. If a surface sample exceeds PCB concentrations of 5 ppm or DDT (and its derivatives DDD and DDE) at 2 ppm, then the next deeper interval (1 to 2 feet) will be analyzed. If a sample is less than the 5 ppm PCB or 2 ppm DDT, then the deeper samples will not be analyzed. The maximum number of samples which can be analyzed for PCBs and pesticides is 108. However, biased sampling of suspect areas can increase the number.

3.5.2 Groundwater Sampling. Contaminant migration from the soil to the groundwater has occurred as evident by trace concentrations of arsenic, DDT, PCBs and BHC in monitoring wells WOC-1 and WOC-2. To evaluate the extent of groundwater impacts from SWMU #7, five additional monitoring wells will be installed in SWMU #6 as described in Section 3.4.2. The exact well locations will be selected in the field by a hydrogeologist during installation. Groundwater will be sampled and analyzed for pesticides and PCBs by EPA method 8080. Arsenic and BHC are constituents commonly associated with pesticide formulation processes and, therefore, will not be analyzed.

Gauging of all seven monitoring wells should be conducted on a regular basis to allow construction of a series of groundwater surface contour maps for the two SWMUs. These maps will show the direction(s) of groundwater flow in and near the site. Combining the hydrogeologic data and analytical results should allow a better understanding of the extent and magnitude of any groundwater contamination resulting from the Public Works Storage Yard and/or the PCB Transformer Storage Area. The transport direction and migration rates of potential groundwater plumes will also be assessed. Once this information becomes available, additional off-site monitoring wells will be proposed, if necessary, to complete the delineation effort.

3.5.3 Temporary Land Use Restrictions. The site activities should be limited to those which do not disturb the soil or groundwater. Utility construction should be minimized and conducted with proper preventive measures to prevent physical contact with potential contaminants. Restrictive access to the area should be enforced until remedial activities have been completed.

3.6 SWMU #8, OIL SLUDGE PIT AREA. Oil sludges produced from various industrial processes in NSY were disposed of in three unlined pits during the period of 1944 to 1977. Two of the pits were filled before 1955. The remaining pit was filled in 1974.

Ninety-three test borings were drilled in this area in 1982 (see Section 2.6.8). Many found free-floating oil, particularly in the southwestern portion of the area overlying one of the three pits. The thickness of free-floating oil detected ranged from two to four inches over this unit at the time and attenuated rapidly with distance from the unit.

Although numerous samples were collected during prior investigations, delineation of the oil contamination was accomplished by field observations and not by laboratory testing. Additionally, the data collected in 1982 may no longer be reliable. To adequately characterize the site, a phased investigation will be performed. Additional borings are planned to determine site hydrogeologic characteristics and identify areas of soil and groundwater contamination.

3.6.1 Soil Sampling. Under the first phase, soil samples will identify areas of soil contamination. The proposed 27 sample stations have been selected considering the areas where trace to heavy concentrations of oil were reported in the previous study. Sample stations are located 10 feet and 50 feet from the perimeter of each pit, as shown in Figure 3-5. Seven samples will also be collected from each of the three sludge oil pits at the soil/water interface.

Soil borings will be installed with a drilling rig and soil samples will be retrieved using a split-spoon sampler. Conditions may require that hand augering be used to advance and sample soil borings. The actual retrieval depths will depend upon the materials encountered. However, the general rationale will be to collect a series of samples which vertically bracket any encountered contamination. To assist in field determination of contaminated zones, the field crew will conduct head space analyses using an OVA.

Selected samples will be sent to the laboratory for TPH analysis to confirm and initially delineate the presence of contamination. Selected samples containing oil will be analyzed for RCRA metals, volatile organic and semi-volatile organic compounds, and PCBs.

The findings from the Phase I investigation will be used to select additional soil sample locations, if required, to fully delineate contamination of the site.

3.6.2 Groundwater Sampling. Once the soil sampling program has been completed, six additional monitoring wells will be installed to complement the existing three wells. The purpose of these wells is to determine if subsurface releases from the oil sludge pits have adversely impacted groundwater quality in the surficial aquifer. Groundwater samples will be collected and assayed for TPH and additional constituents as determined by the soil assay results. Gauging of the monitoring wells should be conducted on a regular basis to allow construction of a series of groundwater surface contour maps for the site. All monitoring wells should be gauged using an oil/water interface probe so that the thickness of any free floating petroleum layer can be determined. Groundwater surface contour maps will indicate the direction of groundwater flow in and near SWMU #8. Combining the hydrogeologic data and analytical results should allow a better understanding of the extent and magnitude of any groundwater contamination resulting from the Oil Sludge Pit Area and the transport direction and migration rates of potential groundwater plumes. Once this information becomes available, then additional off-site monitoring wells will be proposed, if necessary, to complete the delineation effort.

3.6.3 Temporary Land Use Restrictions. The site's activities should be limited to those which do not disturb the soil or groundwater. Utility construction should be minimized and conducted with proper preventive measures to prevent release of groundwater contamination.

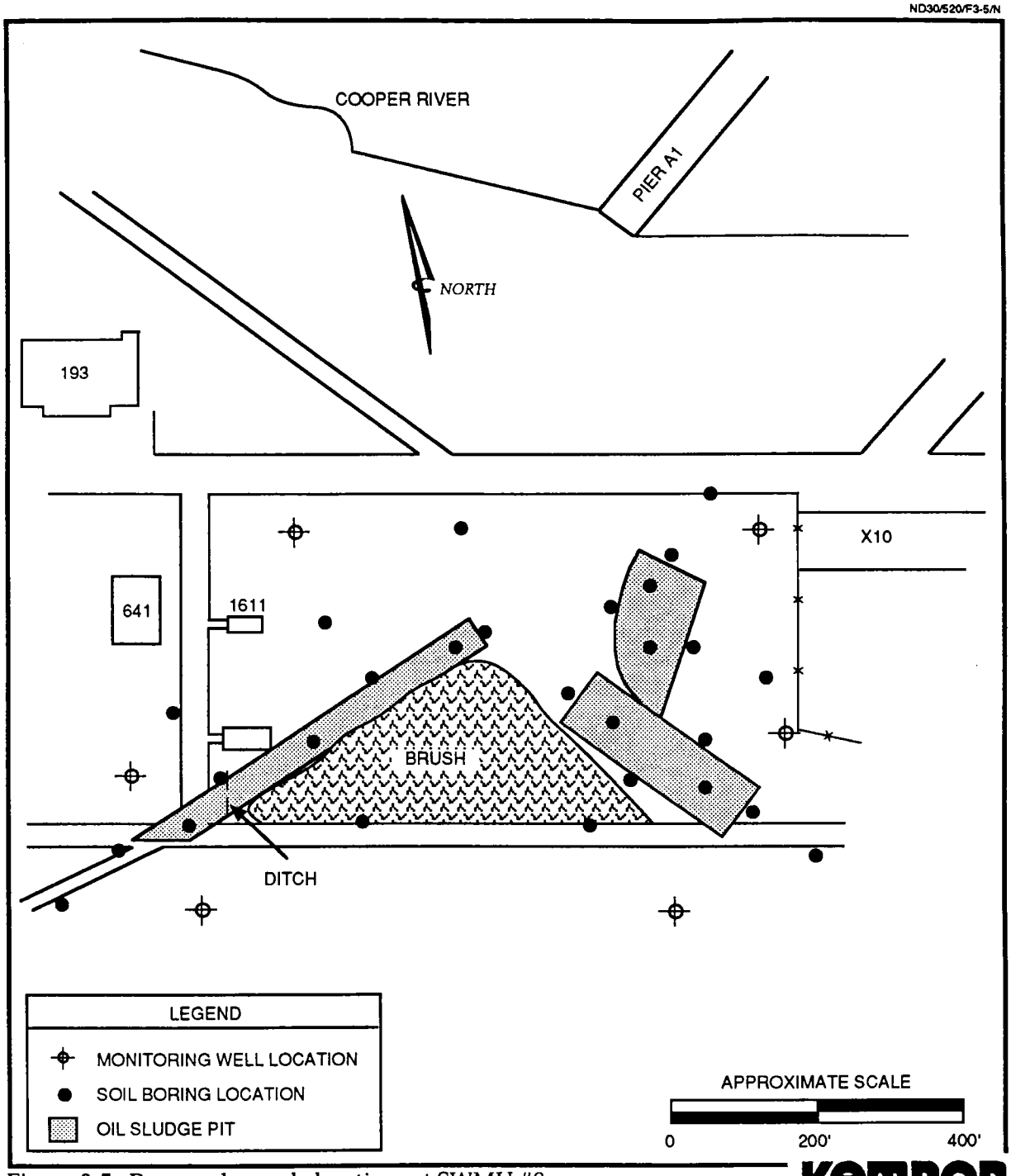

Figure 3-5. Proposed sample locations at SWMU #8.

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3.7 SWMU #9, CLOSED LANDFILL. The closed landfill is located at the southwestern part of the peninsula at NSY. Over the period from the 1930's to the early 1970's, various solid wastes generated at NSY operations were disposed of in this landfill. Previous characterization activities of the site have included installation and sampling of 17 monitoring wells and four test pits (Figure 3-6; Section 2.6.9). Analytical data from sampling of the original thirteen wells (LF1 to LF10; SLF1 and SLF2; and DLF1) is nearly ten years old. The key issue at the closed landfill is determining the extent and magnitude of groundwater impacts from historical and ongoing discharge of leachate into the surficial aquifer. Groundwater analytical data generated to date have shown the presence of low levels of contamination including volatile and semi-volatile organic compounds and metals. Additional work proposed in this unit should allow an accurate assessment of the closed landfill's impact upon groundwater quality in the area.

3.7.1 Geophysical Surveys. Geophysical techniques will be used initially at SWMU #9. The purpose of the geophysical surveys is to find buried drums and other metal containers and delineate areas where dissolved ions have altered the electrical conductivity of groundwater.

The initial survey will be conducted with a magnetometer. The purpose of this survey is to detect the presence of buried drums and other metallic debris in the subsurface. The expected range of the survey will be approximately 30 feet below grade. A variable grid spacing will be used for the magnetic survey with tighter spacing in areas where conductive irregularities or anomalies have been found by the resistivity survey. In addition, tighter spacing will also be used to characterize any magnetic anomalies. Although wider spacing may be used in some areas, the distance between transects will be kept low enough to detect a buried 55 gallon drum or several 5 gallon pails.

A resistivity survey will follow the magnetic survey. The purpose of the resistivity survey is to detect regions of elevated groundwater conductivity across the site which may be associated with contaminant plumes.

3.7.2 Soil Gas Survey. As part of the initial investigation of the closed landfill, a soil gas survey will be conducted to detect areas where volatile organic compounds may be present in the subsurface soils. Field instrumentation will be available to distinguish between methane and heavier volatile organic compounds. A base map of the closed landfill will be surveyed with a 100 by 100 foot grid system to be used in transecting the site and locating sample collection points. Sample station locations will be selected based upon the information gathered from the geophysical survey, historical information on the landfill operations and aerial photographs of the site if available.

3.7.3 Test Trenching. Information gathered from the geophysical and soil gas survey will be confirmed by test trenching. The anomalies identified from the surveys and suspect areas identified through past historical information sources will be confirmed by excavating a trench and making visual observations of the subsurface conditions. Samples will be collected from the affected media (soil, water, drum or sludge).

Areas where contamination is present (i.e., drums) will be delineated by additional test trenching to determine the lateral extent of the disposal area. The number of test trenches cannot be determined until the geophysical and soil gas survey are completed.

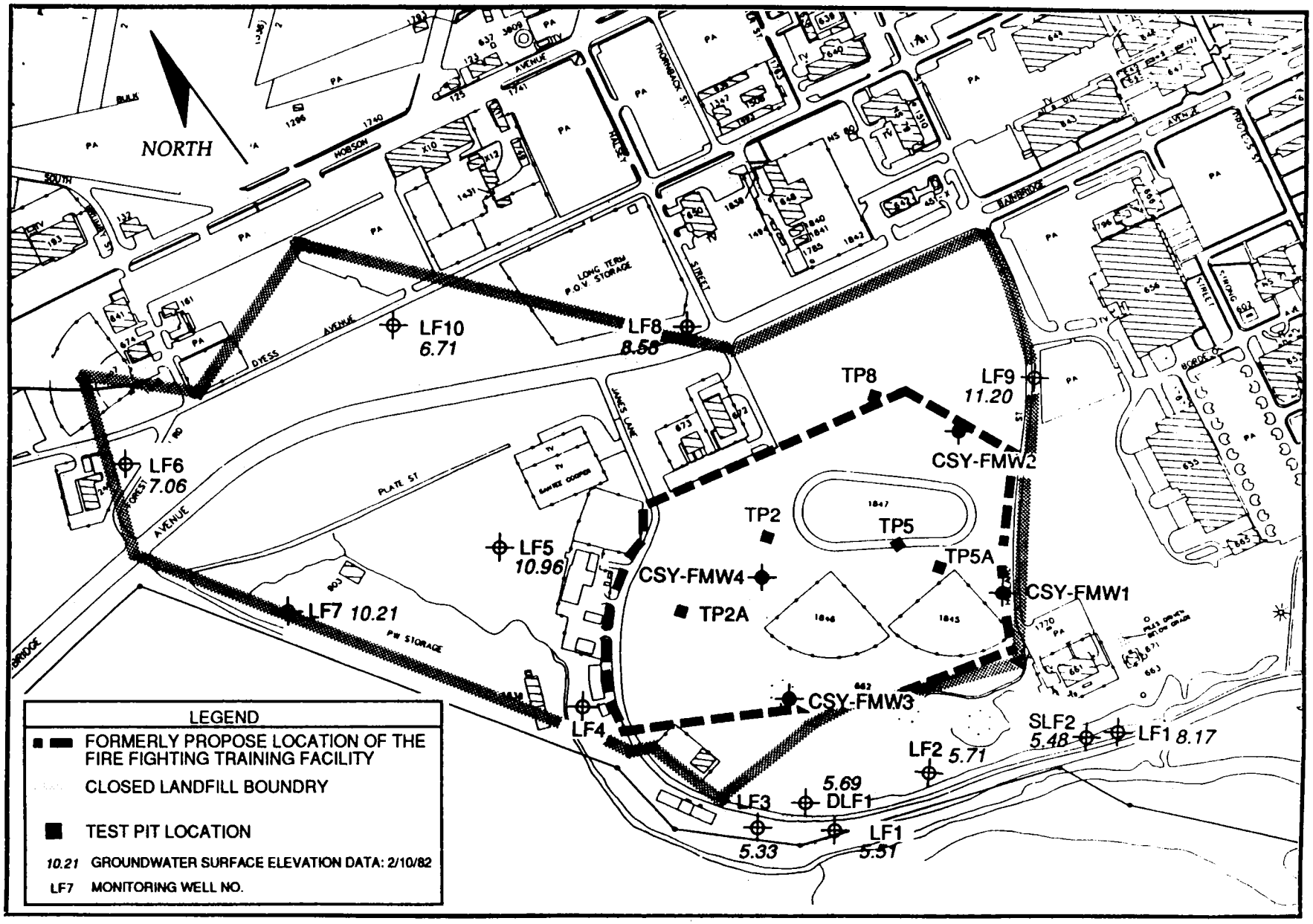

Figure 3-6. Closed landfill area plan. (Figure compiled from References 12, 17.)

3.7.4 Soil Sampling. The soil sampling program will be performed during implementation of the soil trenching and groundwater monitoring program. The purpose of this initial phase of investigation is to determine where soils are contaminated and develop a second phase which will completely characterize and delineate the horizontal and vertical extent of contamination in the landfill area. Samples will be collected from soils in the excavated test trench, material leaking from a drum(s) or container(s), sludge or fill material, or any suspect material in the excavation.

The estimated number of samples cannot be determined until the geophysical and soil gas surveys are completed. Samples collected this phase of work will be assayed for RCRA metals, volatile organic and semi-volatile organic compounds, PCBs and pesticides.

3.7.5. Groundwater Sampling. All monitoring wells should be re-sampled for RCRA metals, volatile organics, semi-volatiles, PCBs and pesticides. Gauging of all existing monitoring wells should be conducted on a regular basis to allow construction of a series of groundwater surface contour maps for the site. These maps will show the direction(s) of groundwater flow in and near the closed landfill. Combining the hydrogeologic data and analytical results should allow a better understanding of the extent and magnitude of groundwater contamination resulting from the closed landfill and the direction and migration rates of potential groundwater plumes. Once this information becomes available, then additional off-site monitoring wells will be proposed, if necessary, to complete the delineation effort.

3.7.6. Temporary Land Use Restrictions. The site's activities should be limited to those which do not disturb the soil or groundwater. Utility construction activities should be minimized and conducted with proper safety measures to prevent release of potential contamination.

3.8 SWMU #14, CHEMICAL DISPOSAL AREA. The chemical disposal area is located at the southern end of NSY in the vicinity of the skeet and pistol ranges. Within this general area, the precise locations of disposals are unknown. Waste materials are thought to have been buried in drums, but may include bagged or bulk wastes.

3.8.1 Geophysical Surveys. Geophysical techniques will be used at SWMU 14 before initiation of the boring and sampling program. The purpose of the geophysical surveys is to find buried drums and other metal containers and delineate areas where dissolved ions have altered the electrical conductivity of groundwater. Results of the geophysical surveys will be used to plan a more efficient soil boring and sampling program.

The initial survey will be conducted with a magnetometer. The purpose of this survey is to detect the presence of buried drums and other metallic debris in the subsurface. The expected range of the survey will be approximately 30 feet below grade. A variable grid spacing will be used for the magnetic survey with tighter spacing in areas where conductive irregularities or anomalies have been found by the resistivity survey. In addition, tighter spacing will also be used to characterize any magnetic anomalies. Although wider spacing may be used in some areas, the distance between transects will be kept low enough to detect a buried 55 gallon drum or several 5 gallon pails.

A resistivity survey will follow the magnetic survey. The purpose of the resistivity survey is to detect regions of elevated groundwater conductivity across the site which may be associated with contaminant plumes.

3.8.2 Soil Sampling. The next phase of additional site assessment work will be implementation of a soil boring and sampling program. The purpose of this program is to characterize and delineate the horizontal and vertical extent of soil contamination in the area. The actual scope of this work phase will be largely dependent upon the results of the geophysical surveys. At this stage of planning, 25 soil borings are estimated with retrieval of up to three discrete samples from each boring. Soil borings will be installed with a drilling rig and soil samples will be retrieved using a split-spoon sampler. Conditions may require that hand augering be used to advance and sample soil borings. The actual retrieval depths will depend upon the materials encountered. However, the general rationale will be to collect a series of samples which vertically bracket any encountered contamination. To assist in field determination of contaminated zones, the field crew will conduct head space analyses using an OVA. – Field GC –

It is estimated that a minimum of 20 discrete soil samples will be assayed by the laboratory. Laboratory testing of soil samples will include, at a minimum, EPA methods 8240 and 8250 (volatiles, base/neutrals and acid extractables), with a library search, and additional assays for metals, pesticides and PCBs and/or cyanide. When assay results are compiled, they will be reported along with the geophysical results and proposed remedial activities.

3.8.3 Groundwater Sampling. Due to the unknown types and amounts of chemicals which were disposed of in the area, it is recommended that the five existing monitoring wells be sampled for Appendix IX parameters (Figure 3-7). Gauging of all existing monitoring wells should be conducted on a regular basis to allow construction of a series of groundwater surface contour maps for the site. These maps will show the direction(s) of groundwater flow in and near SWMU #14. Combining the hydrogeologic data and analytical results should allow a better understanding of the extent and magnitude of groundwater contamination resulting from the Chemical Disposal Area as well as the direction and migration rates of potential groundwater plumes. Once this information becomes available, additional off-site monitoring wells will be proposed (including a "deep" well), if necessary, to complete the delineation effort.

3.8.4 Temporary Land Use Restrictions. The site's activities should be limited to those which do not disturb the soil or groundwater. Utility construction should not be conducted until the area has been completely assessed. Limited access to the area should be enforced until remedial activities have been completed.

3.9 SWMU #17, OIL SPILL AREA. This spill occurred in June 1987 when an underground pipe ruptured which supplied No. 2 diesel fuel to the boiler in Building No. FBM61, Figure 3-8. Some samples of oil collected during remediation of the spill were found to be contaminated with PCBs. The location of samples with PCBs and their concentrations indicate that the source of the PCBs is beneath Building FBM61. Beyond the initial remedial actions conducted at the time of the spill and subsequent release to the Cooper River, there has not been a soil or groundwater investigation to delineate the extent and magnitude of potential subsurface oil contamination at the site. Available data suggest that the soil contamination produced by the spill remains underneath the building. In order to fill in current data gaps and ensure that migration of

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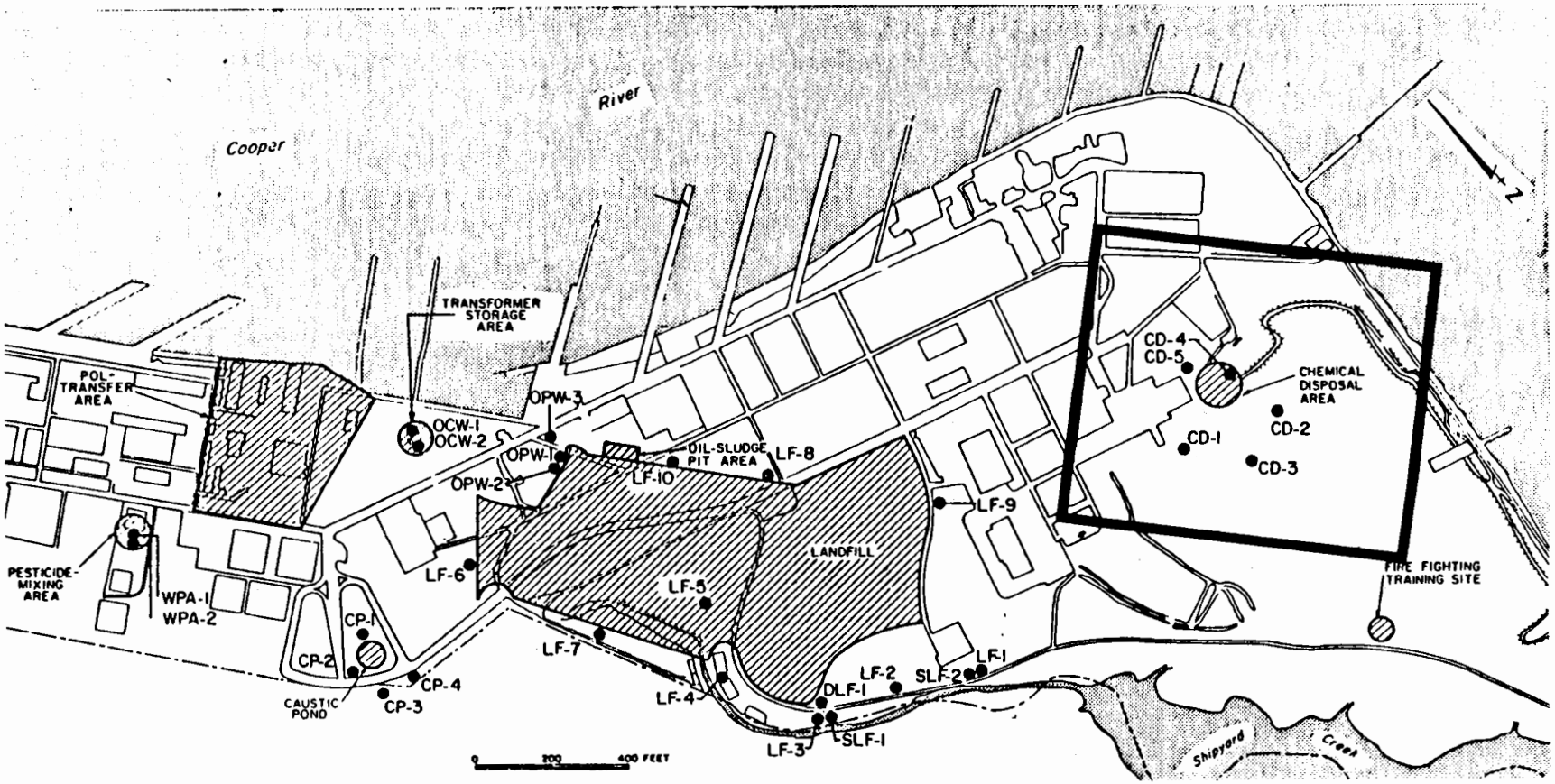

Figure 3-7. Location of monitoring wells-Chemical Disposal Area. (Figure taken from Reference 12.)

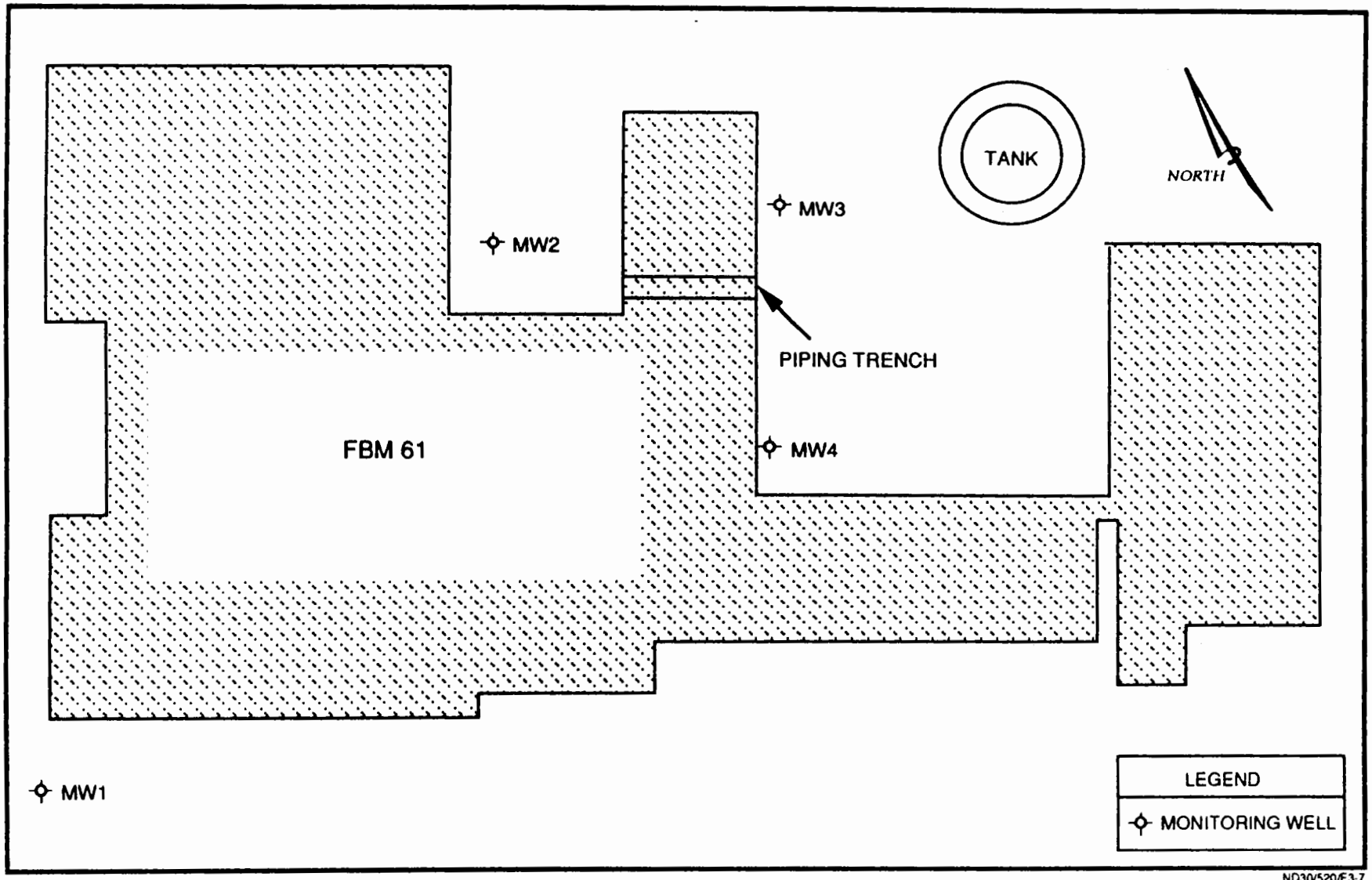

Figure 3-8. Proposed monitoring well locations at SWMU #17.

contaminants is not occurring beyond the building area, the following soil and groundwater investigation is proposed for the site.

3.9.1 Soil Sampling. Due to the location of the contamination (primarily beneath Building FBM61), a comprehensive soil sampling program is not feasible. However, soil samples will be collected at the locations of the four proposed monitoring wells using the soil sampling protocols described in Section 4.4.1. Soil borings will be installed with a drilling rig and soil samples will be retrieved using a split-spoon sampler. Conditions may require that hand augering be used to advance and sample soil borings. The actual retrieval depths will depend upon the materials encountered. However, the general rationale will be to collect a series of samples which vertically bracket any encountered contamination. To assist in field determination of contaminated zones, the field crew will conduct head space analyses using an OVA. It is estimated that a minimum of eight discrete soil samples will be assayed by the laboratory for PCBs, Total Petroleum Hydrocarbons (TPH), and Base-neutral compounds.

3.9.2 Groundwater Sampling. The migration potential of PCBs at SWMU #17 is believed to be rather limited. The contaminated area has an impermeable cover consisting of the building and surrounding paved areas and PCBs bind tightly to soils, especially those with a high degree of naturally occurring organic content. However, in order to confirm that any remaining constituents are not migrating into surrounding soils and/or groundwater, four monitoring wells are proposed for locations surrounding the building (Figure 3-8). Monitoring wells MW-2, MW-3, and MW-4 were sited to bracket the areas where initial samples were taken beyond the confines of the building. MW-1 is designed as an upgradient well. Since the potential for advective transport is low, the four wells should be sufficient to detect transport by diffusion from the area.

The wells will be installed and sampled using the protocols described in Section 4.4.2. Samples will be analyzed for PCBs, TPH, and Base-neutral extractables. No further remedial action is planned until the building is demolished or until PCBs or other constituents of concern are detected in the groundwater. Gauging of the four proposed monitoring wells should be conducted on a regular basis to allow construction of a series of groundwater surface contour maps for the site. These maps will show the direction(s) of groundwater flow in and near SWMU #17. Combining the hydrogeologic data and analytical results should allow a better understanding of the extent and magnitude of any groundwater contamination resulting from the Oil Spill Area.

3.9.3 Temporary Land Use Restrictions. The site's activities should be limited to those which do not disturb the soil or groundwater. Utility construction should be minimized and conducted with the proper protection to prevent physical contact with potential contaminants.

3.10 SWMU #21, WASTE PAINT STORAGE AREA. This area was previously used for temporary storage of containerized paint waste and sand-blasting operations. Paint wastes were known to contain cadmium, chromium, lead, cyanide, toluene and tetrachloroethylene. Sand-blasting residues contained organo-tin paint constituents. These materials were stored in containers on a concrete pad. In addition, materials were found in residues directly on the ground surface surrounding the pad (Figure 3-9). Under the prior investigation to clean close this unit, paint chips were tested and passed EP toxicity tests. However, analytical testing of the

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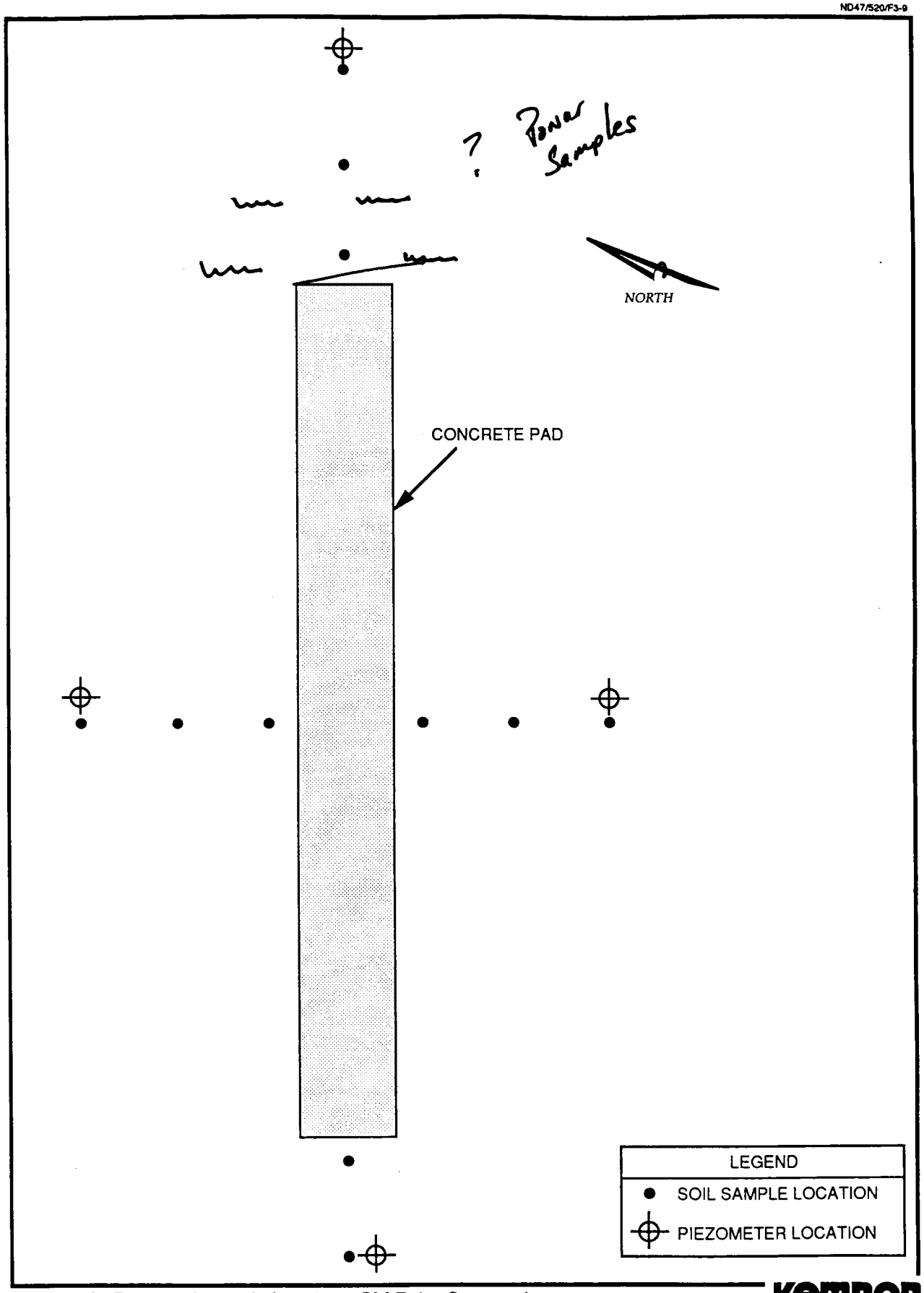

Figure 3-9. Proposed sample locations-Old Paint Storage Area.

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soil and groundwater surrounding SWMU #21 had not been performed to determine the extent and magnitude of contamination. In order to fill in current data gaps and ensure that migration of contaminants is not occurring beyond the concrete pad area, the following soil and groundwater investigation is proposed for the site.

3.10.1 Soil Sampling. Two phases are envisioned for the soil contamination investigation. In Phase I, a series of shallow soil samples will be collected on all four sides of the pad at distances of 5 feet, 25 feet and 45 feet out from the pad. The 16 sample points are depicted in Figure 3-9. Two samples will be collected for each designated point at depths of 0 to 0.5 feet and 0.5 to 1 feet below grade. Initially, all surface samples (0 to 0.5 feet) at a distance of 5 feet from the pad will be analyzed for RCRA metals, volatile organic and semi-volatile organic compounds. The constituents found in these initial samples will determine the types of assays which will be performed on remaining samples. Samples will be analyzed using a tiered approach with shallow samples located at 25 and 45 feet from the pad successively assayed. If the initial 16 samples prove insufficient to delineate soil contamination at the SWMU, then a more extensive effort will be undertaken.

3.10.2 Groundwater Sampling. Four temporary monitoring wells will be installed around the pad at the locations shown in Figure 3-9. The purpose of this effort is to ascertain if potential soil contamination has adversely impacted groundwater quality. The potential for groundwater impacts is relatively high due to the shallow water table (2 to 4 feet below grade) in the area. Swampy conditions would likely make it difficult to install wells with a standard drilling rig. Therefore, we propose to install temporary monitoring wells using hand augering techniques. Groundwater samples will be retrieved and analyzed for RCRA metals, volatile organics, and semi-volatiles. Additional wells will be installed and sampled if needed to complete a delineation of potential groundwater contamination.

3.11 SWMU #25, OLD PLATING OPERATION, BUILDING 44. The old plating operation will require a phased approach to delineate contamination and decontaminate the building. Prior investigations revealed the interior surface areas and process tanks are contaminated with metals. Asbestos was also detected in roof samples. Further evaluation of concrete floors, subsurface soils inside and outside the building, and groundwater will be required. Analytical data gathered for SWMU #22 will be incorporated into the SWMU #25 Workplan. The sampling investigation for this unit will require concrete core, subsurface, and groundwater samples to delineate contamination at the site. Figure 3-10 presents proposed sample locations.

The concrete floor inside the building has deteriorated and the condition of the floor drain piping is questionable. The potential for contaminant migration to groundwater is high, especially with the evidence of low pH conditions. All plating operation equipment is scheduled to be removed by a contractor before the investigation begins.

3.11.1 Core Sampling. Concrete core samples will be collected inside Building 44 to allow evaluation of the potential for vertical migration of metals contamination into the concrete. Seven 4-inch diameter core samples are proposed to be cored through the concrete. The cores will be divided into 2-inch sections and pulverized for analysis. Samples will be analyzed for RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) and cyanide.

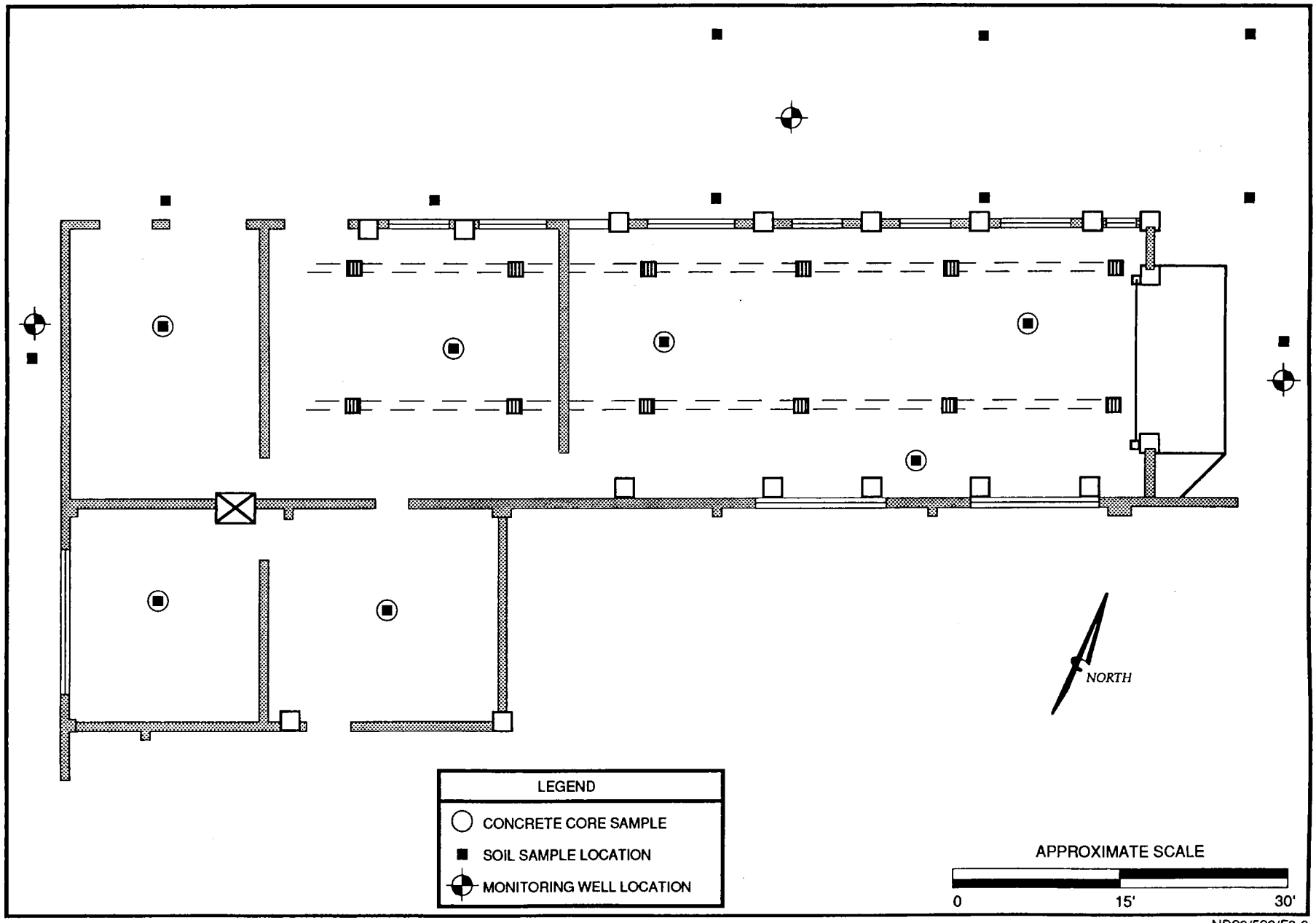

Figure 3-10. Proposed sample and monitoring well locations at SWMU#25.

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3.11.2 Soil Sampling. A hand auger will be used to collect subsurface soil samples, beneath the concrete, from the seven 4-inch diameter holes. A 3-inch diameter hand auger will be utilized to collect soil samples at 1 foot intervals to a depth of 4 feet unless groundwater is encountered first. Laboratory analysis will be performed first on the near surface samples and continue with deeper samples unless non-detectable levels are obtained.

The subsurface soils around the exterior areas of Building 44 will also be sampled. Ten additional sample locations will be selected around the northern and eastern perimeter of Building 44. Subsurface soil samples will be collected at 1 foot intervals beneath the asphalt at the soil/ groundwater interface. Samples will be analyzed for RCRA metals and cyanide.

3.11.3 Groundwater Sampling. Installation of three monitoring wells at SWMU #25 and the associated waste treatment system, SWMU #22, are recommended under this RFI Workplan. The potential for constituents to migrate from the site is somewhat higher than at other units due to the metals in reduced pH (<5) conditions. The age of the plating operation and the presence of conduits for transport via the floor drain piping suggest a potential for significant contamination which warrants groundwater testing.

Three groundwater wells will be installed and sampled using the protocols described in Section 4.4. Monitoring wells will initially be installed to characterize site hydrogeology and groundwater contamination (Phase I). Gauging of the three monitoring wells should be conducted on a regular basis to allow construction of a series of groundwater surface contour maps for the SWMU #25. These maps will show the direction(s) of groundwater flow in and near the site. Combining the hydrogeologic data and analytical results should allow a better understanding of the extent and magnitude of any groundwater contamination resulting from the Old Plating Operation. The transport direction and migration rates of potential groundwater plumes will also be assessed. Once this information becomes available, then additional off-site monitoring wells will be proposed, if necessary, to complete the delineation effort.

Samples will be analyzed for RCRA metals and cyanide. Proposed well locations are identified in Figure 3-10. Additional monitoring wells will be required if groundwater is resolved to be contaminated (Phase II).

3.11.4 Temporary Land Use Restrictions. Access has been restricted in the plating operation area since the operation was shut down. The area between Building 44 and the waste treatment system tank is an industrialized area of the CIA. Temporary land use restrictions should be implemented to restrict any utility construction between the units and minimize construction near these two areas.

3.12 SWMU #29, BUILDING X-10. As described earlier, the area south of Building X-10 was used as a waste accumulation area for submarine maintenance and repair. Although the site is almost entirely covered with asphalt, there are signs that spillage may have impacted soil and grassy areas surrounding the site. An initial sample investigation is proposed for this unit to determine if soil contamination is present. SWMU #34 will be incorporated into this investigation as well.

3.12.1 Soil Sampling. Ten locations have been selected under an initial Phase I investigation to collect subsurface soil samples as shown in Figure 3-11. Hand augered samples will be collected at 1 foot intervals at each location to a depth of 5 feet. The ten samples collected from the surface to 1 foot soil horizon will be split for grab and composite sample analysis. Ten subsamples will be divided and combined into three distinct composites based on location. The remaining (grab) subsurface samples will be temporarily archived at 4 C. The three composite groups will then be assayed for volatile organics, semi-volatile organics, total RCRA metals, cyanide, and PCBs.

If contamination is present in the composite samples, then the individual grab samples will be assayed for the constituents (analytes) identified in the composite sample. Analysis will begin with near surface samples and progress downwards. Analysis for each sample location will be discontinued if results are non-detectable. The findings will be evaluated and the need for a Phase II investigation will be determined.

3.12.2 Groundwater Sampling. Groundwater sampling is not presently proposed for this site. Historical data are not available. Until the Phase I sampling program is completed, installation of monitoring wells is not warranted.

3.12.3 Temporary Land Use Restrictions. The site's activities should be limited to those which do not disturb the soil or groundwater. Utility construction should be minimized and conducted with proper preventive measures to prevent release of groundwater contamination.

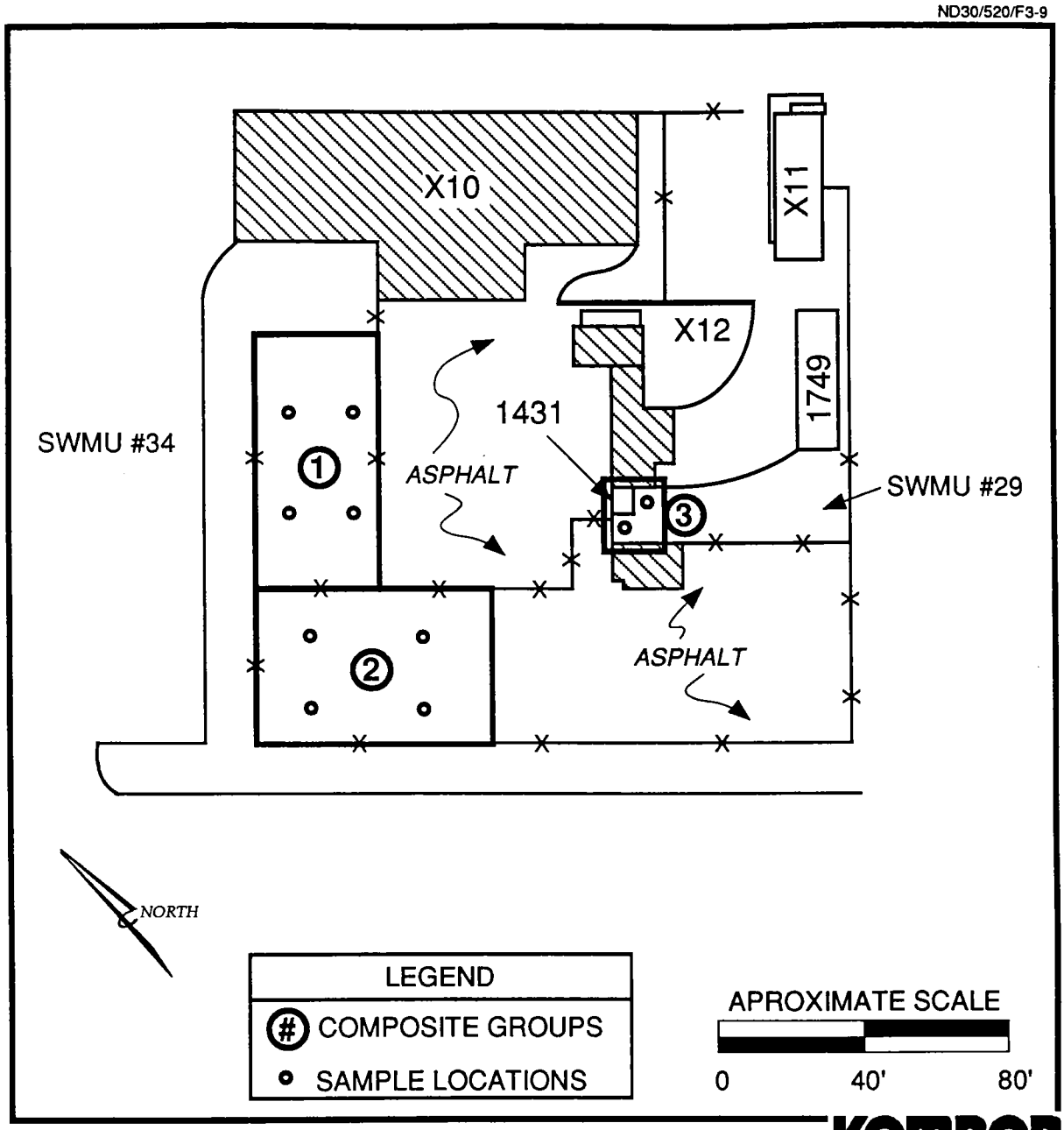

Figure 3-11. Proposed sample locations at SWMU #29.

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CHAPTER 4. QUALITY ASSURANCE/QUALITY CONTROL PLAN

The following sections describe methods to be utilized to assure collection of usable data for the RFI. Elements of this program include project organization, sampling protocols, laboratory protocols, and quality control checks.

4.1 PROJECT DESCRIPTION. The RFA and its Addendum for the NSY identified 35 SWMUs. Eleven of these units require further investigation. These units are:

- the lead contamination area (SWMUs #1 and #2);
- the battery electrolyte treatment area (SWMU #5);
- the public works storage yard (SWMU #6);
- the transformer storage area (SWMU #7);
- the oil sludge pit area (SWMU #8);
- the closed landfill (SWMU #9);
- the chemical disposal area (SWMU #14);
- the oil spill area (SWMU #17);
- the old paint storage area (SWMU #21);
- building 44 old plating operation (SWMUs #22 and #25);
- building X-10 (SWMUs #29 and #34)

Section 2.6 describes the types of hazardous materials likely to be encountered at each unit.

To characterize the nature and extent of contamination, soil and groundwater samples will be collected. Sampling protocols and number of samples to be collected are described in this QA/QC plan. Both sampling and analysis procedures will follow protocols as outlined in the EPA Region IV Standard Operating Procedures and Quality Assurance Manual (SOP) and SW-846. The rationale for particular kinds of sampling are discussed in Sections 2.0 and 3.0 of this RFI Workplan.

4.2 PROJECT ORGANIZATION AND RESPONSIBILITIES. This section describes project organization, lines of authority and responsibility of various personnel for particular tasks and quality assurance on the project. Figure 4-1 is a project organizational chart. Resumes of the key individuals who will serve in the positions are described below can be found in Appendix N.

4.2.1 Project Manager. The project manager will be responsible for overall supervision and all administrative duties related to the project. Besides directing overall RFI activities, he will be responsible for ensuring full compliance with this QA/QC plan, the health and safety plan, and state and Federal regulations. He will have final authority over and responsibility for all activities conducted in connection with various phases of the RFI and will provide lines of communication between WAPORA, the NSY project manager, DHEC and EPA.

4.2.2 Project Hydrogeologist. The project hydrogeologist will be responsible for the activities of site personnel during well installation and sampling operations. He will report directly to the project manager and be responsible for assuring compliance with this QA/QC plan during the above operations. The project hydrogeologist will control submittal of collected samples to the laboratory for analyses.

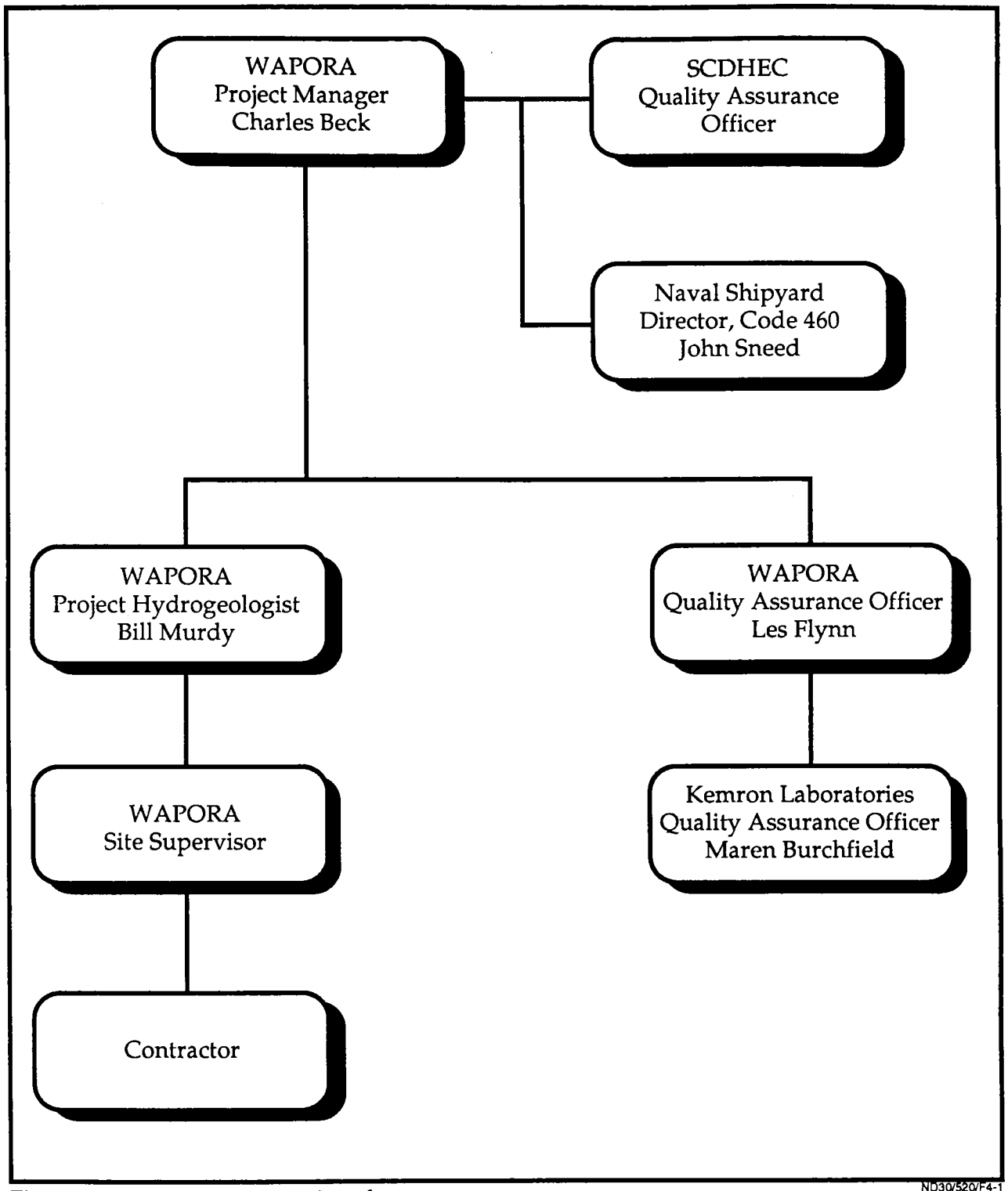

Figure 4-1. Project organization chart.

4.2.3 Project Quality Assurance Officer. The project quality assurance officer will be responsible for updating and reviewing compliance with program and site-specific QA/QC plans to assure that objectives of the plan are consistently met. He will review data recorded in the field log books and laboratory analytical data to validate conformity with standards set forth in the QA/QC plan. If changed conditions warrant, he will update this QA/QC plan to comply with DHEC and EPA guidelines.

4.2.4 Site Supervisors. Site supervisors will direct field teams under the overall direction of the project hydrogeologist. As site manager, each supervisor will be responsible for assuring that all QA/QC procedures are strictly followed by field technicians and all subcontractors under his direction. He will report any deviations from QA/QC procedures to the project hydrogeologist or quality assurance officer.

4.3 QA/QC OBJECTIVES AND PROCEDURES.

4.3.1 QA/QC Objectives. Data generated during the RFI will provide the basis for decisions on corrective measures or remedial responses at each site. Therefore, data collected during the investigation needs to be of sufficient quality to support subsequent decisions. In order to provide data that present a valid characterization of the situation for each SWMU, WAPORA has developed QA/QC procedures for the RFI at NSY. Implementation and enforcement of these procedures will assure the validity of data generated during the investigation. To specify the quality and quantity of data required to achieve established goals, data quality objectives (DQOs) have been established to be used in designing sampling and analysis plans. The elements covered in the DQOs are laboratory selection, identification of the number of samples and their matrices, sampling schedules, constituents of interest, required analytical methodologies, detection limits, holding times, deliverables, levels of QA/QC, and turnaround of analytical results.

4.3.2 QA/QC Procedures. This section describes field Quality Assurance and Quality Control procedures. All personnel involved in this project will be required to read, understand, and comply with the procedures, methods, and protocols described in this section. The project manager, QA/QC officer and site supervisor will insure that field operations are conducted in accordance with these procedures in order to assure the validity of all data generated during field activities.

4.3.2.1 Documentation of Field Data. The site supervisor will see to it that the following information will be recorded in a site-specific field notebook:

- WAPORA site personnel and identity of any subcontractors
- Equipment calibration readings
- Sample identification number
- Sample location and depth
- Date, time and method of sample retrieval
- Sample type (grab or composite)
- Sample description and classification (for soils)
- Sample preservative
- Sampler
- Weather conditions

- QA/QC sample designations (trip, field, or equipment blanks and duplicates)
- pH, conductivity, and temperature readings of water samples
- Organic vapor concentration readings from boreholes, wells or headspace analysis
- Static well water levels
- Monitoring well depths
- Volume of well water purged prior to sampling

4.3.2.2 Equipment Decontamination Procedures. This section describes procedures for decontamination of field equipment. Drilling augers are cleaned using a steam or hot water pressure washing system. Sampling tools such as split-spoons, stainless steel trowels, bailers, and groundwater pumps should be decontaminated using the following procedures:

Field Cleaning Procedures for Teflon and Stainless Steel Equipment Used to Collect Samples for Organic Compounds and Trace Metals Analyses

1. Clean with tap water and laboratory grade detergent (Alconox or equivalent) using brush if necessary to remove particulate matter and surface films.

2. Rinse thoroughly with tap water.

3. Rinse with 1 to 1 reagent grade nitric acid, HNO_3, but only if trace metals are to be sampled. The acid rinse should not be used on stainless steel sampling equipment (bailers, augers, trowels, etc.).

4. Rinse thoroughly with deionized water.

5. Rinse twice with pesticide grade or nanograde methanol or isopropanol.

6. Rinse thoroughly with analyte-free (usually organic-free or metal-free) water and allow to air dry as long as possible.

7. If analyte-free water is not available, allow equipment to air dry as long as possible.

8. Wrap with aluminum foil, if appropriate, to prevent contamination if equipment is to be stored or transported.

Because of the geographic distribution of the SWMUs at NSY, the locations of decontamination areas will have to be chosen on a site-by-site basis. These locations will be selected in the field by the site supervisor.

4.3.2.3 Preparation of Quality Control Samples. An integral component of a field QA/QC program is the use of trip blanks, field blanks, equipment blanks, and sample duplicates. During groundwater sampling, a trip blank consists of a VOA vial filled with analyte-free water prepared in the laboratory. During soil sampling, a trip blank consists of soil sample jar filled with organic-free sand. The trip blank is placed undisturbed in a cooler with samples retrieved during the day. The bottle is listed as a trip blank on the chain-of-custody form. At least one trip blank should accompany every shipment of water or soil samples from the field to the

that contains VOA's?

laboratory. The purpose of a trip blank is to detect potential contamination of samples from volatile organic compounds at any point during sample bottle shipment or storage activities.

A field blank is prepared in the field with analyte-free water used for decontamination and steam cleaning procedures. One field blank should be prepared for each parameter being sampled and placed into appropriate coolers prior to retrieval of monitoring well samples. The field blank frequency should be one per water source per sampling event for each type of analyte. The purpose of a field blank is to determine if cross-contamination of samples is occurring during retrieval and storage in the field. It also serves as an additional check on laboratory QA/QC.

w/ analytical alternate day

An equipment blank should be prepared periodically if non-dedicated sampling equipment is utilized. An equipment blank consists of rinse water collected after the final stage of equipment decontamination. The frequency of equipment blanks is one per day. The purpose of an equipment blank is to determine the adequacy of field decontamination procedures.

Duplicates should be prepared at a frequency of 10% of all soil and groundwater samples. The samples may be labeled as a duplicate or may be packaged as a blind duplicate with the identity of the sample not revealed on the chain-of-custody form. The purpose of duplicate samples is to check the accuracy and precision of laboratory analytical data.

4.3.3 Laboratory QA/QC Procedures. WAPORA/KEMRON's Quality Assurance Officer will direct analytical procedures so that they strictly follow the QA/QC program to assure the accuracy and precision of analytical results. The QA/QC analytical procedures include:

- Appropriate sample storage;
- Appropriate sample preparation methods;
- Appropriate analytical methods;
- Appropriate calibration and analytical procedures;
- Data handling, review, and reporting; and
- Internal QA/QC control.

All these procedures are detailed explicitly in WAPORA/KEMRON's QA/QC manual and briefly referred to here. The QA/QC manual complies with the CLP Statement of Work.

4.4 SAMPLING PROTOCOLS. During the RFI, soil and groundwater samples will be collected for chemical analysis. This will be accomplished by a variety of methods including soil test borings, hand auger borings, and monitoring wells. The following sections describe the general approach to these activities. Variations in the protocols may be necessary due to site conditions.

4.4.1 Soil Test Borings. Soil test borings will be placed in areas of suspected or potential contamination as described in Section 3.0 of this RFI Workplan. Each boring will be advanced by hollow stem auger techniques using either 3 -inch or 6 -inch inside diameter augers. Soil

samples will be collected ahead of the augers by use of a previously cleaned split barrel sampler. The first sample will be collected from 0.0 to 0.5 feet below the ground surface. Additional samples will typically be collected at five foot intervals from 3.5 to 5.0 feet, 8.5 to 10.0 feet, etc. The sampler will be driven by a 140-pound hammer falling 30 inches following ASTM D-1586. Each sample will be visually examined and logged by a site geologist. Additional samples will be collected when changes in soil lithology are observed or evidence of soil contamination is present. Representative samples will be placed into appropriate containers.

During the drilling operations, an OVA or HNu will be used to monitor organic vapors in the breathing zone and near the auger cuttings. ("OVA" and "HNu" are trade names for vapor analyzers using flame ionization and photo-ionization detectors, respectively). Individual soil samples will be monitored using the head space technique to assist in locating contaminated zones or areas.

All soil borings will be abandoned by a pressure grouting procedure as required by South Carolina Well Standards and Regulations (R. 61-71). The procedure will be accomplished by pouring a cement-bentonite mixture through a tremie pipe starting at the bottom of the boring. Grouting will proceed from the bottom of the boring to the surface in one continuous operation.

4.4.2 Monitoring Well Construction. Several monitoring wells will be constructed at the individual SWMU locations identified in Section 3.0 of this RFI Workplan. Each monitoring well will be drilled using 6 ¼-inch hollow stem augers utilizing the techniques described above for soil borings. The total depth of each well will vary depending on site conditions. Each well will be screened from two feet above the water table to eight feet below. A five foot screen will be installed in any "deep" monitoring wells designed to ascertain the vertical extent of contamination. Each well will typically include a 10-foot long, 2-inch I.D. schedule 40, PVC screen. Both screen and casing will be inserted through the auger. Sand pack will consist of silica sand washed into the annular space by tremie pipe and extended 2.0 feet above the screened interval. The size of the screen slots and the sand pack grain size will be determined by first performing sieve analyses on the soil. Once the sand is placed, a minimum of a 2-foot bentonite pellet seal will be placed above the sand pack. The placing of both the sand pack and bentonite seal will occur in increments of two feet or less, with the augers withdrawn in similar increments. Following installation of the bentonite seal, the augers will be withdrawn and the remaining annular space will be grouted by tremie pipe using a 5%, $\pm$ 1%, bentonite and neat cement mixture. The hydration time for the bentonite seal will meet the manufacturer's specifications.

Each monitoring well will be completed with a 4-inch locking protective steel surface casing with locking cover. The casing will be marked with the international symbol for monitoring wells and surrounded by an elevated concrete pad. For those wells located in areas of vehicular traffic, protective bumpers will be installed. A monitoring well construction diagram is presented in Figure 4-1a.

4.4.3 Well Gauging Procedures. Static groundwater levels will be measured in each monitoring well 24 hours following development. All wells at individual SWMU locations will be gauged on the same day. Well gauging will consist of measuring the depth to water and depth to free floating product (if present) using a decontaminated oil/water interface probe. The

measurements will be made to an accuracy of 0.01 foot. The well depth will be measured using a decontaminated weighted steel tape with an accuracy of at least 0.10 foot. All readings will be made at a clearly marked reference point at the top of each well casing. Each well reference point will be surveyed to a common datum and/or mean sea level to allow construction of a groundwater surface contour map.

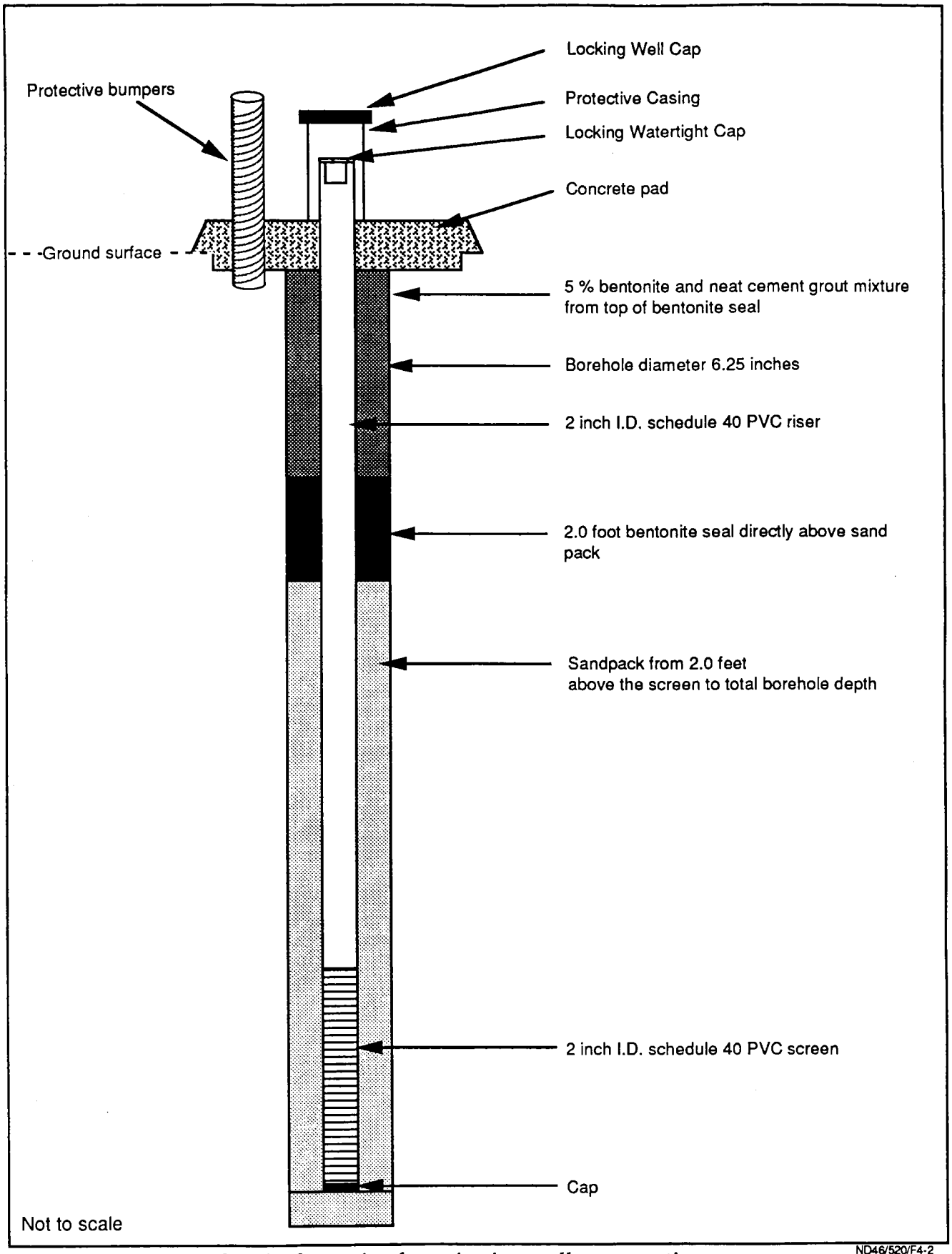

Figure 4-1A. Generalized schematic of monitoring well construction.

4.4.4 Monitoring Well Sampling Procedures. Groundwater samples will be collected from the monitoring wells within approximately one week after well construction. Each well will be fully developed by surge and bailing techniques. During the development process, pH and conductivity will be measured. Each well will be considered developed when pH and conductivity have stabilized and the water is free of silt.

Temp

WAPORA will begin well sampling at a site with either the upgradient (clean) well or wells which are known or believed to be clean. Sampling then proceeds with increasingly contaminated wells and ends with the most contaminated well. This procedure will help to minimize the potential for cross contamination of wells, especially false positives in clean wells due to insufficient decontamination of field sampling equipment. Samples should be collected in the following order: volatile organics, purgeable organic carbon, purgeable organic halogen, total organic halogen, total organic carbon, extractable organics, total metals, dissolved metals, phenols, cyanide, sulfate and chloride, turbidity, nitrate and ammonia, radionuclides.

The monitoring well sampling procedure begins with placement of plastic or aluminum foil around the well head prior to purging and sampling to provide an area where equipment can be placed temporarily without risk of contamination. Disposable latex gloves may be worn while sampling at all types of sites, provided that new, unused gloves are worn for each separate sampling point. Static well water levels will be measured with an electronic water level meter prior to commencement of well sampling procedures. An oil/water interface probe will be used if free floating petroleum is present or suspected in the well. The water level measurement is recorded in the project field notebook. Water and product level measurements will be taken from the same point each time they are measured. The thickness of any floating free product observed will also be noted in the field notebook. Wells with free product will not be sampled for trace contaminants. The depth of the well will be determined with a pre-cleaned weighted steel tape. All water level measuring devices must be accurate to within 1/10th of a foot or better. The volume of water in the well casing will be calculated as follows:

$$V = pi(r^2)hw$$

V = the well volume in cubic feet

r = the well radius in feet (0.083 for a 2 inch well).

hw = the height of the water column in the well
(well depth minus static water level)

The result is then multiplied by 7.48 to convert cubic feet to gallons.

Well water will be purged using equipment described above which has been thoroughly pre-cleaned. Dedicated pumps or tubing will be used. All dedicated equipment, except equipment that is never removed from the well, even during sampling, will be stored off site and will be cleaned between sampling events. The pump and/or pump tubing will be positioned within the upper few feet of the water column to achieve thorough purging. Wells will be purged of at least three well volumes to insure that the sample retrieved is representative of aquifer water quality. Purged water volume will be measured with graduated buckets or flow rate calculations. The wells will be considered purged and ready for sampling if pH, conductivity

and temperature readings of the well water have stabilized (values within 5% of each other) by the time three well volumes have been removed. If stabilization has not occurred, then additional water will be purged until readings stabilize. The maximum allowable time between purging and sampling is six hours (or for slowly recovering wells, ten hours). In the event a well has recovered insufficiently after this time, the well will not be sampled. Purged waters will be retained on-site in a tank or 55 gallon drum until laboratory analytical results indicate the regulatory status of the water. If pump tubing or piping is used which is not constructed of Teflon or stainless steel, then the following procedure will be followed.

Contact with formation waters will be minimized by slowly withdrawing the pump from the water column during the last phase of purging. This will tend to remove from the well any groundwater which has contacted the exterior of the pump and or tubing/piping. Following this procedure, an additional well volume will be removed from the well using a Teflon bailer (or other applicable sampling device) prior to commencement of sampling procedures.

All groundwater samples will normally be retrieved using Teflon bailers, once subjected to thorough pre-cleaning. A new, braided nylon rope is used to lower the bailer, and the rope is not reused following sampling of the well. Duplicate samples should be taken from successively collected bailers. Split samples should be taken successively from the same bailer. If one bailer does not contain enough water to fill both sample bottles, the 1/2 of the bailer should be poured into one sample container and 1/2 into the other. Another bailer of water should then be collected, and the sample containers filled. The water samples collected with a bailer will be poured directly from the bailer into the appropriate pre-labeled containers. Wet ice placed in sealable plastic bags is used to provide temperature preservation at 4 C. All sample bottles from a specific well will be placed within the sample cooler. Specific sampling methods are outlined below:

a. A decontaminated sampling cup will be used to collect a sample for field analyses of temperature, specific conductivity, and pH. These results should be immediately recorded on the monitoring well sampling log sheet.

b. Aliquots for volatile organic analyses (VOA's) should always be retrieved first. The vials should be immediately labeled and ID numbers recorded in the field notebook. Special attention is required for this critical protocol. Detailed VOA sampling instruction are as follows.

At least two 40 ml septum vials should be filled for VOA constituents. The screw caps for the vials contain a Teflon lined silicone disc to prevent contamination of the sample by the cap. The discs should be placed in the caps (Teflon side to be in contact with the sample) in the laboratory prior to the beginning of the sampling program. The VOA 40 ml vials should be completely filled (zero headspace) to prevent volatilization of constituents. Extreme caution should be exercised when filling a vial to avoid any turbulence which could also produce volatilization. The sample should be carefully poured or received down the side of the vial to minimize turbulence. As a rule, it is best to gently pour the last few drops into the vial so that surface tension holds the water in a "convex meniscus." The cap with Teflon coated septum is then applied and some overflow is lost. However, the end result is complete elimination of air space in the bottle. After capping, the bottle should be turned upside down to check for the presence of any bubbles. If bubbles are observed, then the entire sampling procedure must be repeated.

In the event the VOA vials are pre-preserved, extreme caution should be exercised when the vials are actually used for surface water sampling in order to prevent loss of preservative. The best procedure is to not completely fill the vial and to use the vial cap to collect enough water to top-off the sample.

4.4.5 Hand Auger Borings. Standard hand auger borings will be drilled to shallow depths at selected SWMU locations (see Section 3.0) by use of a previously cleaned 3-inch stainless steel hand auger. Borings will typically be advanced through 6-inch intervals. Soils will be described and representative samples retained. Borings will be terminated at or slightly below the water table. Temporary monitoring wells may be installed using hand auger in areas where drill access is difficult or impossible.

One or more laboratory samples will be collected from each boring as required with each sample placed in an appropriate container and labeled accordingly. The extent of contamination also will be estimated in the field by visual examination and OVA/HNu data. A two person sampling crew will be utilized during the collection of the soil samples. All samples will be properly packed with chain-of-custody documentation and shipped to the laboratory for analysis.

4.5 SAMPLE CUSTODY. Strict chain-of-custody procedures will be followed by all personnel. Possession and handling of samples will be documented from the time of collection through analysis and final disposition. An example of WAPORA's chain-of-custody form is shown in Figure 4-2.

Cleaned sample containers will be securely packed, sealed, and delivered to the laboratory. The package will be opened by authorized personnel only at which time a preprinted label will be affixed to each container. Chain-of-custody forms will be filled out immediately after sample collection. Information such as sample ID number, types of sample (composite/grab), date and time of sampling, sample location, sampler, constituents to be analyzed, and special analytical requirements. The chain-of-custody form will be signed by the site supervisor upon completion of the sample collection. A copy of the form will accompany the sample. Samples, packed with ice when necessary, will be shipped to the laboratory via an overnight delivery service.

4.6 CALIBRATION PROCEDURES.

4.6.1 Field Equipment. Equipment anticipated to be used includes an organic vapor analyzer (OVA), HNu, portable pH meter, and portable conductivity meter.

The OVA will be checked before each field use. The battery charge and possibility of hydrogen leaks will be checked. The instrument will be calibrated with a gas of known concentration prior to startup and recalibrated monthly.

The HNu battery, lamp, and fan will be checked before each field use. Isobutylene will be used as the calibration gas before each day's field use. The probe will be cleaned or replaced as needed.

Portable pH meters will be checked daily before use for mechanical and electrical functions. The meter will be calibrated with two buffer solutions (pH 4 and 7) before sampling. The buffer solution will be changed daily.

WAPORA Environmental Engineers/Scientists

№ 00701

CHAIN-OF-CUSTODY RECORD

Page _____ of _____.

Project Contact:

Turn Around Requirements:

Project No.: Project Name:

Sampler (print): Signature:

Sample I.D. No.	Comp*	Grab	Date	Time	Protocol CWA	Protocol SW846	NUMBER OF SAMPLES	Hold	Purgeable Halocarbons 601/8010	Volatile Aromatics 602/8020	Organochlorine Pesticides & PCBs 608/8080	Polynuclear Aromatics 610/8100	Volatile Organics 624/8240	Semi-Volatile Organics 625/8270	RCRA Metals (Total)	TCLP Metals	TCLP Metals w/MBC	TCLP VOAs, BNAs & Metals	TCLP VOAs, BNAs & Metals w/MBC	BETX 5 ☐ or 1 ☐	TPH 25 ☐ or 10 ☐				ADDITIONAL REQUIREMENTS

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Relinquished by: (Signature)	Date	Time	Received by: (Signature)

Relinquished by: (Signature)	Date	Time	Received for Laboratory by: (Signature)	Date	Time	Remarks:

*Homogenize all composite samples prior to analysis

White – Lab Yellow – Office Pink – Field

Figure 4-2. Chain-of-custody form.

Portable conductivity meters will be checked daily. Batteries will be checked and internal calibration procedures followed using the manufacturer's guidelines.

4.6.2 Laboratory Equipment. The laboratory calibration procedures for analytical instruments will be in accordance with WAPORA/KEMRON Laboratories' QA/QC Plan.

4.7 ANALYTICAL PROCEDURES. The analytical procedures for various constituents of interest are described in detail in WAPORA/KEMRON's QA/QC Plan. Specific EPA analytical procedures to be used during this project are shown in Table 4-1.

4.8 DATA REDUCTION, VALIDATION, AND REPORTING. Data transfer, reduction, validation, and reporting are primarily functions of the analytical laboratory. The project manager generally provides an interpretation of the data based upon site conditions and characteristics. These interpretations may include utilizing acceptable statistical techniques. The project manager will assist the laboratory in data validation by checking and interpreting the results of field blank and duplicate analyses.

Laboratory procedures for data reduction, validation, and reporting are described in WAPORA/KEMRON's QA/QC Plan. These procedures follow those given in each of EPA's approved methods (40 CFR Part 136).

Sample locations will be reported graphically and assay results will be tabulated for each site. Because of the nature of the samples to be taken, no statistical or trend analyses are to be performed for this project.

4.9 INTERNAL QUALITY CONTROL CHECKS. The intra-laboratory control program is a continuing, systematic, in-house regimen intended to ensure the validity of analytical data. Its functions are:

- To provide a measure of the precision of analytical methods;
- To maintain a continuing assessment of the accuracy and precision of analysts within the laboratory group;
- To identify weak methodology and provide a continuing source of research into problems aimed at overcoming deficiencies;
- To provide a permanent record of instrument performance as a basis for validating data and projecting repair or replacement needs;
- To detect training needs within the analytical group; and
- To upgrade the overall quality of laboratory performance.

The intra-laboratory control checks for analytical work are described in WAPORA/KEMRON Laboratories' QA/QC Plan.

Table 4-1. EPA analytical methods for constituents of interest.

SOILS		
Parameter	Analytical Method	Extraction/ Preparation Methods
PCBs and Organochlorine Pesticides	8080	3550
Volatile Organics (GC/MS)	8240	5030
Semi-volatile Organics (GC/MS)	8250, 8270	3550
Organophosphorus Pesticides (GC)	8140	3550
Total Metals (Atomic Absorption)	7040-7950	3050
Extractable Lead	7420, 7421	
Total Petroleum Hydrocarbons	418.1 IR	3050
GROUNDWATER		
Parameter		
Total Lead	239.1	
PCBs and Organochlorine Pesticides	608	
RCRA Metals	200 Series	
Cyanide	9010	
Volatile Organics (GC/MS)	624	
Semi-volatile Organics (GC/MS)	625	
Organophosphorus Pesticides (GC)	614	
Total Petroleum Hydrocarbons	418.1 IR	why not 8010 catal mod

Sources: 40 CFR Part 136 and SW-846

4.10 PERFORMANCE AND SYSTEM AUDITS. A system audit is a qualitative evaluation of all components of the measurement systems to determine their proper selection and use. After systems (procedures) are operational and generating data, performance audits are conducted periodically to determine the accuracy of the total measurement system. The performance and system audits of analytical works are stated in WAPORA/KEMRON Laboratories' QA/QC Plan.

4.11 PREVENTIVE MAINTENANCE. The purpose of preventive maintenance for analytical instruments and field devices is to assure normal operation of the equipment. The OVA and HNu used during drilling operations and site investigation will be recharged overnight to prevent downtime. Conductivity and pH probes will be rinsed with distilled water between measurements and stored in distilled water overnight. Analytical instruments will be maintained according to manufacturer's specifications. The process is referred to in WAPORA/KEMRON Laboratories' QA/QC Plan.

4.12 SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS. Analytical performance measurements are described in WAPORA/KEMRON Laboratories' QA/QC Plan.

4.13 CORRECTIVE ACTION. The purpose of WAPORA's internal corrective action protocol is to investigate and resolve any quality control problems related to field sampling procedures, sample custody, and sample analysis such as identification of contaminated field or laboratory trip blanks. In the event of a QA problem, the WAPORA quality assurance officer will review the sampling procedures utilized in the field to determine whether the sample integrity was compromised. The investigation will include interviews with the site supervisor and other site personnel, review of field notes, and examination of chain-of-custody documents. WAPORA's project quality assurance officer will also coordinate with the laboratory's quality assurance officer concerning any incident of questionable analytical results or internal QC data. He will work with the laboratory staff to resolve any problems and implement appropriate corrective action. WAPORA will subscribe to any corrective action deemed necessary by DHEC, EPA, or NSY QA offices.

The internal laboratory corrective action procedures for analytical work are described in WAPORA/KEMRON Laboratories' QA/QC Plan.

4.14 QUALITY ASSURANCE REPORTS TO MANAGEMENT. The WAPORA project quality assurance officer will report to the WAPORA project manager concerning the performance of measurement systems and data quality. The final contamination assessment report will include a separate QA section summarizing all data quality information, significant quality assurance problems, if any, recommended solutions, and the outcome of any corrective actions. A copy this report will be forwarded to the DHEC, EPA, and NSY QA offices.

WAPORA also will compile laboratory quality assurance reports and include them in its report. The nature and content of laboratory QA reports are described in WAPORA/KEMRON Laboratories' QA/QC Plan.

CHAPTER 5. DATA MANAGEMENT PROCEDURES

The objective of this portion of the RFI Workplan is to describe methods WAPORA will utilize throughout the RFI project to manage collected data.

5.1 GENERAL DOCUMENTATION PROCEDURES. Each field team will have at least one person, generally the site supervisor, who is thoroughly familiar with the appropriate documentation procedures. This person will personally perform or will directly oversee the completion of the documents which accompany the task. Documentation tasks will be performed on a sample-by-sample or item-by-item basis throughout the day. However, items such as shipping containers and sample tags will be prepared in advance.

5.2 FIELD DOCUMENTATION. Sample possession will be traceable from the time the sample is collected to its delivery at the laboratory. In order to identify samples and manage the information, samples will be numbered sequentially by SWMU site and type (i.e., soil, groundwater, etc.).

The following sections describe records and forms to be used to provide documentation and quality control.

5.2.1 Field Log Books. Permanently bound field notebooks will be used to record data and activities performed at each SWMU site. Entries will be described in as much detail as practical. Each notebook will be identified by the project specific document number. The notebook cover will include: project name and number, book number, start and end dates, and the name of the field team whose activities are recorded in the book.

At the beginning of each entry, the date, start time, weather, field personnel present, and activity will be recorded. Additional entries may include geologic logs, drilling records, sample records, and additional data as may be appropriate. Each entry will be initialled by the person making the entry.

5.2.2 Sample Tags. Sample tags will be filled out and attached to each collected sample prior to the time of collection. Label information will be recorded in the Field Log Book as a cross-reference at the time of collection.

5.2.3 Chain-Of-Custody Records. The chain-of-custody record will contain a summary of the contents of the shipment, dates, times, sample numbers, tag numbers, number and volume of containers, and signatures for the transferral of samples.

5.2.4 Subsurface Boring Logs. The subsurface boring logs will be prepared as each boring is advanced. Items to be recorded include materials encountered, depth to water, obvious contamination areas, and any other necessary or appropriate information. A general log also will be recorded in the Field Log Book as a cross-reference.

5.2.5 Monitoring Well Schematic. The monitoring well schematic will provide a summary of pertinent monitoring well information including location, date drilled, drilling method, well depth, screen location, and construction data. A general log also will be recorded in the Field Log Book as a cross-reference.

5.3 OTHER RELATED DATA. Other related data will include illustrations, graphs, meeting summaries, audit reports, and laboratory results. This information will be compiled and reviewed for report presentation.

5.3.1 General Data.

Meeting Summaries, Telephone Conversations, and Notes

These items will be recorded in the field notebooks along with the dates, time, and names of persons involved. These notes will be available for photo copies if requested by the NSY project manager. Meetings and conversations with a substantial impact on the project will be described in a memorandum to the NSY project manager.

Illustrations, Computation, and Engineering Data

Original illustrations and graphics will be initialed and dated by the person originating the document. A second person will check these documents for completeness and needed corrections. All maps, calculations, and data will be reported or prepared to normally accepted standards and confidence levels.

5.3.2 Reports.

Progress Report

These will be prepared periodically by the project manager and will include: the number of samples collected, sites investigated, monitoring wells installed, deviations from approved field or laboratory procedures, if any, and other appropriate information. These reports will be directed to the NSY's project manager.

RFI Report

This report will be written following sampling and completion of laboratory testing. The report will consolidate and summarize the collected data and document the SWMU site evaluations. An initial draft report will be submitted for comment by the NSY, USEPA, and DHEC. Where appropriate, the comments will be incorporated into the final document.

Interim reports may be necessary or appropriate to describe significant divergence of site conditions from those anticipated, to secure concurrence on the need for emergency or interim corrective measures, or to gain regulatory input on unanticipated issues.

Data obtained from sampling and analysis procedures will be summarized and presented in a logical tabular format for each of the SWMUs. These tables will be supported by the raw laboratory reports included as an appendix. The reduction of the laboratory data into tables will

be performed by a technician and reviewed by the Project QA Officer.

Graphical presentation of the sampling results will be in several formats. Isopleth (isoconcentration) maps will be developed for each of the soil and groundwater parameters at each SWMU. In addition, maps showing the sample locations labeled with the sampling results will be developed for each SWMU. For sites where groundwater contamination is a concern, groundwater surface contours will be displayed on the site base maps. Groundwater flow direction will be determined from these maps. The maps used for reporting results will be similar to those found in Section 3.0 of this Workplan showing proposed sampling locations. Cross-sectional plots may also be employed if it is determined that their use will enhance understanding of the site specific geologic environment.

Soil boring logs from drilling operations will be included as an appendix. The logs will be constructed from sample descriptions made by the on-site geologist.

The interpretation of all the accumulated data and analytical results will be performed as a project team effort. The expertise of each project team individual will be utilized to develop proper conclusions and recommendations. The final decision on interpretation of data for the RFI Report will lie with the Project Manager.

CHAPTER 6. IDENTIFICATION OF POTENTIAL RECEPTORS

Potential receptors of constituents released at NSY would include users of the surficial aquifer, biota in adjacent surface waters and wetlands (primarily at locations where the surficial aquifer discharges to surface water) and NSY personnel. Potential exposure of NSY personnel is limited to specific locations at or in the vicinity of SWMUs. For example, personnel at the DRMO (SWMU #2) may be exposed to airborne lead dust. The risk of exposure is low due to the small volume and periodic nature of site activities. This judgement is somewhat confirmed by the results of medical surveillance programs which have not detected lead accumulations in site workers. However, surface lead concentrations in this area exceed generally applied standards. Therefore, the potential for exposure will be further eliminated by implementation of interim corrective measures. Lead contaminated areas are also present at SWMU #6. However, the potential risk for dermal or inhalation exposure is extremely low since the lead contaminated areas are small localized hot spots where current operations are limited.

The highest potential risk for exposure via a dermal or inhalation pathway is SWMU #25. The building may contain heavy metal residues on interior surfaces which are the due to the old plating operation. To limit exposure of personnel in this area, the NSY has secured the building allowing access only when accompanied by proper authorization. The investigation proposed for this site in the RFI Workplan will provide additional data necessary to design a building decontamination and remediation program.

The potential for dermal exposure to various soil contaminants during earth moving activities is also quite remote but more difficult to quantify. At SWMUs #5, #7, #14, and #29, peak constituent concentrations and their precise locations have not yet been fully determined. In the case of SWMU #29, the identity of constituents has not been sufficiently studied. These data gaps and deficiencies will be addressed through the RFI process, as detailed in this Workplan, and remediation programs will be proposed, as necessary.

Another major potential receptor in the area would be existing or potential users of groundwater removed from the surficial aquifer. As discussed in Section 2.3, a survey of water well users in the area will be undertaken to assess the potential for exposure. However, as stated previously, the surficial aquifer at NSY is apparently not currently being utilized and, in fact, does not constitute a usable aquifer for potable water supplies. In addition, the surficial aquifer simply does not exist down gradient of the NSY. NSY can prevent future use of the surficial aquifer through the simple expedient of making a notation on its master engineering site plan. If required, a deed restriction on groundwater use could be recorded. In any case, while direct groundwater use is a potential exposure route at the NSY, in reality the potential is extremely remote under any sort of reasonable worst case scenario.

There is no question, however, that groundwater from the surficial aquifer continuously discharges to wetlands and surface water bodies within and at the boundary of NSY. Significant impacts to potentially affected ecological communities can and should be eliminated. However, as discussed in Section 2.0, most conditions at NSY present little or no potential for significant impacts to ecological communities due to a nearly flat hydraulic gradient, low values of aquifer hydraulic conductivity, and soil properties which prevent or attenuate movement of constituents. Where bio-accumulative substances have been identified, bioassays and sediment analyses will

be conducted to determine whether biological impacts have occurred.

CHAPTER 7. HEALTH AND SAFETY PLAN

7.1 INTRODUCTION. This Health and Safety Plan (HASP) addresses health and safety concerns associated with site investigations at NSY. It covers all site investigators, other subcontractors, Naval personnel, and the general public as required by the OSHA interim final rule covering work at RCRA sites (29 CFR 1910.120). The HASP includes field standard operating procedures. In addition, it provides available information on the site and on known or suspected contaminants. It sets required levels of protection, decontamination procedures, the locations of various zones of contamination, and provides other pertinent information.

The purpose of this Plan is to assure adequate protection against known and potential hazards which may be encountered during RFI and ICM activities conducted at individual SWMU sites. Each site worker is required to be familiar with standard operating procedures as well as any more specific instructions relevant to particular SWMUs as described in the HASP. These requirements for protecting the health and safety of involved individuals are applicable throughout the investigation and associated remedial activities.

The planned levels of protection are based on limited knowledge of the extent and magnitude of contamination in certain areas of the site. A conservative approach to personnel protection is presented in the event that worst case conditions are encountered. The level of protection will be modified accordingly as more information becomes available. The project manager will have final authority to approve field activities and to establish personal protection levels for all field work as necessary. However, the project manager may delegate certain aspects of this authority to the ranking individual at particular sites as may be appropriate.

Achievement of HASP objectives requires that all involved personnel be adequately trained (per OSHA requirements) and that they familiarize themselves with the provisions regarding safety practices, use of personal protective equipment, and procedures for field inspections and sampling operations, sample handling and shipping, etc. The program also provides procedures for contingencies which may be encountered during various phases of the site investigation. Lines of authority have been established to deal with both routine and emergency situations.

The HASP has been compiled to comply with existing requirements of the Occupational Safety and Health Administration (OSHA), the EPA, and state and local agencies for all activities to be conducted. Updated rules and regulations covering this portion of the RCRA facility investigation will be followed and incorporated as they become applicable.

The eleven sites where RFI work will be conducted are described in Section 2.6 and throughout Section 3.0. Project organization and lines of command are described in section 4.2.

7.2 POTENTIAL RISKS. A variety of potential risks will accompany implementation of the RFI. These include the general physical hazards associated with working out-of-doors and around heavy equipment. In addition, there are chemical exposure hazards which will vary from site to site. Environmental hazards such as exposure to heat, insects, and poisonous snakes are also potential risks. Anticipated hazards at particular sites are described below. Finally, there is always the possibility of encountering unanticipated chemical or physical hazards when exploring the subsurface environment.

7.2.1 SWMU #1, DRMO Building 1617 and SWMU #2, Lead Contamination Area. Anticipated hazards in the lead contamination area include the chemical hazards of working around lead dust and lead contaminated water and the physical hazards associated with the investigative measures to be conducted. Until the corrective measures are completed, all surfaces in the area should be considered to be contaminated with lead. Soils adjacent to paved areas should be considered as lead contaminated until delineation work is completed. The potential for drowning during sediment sample collection from Cooper River will require Coast Guard approved life jackets.

7.2.2 SWMU #5, Battery Electrolyte Treatment Area. Chemical and physical hazards exist around the battery electrolyte treatment area. Lead and low pH levels in the soils around the waste acid treatment tank are anticipated hazards for this unit. An expanded soil sampling program increases the potential for chemical exposure when collecting samples in areas where contamination is undefined. Additional safety precautions are required around structures where above ground and underground utilities (gas, electric, or water) may service the area. Overhead power lines can also be dangerous not only to drill rigs, but field crews using long extensions on hand augers.

7.2.3 SWMU #6, Public Works Storage Yard. Anticipated hazards in the public works storage yard are the chemical hazards when working around lead contaminated soils. The groundwater monitoring program increases the potential for chemical exposure when collecting samples in areas where contamination is undefined. Additional safety precautions are required around structures where above ground and underground utilities (gas, electric, or water) may service the area. Overhead power lines can also be dangerous not only to drill rigs, but field crews using long extensions on hand augers.

7.2.4 SWMU #7, PCB Transformer Storage Area. Chemical hazards are primarily pesticides and PCBs. All soils within the zone depicted in Figure 3-4 (within the sampling grid) should be considered to be pesticide and PCB contaminated until delineation is completed, and following delineation where test results indicate.

7.2.5 SWMU #8, Oil Sludge Pit Area. Anticipated hazards in the oil sludge pit area are the physical hazards associated with a drilling rig and the potential for chemical exposure to petroleum constituents and degradation products which have not been identified.

7.2.6 SWMU #9, Closed Landfill Area. Previous groundwater sampling activities detected trace levels of contamination including volatile and semi-volatile organic compounds and metals. Re-sampling and periodic gauging of the 17 monitoring wells is the only activity currently planned. Therefore, the risk of exposure would appear to be low. Anticipated hazards during the geophysical survey include the possible presence of snakes and the possibility of surface instability caused by corrosion of buried containers. If surface instability is encountered, there would be a potential for tripping or falling and a possibility for chemical exposure. Additional hazards are associated with soil gas surveys, test trenching, sampling and installation of monitoring wells. Soil borings will be installed in areas where the geophysical survey suggests chemicals may be buried. Anticipated potential hazards during these activities include the chemical exposure hazards associated with drilling into unknown buried wastes. Extreme caution must be exercised by all personnel during these activities. All soil cuttings and undisturbed samples should be considered to be contaminated materials until proven otherwise.

Although current knowledge regarding this site suggests that there is no potential for encountering toxic or explosive gases, workers during this phase of the investigation should assume such possibility exists until all borings have been completed. An explosimeter and OVA should be used constantly during drilling and sampling activities. Personnel should be prepared to quickly upgrade respiratory and dermal protection levels. Personnel will also be exposed to potential injury working near heavy equipment. Excavating unknown buried waste will require heavy equipment to have explosion proof shielding over the windows.

7.2.7 SWMU #14, Chemical Disposal Area. Anticipated hazards during the geophysical survey include the possible presence of snakes and the possibility of surface instability caused by corrosion of buried containers. If surface instability is encountered, there would be a potential for tripping or falling and an associated possibility for chemical exposure. Soil borings will be installed in areas where the geophysical survey suggests chemicals may be buried. Anticipated potential hazards during these activities include the chemical exposure hazards associated with drilling into unknown buried wastes. Extreme caution must be exercised by all personnel during these activities. All soil cuttings and undisturbed samples should be considered to be contaminated materials until proven otherwise. Although current knowledge regarding this site suggests that there is no potential for encountering toxic or explosive gases, workers during this phase of the investigation should assume such possibility exists until all borings have been completed. An explosimeter and OVA should be used constantly during drilling and sampling activities.

7.2.8 SWMU #17, Oil Spill Area. During well installation and soil sampling, all groundwater and subsoils should be assumed to be contaminated with PCBs and petroleum constituents until laboratory assay results demonstrate otherwise. Additional hazards anticipated during this work are the physical hazards associated with well drilling and installation.

7.2.9 SWMU #21, Old Paint Storage Area. Paint wastes at this unit have included materials containing cadmium, chromium, lead, cyanide, toluene, and tetrachloroethylene. In addition, sand blasting residues containing organo-tin paints were also generated. The major risks during soil sampling and monitoring well installation and sampling activities will be generation of metal dusts and possible release of volatile organic vapors.

7.2.10 SWMU #22, Old Plating Waste Treatment System and SWMU #25, Old Plating Operation. Anticipated chemical hazards of contaminants from the plating operations in air, soils, and water media. Physical hazards associated with sampling activities include collection of samples from coring concrete, and working around drill rigs during the installation of monitoring wells. Underground and above ground utilities associated with the operation will also require detailed health and safety procedures to ensure electrical and mechanical systems are tagged and locked out.

7.2.11 SWMU #29, Building X-10 and SWMU #34, SW of Building X-10. Anticipated potential chemical involve encountering unknown contaminants while hand augering into sediment. The physical hazards, depending on the climate, may include heat stress to workers when hand augering for long periods of time in protective clothing.

7.3 WORK ZONES. Work zones will be established by the project manager at each site to limit the spread of contamination and provide for the protection of site workers. An exclusion zone will be established by enclosing all potentially contaminated areas. Exclusion zones will be either flagged or roped off depending upon the degree of potential hazards. In the oil sludge pit area, the chemical disposal area, and the oil spill area, a separate exclusion zone will be established around each boring or well installation location. A decontamination zone will be established adjacent to each exclusion zone. The site supervisor will be responsible for ensuring that all support zone activities and equipment are kept out of the decontamination and exclusion zones. All movement between zones will be controlled by the site supervisor.

Special procedures will be necessary during the interim corrective measures work in the lead contamination area. Initially, the entire area will be considered an exclusion zone. The southern part of the paved area, where contamination is lowest, will then be washed in order to establish the decontamination zone and a support zone. Once other areas are cleaned, they can be removed from the exclusion zone so that DRMO personnel can re-enter and resume operations. Cleaned areas will not be removed from the exclusion zone until it is clear that they will not be recontaminated by activities in adjacent areas.

7.4 PERSONAL PROTECTIVE EQUIPMENT AND SAFETY MEASURES. The following sections specify personal protective equipment to be used at each of the work sites and general safety measures for those sites. This section describes general measures applicable to all sites. The site supervisor may specify additional measures during the morning safety meeting and must specify additional measures at any time when, in his judgement, additional measures are warranted. Whenever existing measures may be inadequate to properly protect worker safety, the site supervisor will stop work and evacuate personnel until adequate measures can be implemented. Additionally, work shall be stopped and personnel evacuated whenever explosive vapors are present above 20% of the LEL in the vicinity of the work being performed and/or whenever total volatile organic levels are present in the breathing zone above 50 ppm as methane. Whenever explosive vapors are present above 10% of the LEL, non-sparking tools will be used. Whenever organic vapors in the breathing zone exceed 5 ppm as methane, all exposed personnel shall be in level C with full-face respirators. Level B respiratory protection would be considered in the area of SWMUs where full characterization of contaminants is not known. OVA monitoring will be conducted continuously during all boring and well installation procedures. Whenever unknown organic vapors exceed 5 ppm as methane in the work zone, continuous explosimeter monitoring will also be conducted.

The site supervisor is responsible for monitoring his workers' exposure as described in Section 7.8.

The site supervisor, with the concurrence of the project manager, may downgrade the level of personal protective equipment when it is reasonably certain that the work can be safely performed at a lower level of protection.

7.4.1 DRMO, Building 1617, and Lead Contamination Area. During sampling of this area, workers will wear Tyveks, disposable latex gloves, and disposable booties over steel-toed boots, and hard hats. Prior to initiating this work, they will be informed that lead is known to occur in this area and it should be assumed that all subsurface soils and waters are contaminated. Change-out will be required following each potentially contaminating contact with gloves. If

winds are strong enough to move dust or the soil is dry enough to allow fugitive dust to enter the breathing zone when field personnel are close to the ground, then dusty areas will be wetted sufficiently to eliminate the dust. If dust and mist cannot be eliminated, full face respirators with dust cartridges will be worn.

An adequate supply of ice water and Gatorade will be maintained in the support zone. Paper cups will be maintained in the support zone to supply partially decontaminated workers with liquids. Liquids will be supplied by the decon man. No other hand-to-mouth activities (eating, drinking, smoking) will be permitted in the decontaminated zone. Any worker showing signs of heat stress will be immediately relieved.

7.4.2 Battery Electrolyte Treatment Area. During sampling of this area, the sampling crew will wear full-faced respirators, tyveks, disposable latex gloves, steel-toed boots, and hard hats. Workers will wear at least two pair of latex gloves and monitor pH levels in samples during collection. If pH decreases to <3, workers will add an outer acid resistant glove. The outer latex gloves will be changed between each sample. If acid resistant gloves are worn, then they will be decontaminated between each sample as well to prevent cross-contamination. Sample collection will always begin in the area of the lowest contamination and proceed to the areas of high concentration.

Workers exiting the work zone will enter the decontamination area. All workers will pass through the boot wash, glove wash, then remove tyvek and latex gloves.

Sample containers and field equipment will be left in the decon area. Any equipment or samples exiting the work zone will be wiped down to remove any fugitive dust or residues. Equipment used in collecting samples will be decontaminated following the procedures as specified in 4.3.2.2.

7.4.3 Public Works Storage Yard. During well installation in this area, workers will wear Tyveks, disposable latex gloves, disposable booties over steel-toed boots, and hard hats. Prior to initiating this work, they will be informed that pesticides, PCBs and metals are potential constituents detected in the surface and subsurface soils and should be assumed that all subsurface soils and waters are contaminated. They will also be informed that latex gloves offer only short-term protection from exposure. Change-out will be required following each potentially contaminating contact with gloves. If repeated contact becomes unavoidable, the site supervisor will require viton outer gloves.

Booties will be removed in the decon zone and boots will be washed with soap and water.

7.4.4 PCB Transformer Storage Area. During sampling of this area, the sampling technicians will wear Tyveks, disposable latex gloves, and disposable booties over their boots. Workers will be informed that latex offers only short-term protection against PCBs. The site supervisor will ensure that gloves are changed following each potentially contaminating exposure. If difficulties are encountered and exposure to the gloves becomes unavoidable, workers will wear Viton outer gloves.

Booties will be disposed of in the decon zone and boots will be washed with soap and water.

7.4.5 Oil Sludge Pit Area. During the installation of borings in this area, workers will wear Tyveks, steel-toed boots, hard hats, and disposable gloves. Borings will be monitored for organic vapors. If organic vapors are encountered above 5 ppm, workers will don organic cartridge respirators and the explosimeter will be used for supplemental monitoring.

7.4.6 Closed Landfill Area. During the geophysical survey, workers will wear Tyveks and steel-toed neoprene boots. If the magnetometer survey finds areas suggestive of buried drums, the area will be explored using a backhoe prior to beginning the boring program. During any such work, the site supervisor will ensure that all workers stay at a safe distance and upwind and that the operator has a 5-minute bottle within reach should emergency evacuation become prudent. Well sampling can be conducted using a Tyveks and disposal latex gloves. Organic vapors in and surrounding the monitoring wells will be checked periodically during sampling activities. Personnel should be prepared to upgrade to Level "C" respiratory protection (full faced APR with organic vapor cartridges) based upon the data available from the OVA or HNu devices.

7.4.7 Chemical Disposal Area. During the geophysical survey, workers will wear Tyveks and neoprene boots.

If the magnetometer survey finds areas suggestive of buried drums, the area will be explored using a backhoe prior to beginning the boring program. During any such work, the site supervisor will ensure that all workers stay at a safe distance and upwind and that the operator has a 5-minute bottle within reach should emergency evacuation become prudent.

During the boring program, workers will wear Tyveks, hard hats, steel-toed boots, and disposable gloves. Monitoring of volatile organic vapors will be conducted by and only by someone wearing a face shield and having a 5-minute bottle close at hand. The person will wear a Responder chemical-resistant suit. The monitoring technician will periodically measure the pH of the cuttings. The driller will at all times be equipped with a hooded tyvek, face-shield and 5-minute bottle. Non-essential personnel will be kept well back of any drilling operations and up wind.

7.4.8 Oil Spill Area. During well installation in this area, workers will wear Tyveks, disposable latex gloves, disposable booties over steel-toed boots, and hard hats. Prior to initiating this work, they will be informed that PCBs are known to occur nearby in the subsurface and it should be assumed that all subsurface soils and waters are PCB-contaminated. They will also be informed that latex gloves offer only short-term protection from exposure. Change-out will be required following each potentially contaminating contact with gloves. If repeated contact becomes unavoidable, the site supervisor will require viton outer gloves.

Booties will be removed in the decon zone and boots will be washed with soap and water.

7.4.9 Old Paint Storage Area. If dusty conditions develop during soil sampling activities, workers should wear full faced respirators with HEPA dust cartridges. Workers should also wear neoprene steel-toed boots with disposable booties, Tyveks, and disposable latex gloves. Personnel should be prepared to upgrade to Level "C" respiratory protection (full faced APR with organic vapor cartridges) based upon the data available from the OVA or HNu devices.

7.4.10 Building 44, Old Plating Operation and Waste Treatment System. During sampling of the interior of building 44, the sampling technicians will wear a full face respirator, tyveks, disposable latex gloves, hard hats, and disposable booties over their work boots. Dust suppression during concrete coring will be prevented by the water used to lubricate the coring bit.

During soil boring activities and collection of subsurface samples in areas where corrosive liquids may have been present, the procedures set forth in Section 7.4.2 will be adhered to.

7.4.11 Building X-10 and SW of Building X-10.

During sampling of this area, the sampling technicians will wear Tyveks, disposable latex gloves, and disposable booties over their boots. The outer latex glove will be changed after each sample is collected.

If organic vapors are encountered above 5 ppm, workers will don organic vapor cartridge respirators and the explosimeter will be used for supplemental monitoring.

Ambient temperature will be recorded in the log book every two hours, and workers will be monitored and given breaks according to ACGIH guidelines. Areas will be designated for field sampling, decontamination of equipment and personnel, and breaks.

7.5 PERSONNEL DECONTAMINATION. Personnel decontamination procedures will vary from site to site and within an individual site depending the degree of exposure. The site supervisor will establish a decontamination train in the decontamination zone appropriate to potential needs. Appropriate stations from the following list should be selected. The full list will not be necessary except at the chemical disposal area.

1. Equipment drop.
2. Outer glove, suit and boot wash.
3. Outer glove, suit and boot rinse.
4. Outer glove and bootie removal.
5. Outer suit removal.
6. Inner glove wash.
7. Inner glove rinse.
8. Respirator removal.
9. Inner glove removal.
10. Inner suit removal.

7.6 EQUIPMENT DECONTAMINATION. Drill rigs and augers will be steam cleaned between borings. Sampling equipment will be decontaminated in accordance with procedures described in Section 4.3.2.2. The site supervisor will designate appropriate decontamination procedures for all other equipment and containers and ensure that they are performed prior to anything leaving the decontamination zone.

7.7 TRAINING. The project manager shall ensure that all workers at the site have training which meets the standards of 29 CFR 1910.120(e) including both classroom and field training, and for site supervisors, supervisory training. In addition, he will ensure that each worker is

experienced in operating the types of equipment to be used and in performing the procedures to be employed at each site. This applies to subcontractor employees as well. Each morning before work begins, the project manager or his delegate will hold a meeting to discuss procedures to be used on that day with particular emphasis on potential hazards that may be encountered and how to deal with them. In addition, before changes in the nature of the work to be performed, site supervisors will review safety procedures with potentially impacted workers.

7.8 SURVEILLANCE. The project manager shall ensure that all workers at the site have been examined by an occupational medicine physician within the past 12 months, and are otherwise under medical surveillance in compliance with 29 CFR 1910.120(f). The Project Manager will review the medical surveillance program of any subcontractor used to ensure compliance with applicable standards.

The site supervisor will establish a buddy system for work at a site prior to the work beginning. Among other aspects of the buddy system will be a requirement that each worker report to the site supervisor any breach of safety measures, physical or procedural, any resultant exposure to potentially hazardous materials, and any signs of heat stress pertaining to himself or his buddy. The site supervisor will observe the progress of the work with particular attention to compliance with safety procedures and signs of heat stress. During breaks in the work, either as a whole or by individuals, the site supervisor will interrogate workers regarding safety compliance and heat stress and make an appropriate examination of the same.

7.9 EMERGENCY RESPONSE. In the event of an emergency on site during the RFI field activities, the project manager will serve as emergency coordinator. The project manager will have the authority to commit team resources as they may be required to prevent, reduce, or eliminate the emergency. The following procedures are guidelines for response to emergencies.

7.9.1 Fire/Explosion. Although the project manager is expected to enforce provisions for ignition control, the possibility of fires at the NSY exists. In the event of a fire, no matter how small or contained, the local fire department must be notified immediately. A-B-C type fire extinguishers are to be available in the Support Zone. The project manager is responsible for establishing evacuation routes, which will vary depending on the area being investigated. He will also establish an emergency communication signal to alert all field personnel to evacuate. The project manager will also alert the local fire fighters to the human health and pollution potential at the site.

7.9.2 Personal Injury/Chemical Exposure. During the performance of work tasks within high hazard areas, a minimum of three personnel shall be used. In the event of a personal injury or exposure to one member of the team, the other members will provide assistance in exiting the site.

If a personal injury occurs, the project manager shall arrange for immediate first aid and transport to the nearest emergency care facility. The injured person must be accompanied to the emergency care facility by a team member who can provide information to medical personnel related to possible chemical exposure and a means of contacting the physician holding medical surveillance records on the injured person.

The nearest hospital to the NSY is Baker Hospital on Azalea Street (Figure 7-1). If transport to the hospital is necessary, the injured person and accompanying team member should proceed to the Reynolds Avenue Gate to exit the NSY. Proceed to Rivers Avenue (second light) and turn right. At the first light turn left onto Cosgrove Avenue. At the first light turn left onto Azalea. Baker Hospital is on the right.

7.9.3 Spills, Leaks, and Discharges. In the event of a spill, leak, or discharge of contaminants which may pose a threat to human health or environment, the project manager must make an immediate assessment of the threat. This assessment may include:

- A threat to field teams requiring an increase in level of PPE;
- A threat to residents or other members of the community near the site requiring notification to local authorities;
- A threat to uncontaminated areas; and
- An increase or change in the potential environmental hazards already present.

Actions which may be appropriate depending on the assessment may include:

- Stop all on-site activities;
- Contact local authorities;
- Implement spill control measures;
- Revise work plans; and
- Abandon work until incident has abated.

Table 7-1 lists the appropriate local, state, and federal agencies as well as project personnel who may be needed.

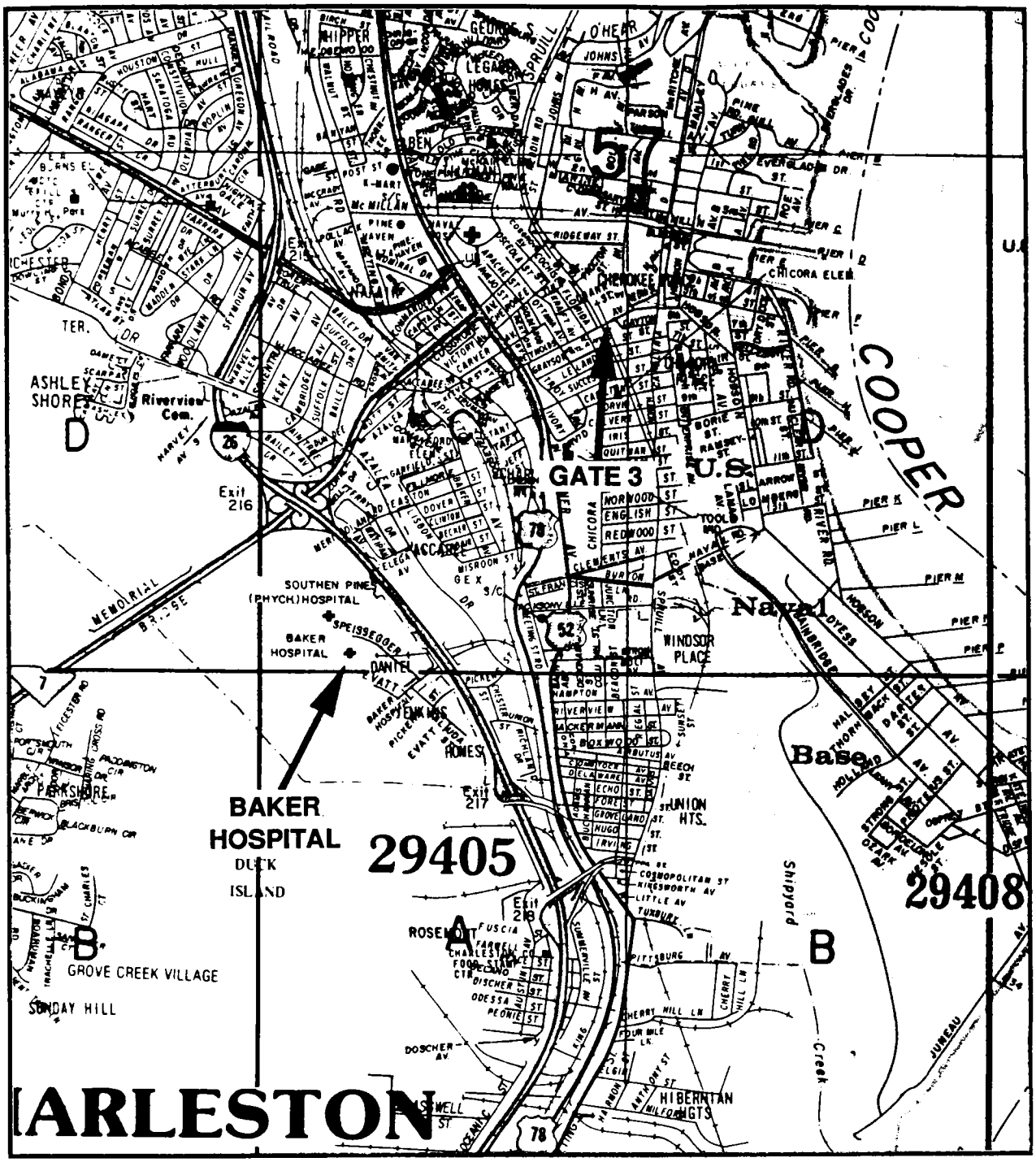

Figure 7-1. Map showing locations of exit gate and Baker Hospital.

NORTH

Table 7-1. Emergency contacts.

Local Sources of Assistance:

NAVBASE, Charleston, South Carolina

Fire	(74) 3-5333
Police	(74) 3-5555*
Ambulance	(74) 3-5444

*Note: When on base, only the digit 3 is dialed followed by the four digits listed.

Charleston County, South Carolina

Fire	911
Police	911
Ambulance	911

National or Regional Sources of Assistance:

WAPORA	1/404/636-0928
EPA	1/404/347-3931
Chemtrec (24-Hours)	1/800/424-9300
Bureau of Explosives (24 Hours) (Association of American Railroads)	1/202/293-4048
Communicative Disease Center (Biological Agents)	1/404/633-5313
National Response Center, NRC (Oil/Hazardous Substances)	1/800/424-3802
DOT, Office of Hazardous Operations DOT, (Regulatory Matters)	1/202/426-0656 1/202/426-9280
U.S. Coast Guard (Major Incidents)	1/800/424-8802

Table 7-1. Emergency contacts (concluded).

National Agricultural Chemical Assoc.	1/513/961-4300
Duke University Occupational Health Services (24 hours)	1/919/684-8111

Special First Aid or Evacuation Procedures: All casualties should be routed through the base infirmary. Base medical personnel will determine if evacuation to a special care facility is necessary.

CHAPTER 8. REFERENCE LIST

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20. South Carolina DHEC. June 4, 1990. Hazardous Waste Permit No. SCO 170 022 560, Charleston Naval Shipyard, Charleston, South Carolina.

21. SW-846, Test Methods for Evaluating Solid Waste - Physical and Chemical Methods.

APPENDIX A

Lithologic Logs

(Source: Reference 12)

LITHOLOGIC LOG OF WELL CP-4

Description	Depth (ft)	Thickness (ft)
Clay, slightly sandy, medium stiff, tan...	0 - 2	2
Sand, fine-grained, gray, with a trace of clay and scattered small shell fragments..	2 - 8	6
Clay, soft, dark gray, with scattered decaying vegetable matter.....	8 - 18	10
Clay, medium stiff, gray, with scattered roots.....	18 - 23	5
Sand, fine-grained, slightly clayey, tan.....	23 - 25	2

LITHOLOGIC LOG OF WELL CD-1

Description	Depth (ft)	Thickness (ft)
Sand, medium-grained, with a trace of small shell fragments.....	0 - 5	5
Clay, soft, gray, with laminations of fine sand.....	5 - 10	5
Sand, medium grained, gray, with a trace of clay.....	10 - 12	2
Clay, soft, gray, with laminations of fine sand and decaying wood.....	12 - 16.5	4.5

LITHOLOGIC LOG OF WELL CD-2

Description	Depth (ft)	Thickness (ft)
Clay, very soft, brown.....	0 - 5	5
Clay, very soft, green, with decaying vegetable matter.....	5 - 15	10

LITHOLOGIC LOG OF WELL LF-1

Description	Depth (ft)	Thickness (ft)
Sand, medium-grained, with gravel and a trace of clay.....	0 - 8.5	8.5
Clay, very soft, dark gray, with scattered gravel and decaying vegetable matter.....	8.5 - 16.5	8
Clay, very soft, gray.....	16.5 - 25	8.5

LITHOLOGIC LOG OF WELL DLF-1

Description	Depth (ft)	Thickness (ft)
Fill - gravel, sand, debris	0 - 12	12
Clay, soft, gray, with a trace of sand....	12 - 20	8
Clay, soft, gray.....	20 - 32	12
Clay, soft, gray, with a trace of sand and shell fragments.....	32 - 45	13
Clay, hard, calcareous, slightly sandy, grayish-green	45 - 62	17

LITHOLOGIC LOG OF WELL LF-2

Description	Depth (ft)	Thickness (ft)
Sand, medium-grained, with gravel.....	0 - 5	5
Clay, very soft, gray.....	5 - 11	6
Clay, very soft, dark gray, with decaying vegetable matter.....	11 - 20	9

LITHOLOGIC LOG OF WELL LF-5

Description	Depth (ft)	Thickness (ft)
Sand, fine grained, tan, with gravel and debris (fill).....	0 - 5	5
Gravel, clayey (fill).....	5 - 13	8
Clay, soft, dark gray, with scattered pieces of decaying wood.....	13 - 21	8
Clay, soft, gray, with scattered shell fragments.....	21 - 31	10

LITHOLOGIC LOG OF WELL LF-6

Description	Depth (ft)	Thickness (ft)
Clay, stiff, dark brown, with a trace of sand, wood, and gravel (fill).....	0 - 1.5	1.5
Clay, very soft, dark gray, with roots....	1.5 - 4	2.5
Clay, very soft, dark gray.....	4 - 15	11

LITHOLOGIC LOG OF WELL LF-7

Description	Depth (ft)	Thickness (ft)
Sand, fine-grained, loose, brown, with gravel and wood (fill).....	0 - 2.5	2.5
Sand, fine-grained, clayey, loose, dark gray to brown, with gravel and wood (fill)	2.5 - 7.5	5
Sand, fine-grained, loose, gray, with gravel (fill).....	7.5 - 9	1.5
Clay, sandy, stiff, reddish-brown.....	9 - 11.5	2.5

LITHOLOGIC LOG OF WPA-1

Description	Depth (ft)	Thickness (ft)
Sand, fine-grained, dark brown, with roots	0 - 4	4
Sand, fine-grained, slightly clayey, firm, orangish-brown.....	4 - 7.5	3.5
Clay, stiff, slightly sandy, gray.....	7.5 - 9	1.5
Sand, fine-grained, firm, light gray, with a trace of clay.....	9 - 12.5	3.5
Clay, soft, dark gray, with a trace of sand.....	12.5 - 15	2.5

LITHOLOGIC LOG OF WPA-2

Description	Depth (ft)	Thickness (ft)
Sand, fine-grained, orangish-brown, with scattered roots.....	0 - 4	4
Clay, sandy, stiff, orangish-brown.....	4 - 6.5	2.5
Sand, fine-grained, clayey, firm, orangish-brown.....	6.5 - 13	6.5
Clay, soft, dark gray.....	13 - 14	1

LITHOLOGIC LOG OF WOC-1

Description	Depth (ft)	Thickness (ft)
Clay, sandy, medium stiff, dark gray to brown.....	0 - 1.5	1.5
Clay, very soft, dark gray, with roots....	1.5 - 6.5	5
Sand, fine to medium-grained, loose, gray, with shell fragments.....	6.5 - 10	3.5

LITHOLOGIC LOG OF WELL OPW-3

Description	Depth (ft)	Thickness (ft)
Fill - sand and gravel.....	0 - 2	2
Sand, clayey, with gravel (fill).....	2 - 5	3
Sand, fine to medium-grained, gray, with scattered shell fragments and a trace of clay.....	5 - 8	3
Sand, fine to medium-grained, gray, with a trace of clay.....	8 - 10	2

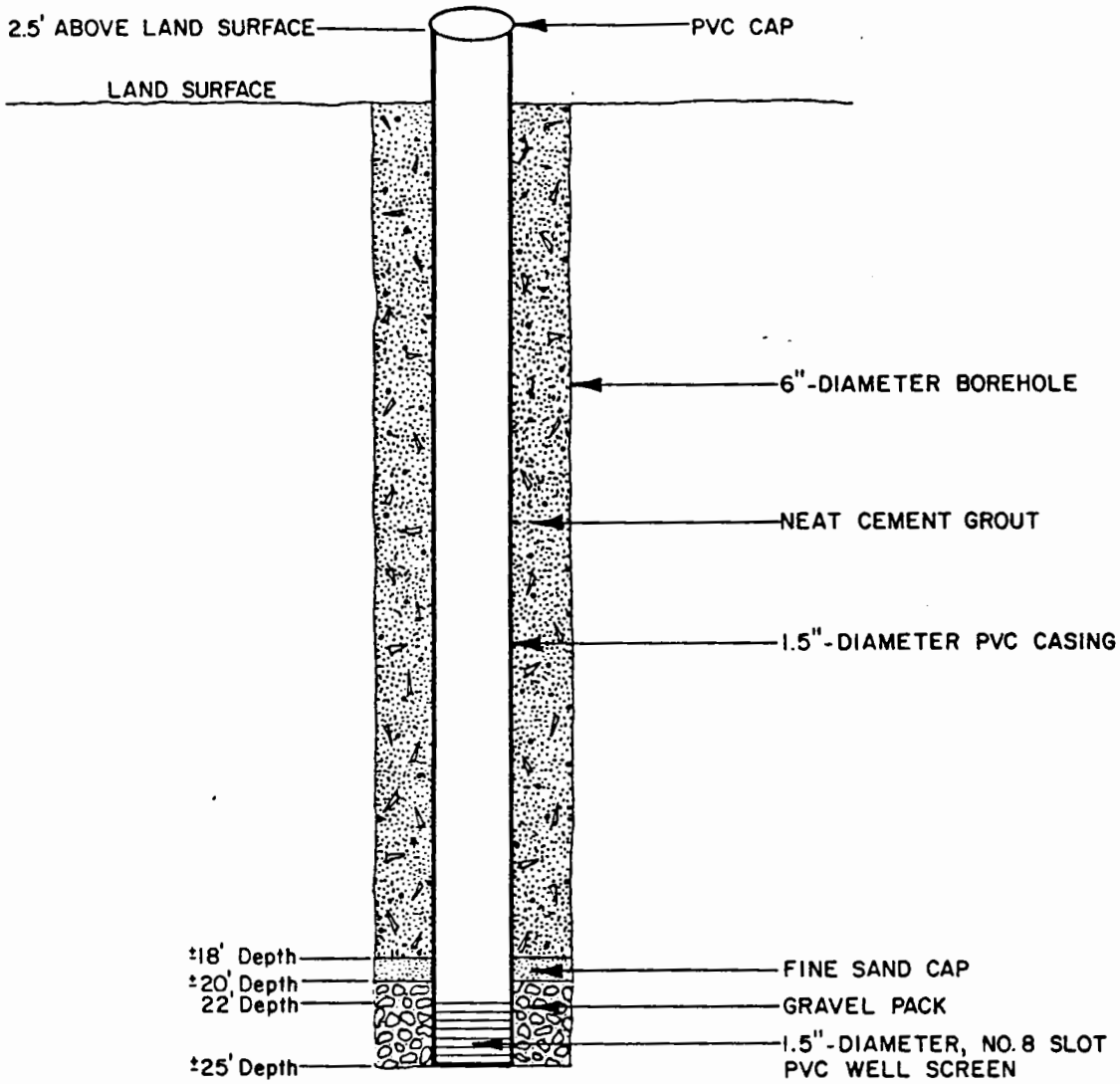


Figure 4. General Construction Diagram of a 1.5-Inch-Diameter Monitor Well.

TABLE 1. CONSTRUCTION DETAILS OF MONITOR WELLS

Well No. and Location	Total Depth (ft/bls)[1)]	Screen Setting (ft/bls)	Gravel-Pack Setting (ft/bls)
Caustic-Pond Area			
CP-1	25	22 - 25	18 - 25
CP-2	25	17 - 20	14 - 25
CP-3	25	22 - 25	18 - 25
CP-4	25	22 - 25	18 - 25
Oil-Sludge Pit Area			
OPW-1	10	7 - 10	4 - 10
OPW-2	4	1 - 4	0 - 4
OPW-3	10	7 - 10	4 - 10
Pesticide-Mixing Area			
WPA-1	13	10 - 13	7 - 15
WPA-2	13	10 - 13	7 - 14
Landfill Area			
LF-1	25	22 - 25	18 - 25
LF-2	20	17 - 20	14 - 20
LF-3	25	22 - 25	18 - 25
LF-4	25	22 - 25	18 - 25
LF-5	31	27 - 30	22 - 31
LF-6	15	5 - 12	7 - 15
LF-7	11.5	7 - 10	4 - 11.5
LF-8	15	12 - 15	7 - 15
LF-9	14	11 - 14	6 - 14
LF-10	12.5	9.5 - 12.5	4 - 12.5

APPENDIX B

Geotechnical Data

(Source: Reference 12)

Soil Consultants, Inc.
FOUNDATION & TESTING ENGINEERS
P.O. Drawer 698, Charleston, S.C. 29402
Phone (803) 723-4539

August 26, 1981

Geraghty and Miller, Inc.
Consulting Ground Water Geologists
and Hydrologists
P. O. Box 271173
Tampa, Florida 33688

RECEIVED
AUG 31 1981
GERAGHTY & MILLER, INC.

Attention: Mr. Philip J. Ciaravella
Hydrogeologist

Re: Monitor Wells, U. S. Naval Station
Charleston, S. C.
SCI Project 81138

Gentlemen:

Enclosed you will find the below laboratory test reports on various tests recently completed on the undisturbed samples obtained from the above noted project.

At the time of our August 3, 1981, telephone discussion you indicated that you desired a consolidation test on Sample No. 1, Boring No. DLF-1. As noted on the Undisturbed Sample Characteristics this was not possible due to high sand content. In view of the similar depth of this sample and that of Sample No. 4, Boring No. LF-1, we performed several additional tests to provide you with as much information as possible due to the vast differences in these two samples.

DATA

Undisturbed Sample Characteristics	-	2 Sheets
Soil Mechanic Laboratory Data	-	1 Sheet
Consolidation Test (including calculated permeability)	-	2 Sheets

If we can be of further service, please call on us.

Sincerely,

SOIL CONSULTANTS, INC.

I. D. Smith, Jr., P.E.
V. P.Of Laboratories
IDSJr.:kmg enclosures

W. K. JOHNSON, P.E.
President
L. K. Himelright, P.E.
Senior Vice President
W. B. HAMILTON, P.E.
Secretary - Treasurer
J. E. DUFFY, P.E.
V. P. Engineering Studies
I. D. SMITH, JR., P.E.
V. P. Laboratories

MATERIALS TESTING REPORT	SOIL CONSULTANTS, INC.	UNDISTURBED SAMPLE CHARACTERISTICS

PROJECT and STATE Geraghty and Miller Inc., Tampa Florida
Monitor Wells, U. S. Naval Station, Charleston, S.C. (SCI 81138)

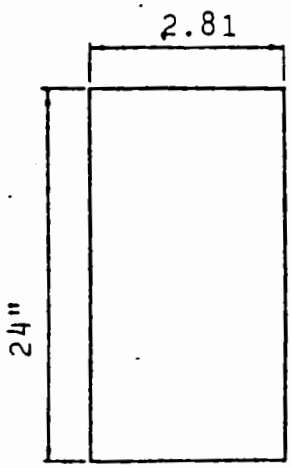
TESTED AT SCI, Charleston, S. C. | APPROVED BY [signature] | DATE 8-4-81

FIELD SAMPLE NO	DEPTH (ft) from	DEPTH (ft) to	SAMPLE LOCATION	TYPE OF SAMPLE	LABORATORY NO
1	20'0"	22'0"	Boring No. DLF-1	Pushed	81-1410

COLOR	RELATIVE MOISTURE	CONSISTENCY	POROSITY OR STRUCTURE	TEXTURE	POCKET PENETROMETER (TSF)	VISUAL CLASSIFICATION (USCS)
Dark Gray	Damp	Solid	Banded	Silty clay	with	
				very high	sand	
				content -		
				numerous sand lenses.		

ω 39.7% γ_d 1.306 g/cc

REMARKS



Numerous sand lenses and high sand content would not permit consolidation test. See Soil Mechanics Data Sheet for confirmation of SM Soil

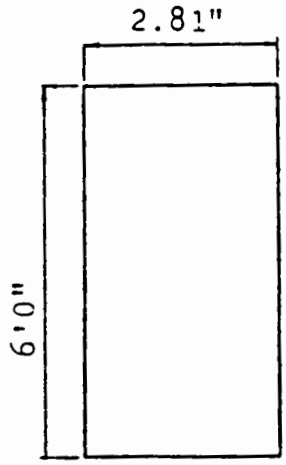
1/4" to 1/2" Dark gray silty clay

FIELD SAMPLE NO	DEPTH (ft) from	DEPTH (ft) to	SAMPLE LOCATION	TYPE OF SAMPLE	LABORATORY NO
3	50'0"	52'0"	Boring No. DLF-1	Pushed	81-1410A

COLOR	RELATIVE MOISTURE	CONSISTENCY	POROSITY OR STRUCTURE	TEXTURE	POCKET PENETROMETER (TSF)	VISUAL CLASSIFICATION (USCS)
Brownish	Very moist	solid	Uniform	Clay and		
Green				silt		
(Marl)						

ω 60.7% γ_d 0.926 g/cc

REMARKS



Consolidation Test

MATERIALS TESTING REPORT	SOIL CONSULTANTS, INC.	UNDISTURBED SAMPLI CHARACTERISTICS

PROJECT and STATE Geraghty and Miller, Inc., Tampa Florida
Monitor Wells, U. S. Naval Station, Charleston, S. C. (SCI 81138)

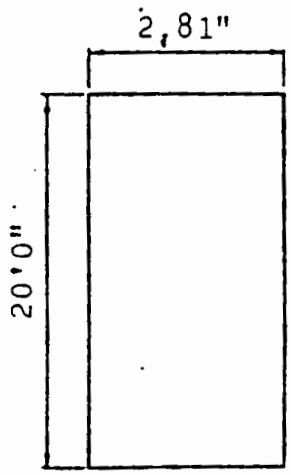
TESTED AT SCI, Charleston, S. C. | APPROVED BY | DATE 8-11-81

FIELD SAMPLE NO	DEPTH (ft) from	DEPTH (ft) to	SAMPLE LOCATION	TYPE OF SAMPLE	LABORATORY NO
4	60'0"	62'0"	Boring No. DLF-1	Pushed	81-1410

COLOR	RELATIVE MOISTURE	CONSISTENCY	POROSITY OR STRUCTURE	TEXTURE	POCKET PENETROMETER (TSF)	VISUAL CLASSIFICATION (USC
Brownish	Very moist	Solid	Uniform	Clay and		
Green				silt		
(Marl)						

ω 43.1 % γ_d 1.223 g/cc

REMARKS



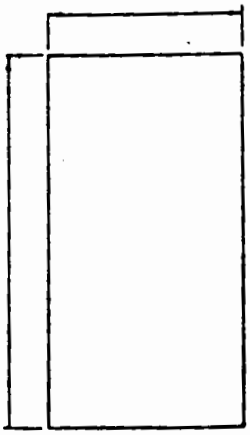
Consolidation Test and
Washed sieve analysis

FIELD SAMPLE NO	DEPTH (ft) from	DEPTH (ft) to	SAMPLE LOCATION	TYPE OF SAMPLE	LABORATORY NO

COLOR	RELATIVE MOISTURE	CONSISTENCY	POROSITY OR STRUCTURE	TEXTURE	POCKET PENETROMETER (TSF)	VISUAL CLASSIFICATION (USCS)

ω ____ % γ_d ____ g/cc

REMARKS



Geraghty and Miller, Inc., Tampa Florida
Monitor Wells, U. S. Naval Station, Charleston, S. C.
(SCI 81138)

SOIL CONSULTANTS, INC.

SOIL MECHANICS LABORATORY DATA
Sheet 1 of 1

LABORATORY SAMPLE NUMBER	FIELD NUMBER		DEPTH	FIELD CLASSIFICATION	MECHANICAL ANALYSIS GRAIN SIZE DISTRIBUTION EXPRESSED AS PERCENT FINER BY DRY WEIGHT: FINES 0.002 mm	FINES 0.005	FINES 0.02	FINES 0.05	FINES #200 0.074	SANDS #100 .149	SANDS #60	SANDS #40	SANDS #20	SANDS #10	SANDS #4	GRAVEL 3/8"	GRAVEL 1/2"	GRAVEL 3/4"	GRAVEL 1"	GRAVEL 1 1/2"	GRAVEL 3"	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	UNIFIED CLASSIFICATION	UNDISTURBED SAMPLE DATA % DRY UNIT WEIGHT	UNDISTURBED SAMPLE DATA H_2O	G_s	SPECIAL TESTS Consolidation Test		
1410	1	Boring DLF-1	20'0" 22'0"						38.1	38.4	56.0	80.3	94.9	98.9	99.8		100					29.0 NP	8.4 NP	*	1306	39.7				
1410A	3	Boring DLF-1	50'0" 52'0"																						0926	69.7	2660	X		
1410B	4	Boring DLF-1	60'0" 62'0"						67.2	77.9	93.5	97.0	99.0	99.6	100										1223	43.1	2645	X		
1410C	1	Boring LF 1	5'0" 6'6"						1.4	4.5	12.3	14.4	18.5	35.5	54.1		80.9	100												
1410D	2	Boring LF 1	10'0" 11'6"						2.7	3.4	4.0	5.4	8.8	20.8	38.2		65.8	72.2	100											
1410E	4	Boring LF 1	20'0" 21'6"						99.3	(Insufficient sample for further testing)																				

* represents the hand picked more clayey portion of this sample for additional information

(SCI 81138) Lab No. 81-1410B

MATERIALS TESTING REPORT	SOIL CONSULTANTS, INC.	CONSOLIDATION TEST

PROJECT and STATE Geraghty and Miller Inc., Tampa Fla. Monitor Wells, U.S. Naval Sta., Charleston, SC			SAMPLE LOCATION Boring DLF-1
FIELD SAMPLE NO. 3	DEPTH 50'0" to 52'0"	GEOLOGIC ORIGIN	
TYPE OF SAMPLE Pushed	TESTED AT SCI-Charleston, SC	APPROVED BY	DATE 8-22-81

CLASSIFICATION (Marl)

G_s 2.660 LL _____ PI _____

INITIAL DENSITY γ_d 0.926

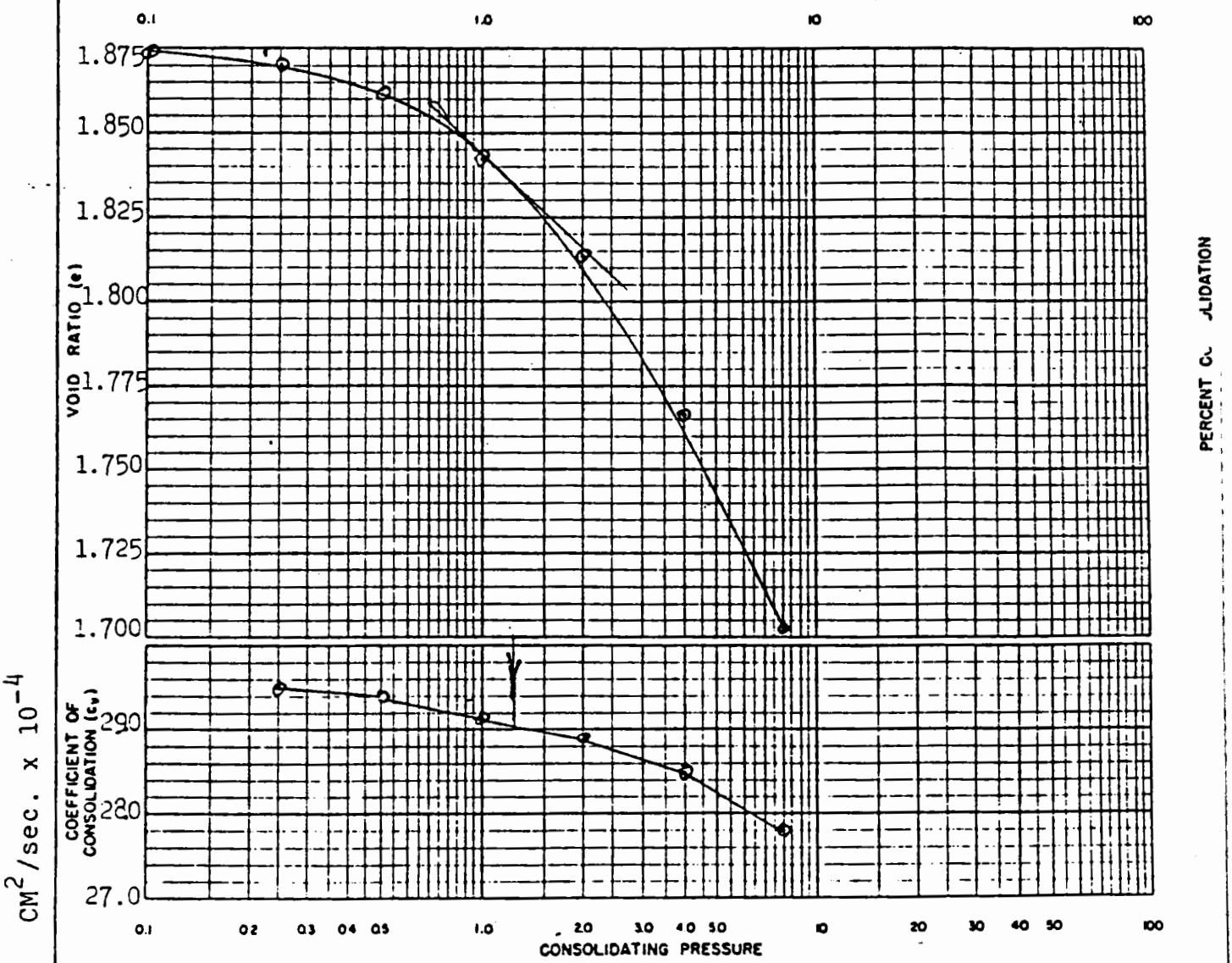
INITIAL VOID RATIO, e_o 1.874

COMPRESSION INDEX, C_c _____

TEST SPECIFICATIONS: MOISTURE CONTENT, %

START OF TEST	DEG. OF SAT. AT START OF TEST	END OF TEST
69.7	98.9	67.5

Flooded after loading to 110 KSF



REMARKS Drainage top and bottom
Sample 2.5" diameter, 1" thick
cc = 1.890 - 1.700 - 0.190
Permeability @ 1.25 KSF k = 13.5 x 10^{-5}

APPENDIX C

Action Level Source Data

(Source: Reference 19, Appendices A through F)

develop and conduct these further Regulatory Impact Analyses.

The new analyses will be conducted in accordance with the existing Agency guidance on Regulatory Impact Analysis and the draft Regulatory Impact Analysis Guidance published in the 1988 Regulatory Program of the United States. The analyses will explicitly examine the costs, health and environmental benefits, and technological limitations for the key regulatory requirements contained in the proposal—especially for the several alternative approaches to ground water remediation outlined in the proposed rule. This analysis will also estimate the aggregate impacts, identified above, for sites eligible for remediation under this rule and for those sites which are listed on the NPL, and will, therefore, look to this rule as an ARAR, under the provisions of CERCLA. Upon completion of the revised analyses, EPA will solicit comment on the results of the analyses and the methodology used to derive them. The Agency will then assess these comments, along with comments which will have been received previously on the proposed rule. Through these actions EPA will ensure that the net social benefits (including environmental and health benefits) of the rule proposed today are maximized, taking into account costs, technological limitations, risks, and realistic assessments of both actual and reasonably expected uses of each site. If the revised RIA, together with the comments received, demonstrate that the rule proposed today does not achieve this outcome, the Agency will make appropriate modifications to the final rule, or if necessary, will repropose the rule.

B. Regulatory Flexibility Act

The Regulatory Flexibility Act requires Federal agencies to fully analyze the economic effects of regulations on small entities. The Agency analyzed the economic impacts for the regulatory options that are most similar to today's proposed rule (*i.e.*, "Immediate Cleanup to Health-Based Standards" and "Flexible Cleanup to Health-Based Standards").

The RIA assumes that a small business is significantly impacted if its excess of cash flow over ten percent of its total liabilities is insufficient to meet corrective action costs, or if its net income is insufficient to meet its corrective action costs.

For the alternative analyzed, it was found that small firms encounter more severe impacts from the corrective action requirements than large firms. The options most similar to the proposed rule result in incremental impacts (*i.e.*, relative to the baseline) on approximately 9 to 11 percent of small businesses owning RCRA facilities.

Based on the Agency's guidelines for implementing the Regulatory Feasibility Act, the results of the analysis as summarized above, suggest that the proposed rule does not impose significant impacts on small entities.

C. Paperwork Reduction Act

The information collection requirements in this proposed rule have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* Reporting and recordkeeping burden on the public fo this collection is estimated at 42,497 hours for the 674 respondents, with an average of 1.151 hours per response. (Burden estimates should include all aspects of the collection effort and may include time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, completing and reviewing the collection of information. *etc.*)

If you wish to submit comments regarding any aspect of the collection of information, including suggestions for reducing the burden, or if you would like a copy of the information collection request (please reference ICR #1451), contact Rick Westlund, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460 (202-382-2745); and Tim Hunt, Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503. The final rule will respond to any OMB or public comments on the information collection requirements contained in this proposal.

List of Subjects in 40 CFR Parts 264, 265, 270, and 271

Administrative practice and procedure, Corrective action, Hazardo waste; Insurance, Reporting and recordkeeping requirements.

Dated: July 5, 1990.

William Reilly,

Administrator.

XI. Supplementary Documents

APPENDIX A.—EXAMPLES OF CONCENTRATIONS MEETING CRITERIA FOR ACTION LEVELS

[Section 264.521(a)(2)(i-iv)]

Constituent name	Class	Air(ug/m^3)	Water (mg/L)	Soils (mg/kg)
Acetone	D		4E−00	8E+03
Acetonitrile	D		2E−01	5E+02
Acetophenone	D	2E−01	4E−00	8E+03
Acrylamide	B2	8E−04	8E−06	2E−01
Acrylonitrile	B1	1E−02	6E−05	1E−00
Aldicarb	D		5E−02	1E+02
Aldrin	B2	2E−04	2E−06	4E−02
Allyl alcohol	D		2E−01	4E+02
Aluminum phosphide	D		1E−02	3E+01
Aniline	B2		6E−03	1E+02
Antimony	D		1E−02	3E+01
Arsenic	A	7E−05	(1)	8E+01
Asbestos (2)	A	2E−02		
Barium cyanide	D		2E−00	6E+03
Barium, ionic	D	4E−01	(1)	4E+03
Benzidine	A	2E−05	2E−07	3E−03
Beryllium	B2	4E−04	8E−06	2E−01
Bis(2-ethylhexyl)phthlate	B2		3E−03	5E+01
Bis(chloroethyl)ether	B2	3E−03	3E−05	6E-01
Bromodichloromethane (3)	B2		3E−05	5E−01
Bromoform (3)	D		7E−01	2E+03
Bromomethane	D	3E+01	5E−02	1E+02
Butyl benzyl phthalate	C		7E−00	2E+04

APPENDIX A.—EXAMPLES OF CONCENTRATIONS MEETING CRITERIA FOR ACTION LEVELS—Continued

[Section 264.521(a)(2)(i-iv)]

Constituent name	Class	Air(ug/m^3)	Water (mg/L)	Soils (mg/kg)
Cadmium	B1	6E−04	(1)	4E+01
Calcium cyanide	D		1E−00	3E+03
Carbon disulfide	D		4E−00	8E+03
Carbon tetrachloride	B2	3E−02	3E−04	5E−00
Chloral	D		7E−02	2E+02
Chlordane	B2	3E−03	3E−05	5E−01
Chlorine cyanide	D		2E−00	4E+03
Chlorobenzene	D	2E+01	7E−01	2E+03
Chloroform (3)	B2	4E−02	6E−03	1E+02
2-Chlorophenol	D		2E−01	4E+02
Chromium (VI)	A	9E−05	(1)	4E+02
Copper cyanide	D		2E−01	4E+02
m-Cresol	D		2E−00	4E+03
o-Cresol	D		2E−00	4E+03
p-Cresol	D		2E−00	40+03
Cyanide	D		7E−01	2E+03
Cyanogen	D		1E−00	3E+03
Cyanogen bromide	D		3E−00	7E+03
DDD	B2		1E−04	3E−00
DDE	B2		1E−04	2E−00
DDT	B2	1E−02	1E−04	2E−00
Dibutyl phthalate	D		4E−00	8E+03
Dibutylnitrosamine	B2	6E−04	6E−06	1E−01
3,3'-Dichlorobenzidine	B2		8E−05	2E−00
Dichlorodifluoromethane	D	2E+02	7E−00	2E+04
1,2-Dichloroethane	B2	4E−02	(1)	8E−00
1,1-Dichloroethylene	C	3E−02	(1)	1E+01
2,4-Dichlorophenol	D		1E−01	2E+02
2,4-Dichlorophenoxyacetic acid	D		4E−01	8E+02
1,3-Dichloropropene	B2		1E−02	2E+01
Dieldrin	B2	2E−04	2E−06	4E−02
Diethyl phthalate	D		3E+01	6E+04
Diethylnitrosamine	B2	2E−05	2E−07	5E−03
Dimethoate	D		7E−01	2E+03
Dimethylnitrosamine	B2	7E−05	7E−07	1E−02
m-Dinitrobenzene	D		4E−03	8E−00
2,4-Dinitrophenol	D		7E−02	2E+02
2,3-Dinitrotoluene (and 2,6-, mixture)	B2		5E−06	1E-00
1,4-Dioxane	B2		3E−03	6E+01
Diphenylamine	D		9E−01	2E+03
1,2-Diphenylhydrazine	B2	4E−03	4E−05	9E−01
Disulfoton	D		1E−03	3E−00
Endosulfan	D		2E−03	4E−00
Endothall	D		7E−01	2E+03
Endrin	D		(1)	2E+01
Epichlorohydrin	B2	8E−01	4E−03	7E+01
Ethylbenzene	D		4E-00	8E+03
Ethylene dibromide	B2	5E−03	4E−07	8E−03
Formaldehyde	B1	8E−02		
Formic acid	D		7E+01	2E+05
Glycidyaldehyde	D		1E−02	3E+01
Heptachlor	B2	8E−04	8E−06	2E−01
Heptachlor epoxide	B2	4E−04	4E−06	8E−02
Hexachlordibenzo-p-dioxin	B2	6E−07	1E−08	1E−04
Hexachlorobutadiene	C	4E−01	4E−03	9E+01
alpha-Hexachlorocyclohexane	B2	6E−04	6E−06	1E−01
beta-Hexachlorocyclohexane	C	2E−02	2E−04	4E−00
Hexachlorocyclopentadiene	D	7E−02	2E−01	6E+02
Hexachloroethane	C	3E−00	3E−02	8E+01
Hexachlorophene	D		1E−02	2E+01
Hydrazine	B2	2E−04	1E−05	2E−01
Hydrogen cyanide	D		7E−01	2E+03
Hydrogen sulfite	D		1E−01	2E+02
Isobutyl alcohol	D		1E+01	2E+04
Isophorone	C		9E−02	2E+03
Lead	B2		(1)	
Lindane (gamma-hexachlorocyclohexane)	B2/C		(1)	5E−01
m-Phenylenediamine	D		2E−01	5E+02
Maleic anhydride	D		4E−00	8E+03
Maleic hydrazide	D		2E+01	4E+04
Mercury (inorganic)	D		(1)	2E+01
Methacrylonitrile	D	7E−01	4E−03	8E-00
Methomyl	D		9E−01	2E+03
Methyl chlorocarbonate	D			
Methyl ethyl ketone	D	3E+02	2E−00	4E+03
Methyl isobutyl ketone	D	7E+01	2E−00	4E+03
Methyl parathion	D		9E−03	2E+01

APPENDIX A.—EXAMPLES OF CONCENTRATIONS MEETING CRITERIA FOR ACTION LEVELS—Continued

[Section 264.521(a)(2)(i-iv)]

Constituent name	Class	Air(ug/m^3)	Water (mg/L)	Soils (mg/kg)
Methylene chloride	B	3E−01	5E−03	9E+01
n-Nitroso-di-n-butylamine	B2	6E−04	6E−06	1E−01
n-Nitroso-n-ethylurea	B			
n-Nitroso-n-methylethylamine	B2		2E−06	3E−02
n-Nitrosodi-n-propylamine	B2		5E−06	1E−01
n-Nitrosodiethanolamine	B2		1E−05	3E−01
n-Nitrosodiphenylamine	B2		7E−03	1E+02
n-Nitrosopyrrolidine	B2	2E−03	2E−05	3E−01
Nickel	D		7E−01	2E+03
Nickel refinery dust	A	4E−03		
Nitric oxide	D		4E−00	8E+03
Nitrobenzene	D	2E−00	2E−02	4E+01
Nitrogen dioxide	D		4E+01	8E+04
Osmium tetroxide	D		4E−04	8E−01
Parathion	C		2E−01	5E+02
Pentachlorobenzene	D		3E−02	6E+01
Pentachloronitrobenzene	C	1E−01	1E−01	2E+02
Pentachlorophenol	D		1E−00	2E+03
Phenol	D		2E+01	5E+04
Phenyl mercuric acetate	D		3E−03	6E−00
Phosphine	D		1E−02	2E+01
Phthalic anhydride	D		7E+01	2E+05
Polychlorinated biphenyls	B2		5E−06	9E−02
Potassium cyanide	D		2E−00	4E+03
Potassium silver cyanide	D		7E−00	2E+04
Pronamide	D		3E−00	6E+03
Pyridine	D		4E−02	8E+01
Selenious acid	D		1E−01	2E+02
Selenourea	D		2E−01	4E+02
Silver	D		(1)	2E+02
Silver cyanide	D		4E−00	8E+03
Sodium cyanide	D		1E−00	3E+03
Strychnine	D		1E−02	2E+01
Styrene	C		7E−00	2E+04
1,1,1,2-Tetrachlorethane	C	1E−00	1E−02	3E+02
1,2,4,5-Tetrachlorobenzene	D		1E−02	2E+01
1,1,1,2-Tetrachloroethane	C	1E−00	1E−02	3E+02
1,1,2,2-Tetrachloroethane	C	2E−01	2E−03	4E+01
Tetrachloroethylene	B2	1E−00	7E−04	1E+01
2,3,4,6-Tetrachlorophenol	D		1E−00	2E+03
Tetraethyl lead	D		4E−08	8E−03
Tetraethyldithiopyrophosphate	D		2E−02	4E+01
Thallic oxide	D		2E−03	6E−00
Thallium acetate	D		3E−03	7E−00
Thallium carbonate	D		3E−03	6E−00
Thallium chloride	D		3E−03	6E−00
Thallium nitrate	D		3E−03	7E−00
Thallium sulfate	D		3E−03	6E−00
Thiosemicarbazide	D		2E−01	5E+02
Thiram	D		2E−01	4E+02
Toluene	D	7E+03	1E+01	2E+04
Toxaphene	B2	3E−03	(1)	6E−01
1,2,4-Trichlorobenzene	D	1E+01	7E−01	2E+03
1,1,1-Trichloroethane	D	1E+03	3E−00	7E+03
1,1,2-Trichloroethane	C	6E−01	6E−03	1E+02
Trichloroethylene	B2		(1)	6E+01
Trichloromonofluoromethane	D	7E+02	1E+01	2E+04
2,4,5-Trichlorophenol	D		4E−00	8E+03
2,4,6-Trichlorophenol	B2	2E−01	2E−03	4E+01
2,4,5-Trichlorophenoxyacetic acid	D		(1)	8E+02
1,2,3-Trichloropropane	D		2E−01	5E+02
Vanadium pentoxide	D		3E−01	7E+02
Xylenes	D	1E+03	7E+01	2E+05
Zinc cyanide	D		2E−00	4E+03
Zinc phosphide	D		1E−02	2E+01

(1) MCL available; see appendix B.

(2) The air action level for asbestos is measured in units of fibers/milliliters.

(3) There is an MCL for total trihalomethanes, which includes four constituents: bromoform, bromodichloromethane, chloroform, and dibromochloromethane. Concentration derived using exposure assumptions in appendix D and reference doses for systemic toxicants and verified risk-specific doses at 10−6 for Class A and B carcinogens and 10−5 for Class C carcinogens (see section VI.F.2.6 for further discussion).

A, B and C represents class A, B and C carcinogens, respectively; D represents a systemic toxicant.

APPENDIX B—MAXIMUM CONTAMINANT LEVELS

Constituent	MCL (ppm)
Arsenic	0.05
Barium	1
Benzene	0.005
Cadmium	0.010
Carbon tetrachloride	0.005
Chromium VI	0.05
p-Dichlorobenzene	0.075
1,2-Dichloroethane	0.005
1,1-Dichloroethylene	0.007

APPENDIX B—MAXIMUM CONTAMINANT LEVELS—Continued

Constituent	MCL (ppm)
2,4-D	0.1
2,4,5-TP Silvex	0.01
Endrin	0.0002
Fluoride	4.0
Lead	0.05
Lindane	0.004
Mercury	0.002
Methoxychlor	0.1
Nitrate	10

APPENDIX B—MAXIMUM CONTAMINANT LEVELS—Continued

Constituent	MCL (ppm)
Selenium	0.01
Silver	0.05
Toxaphene	0.005
1,1,1-Trichloroethane	0.2
Trichloroethylene	0.005
Trihalomethanes, total [1]	0.10
Vinyl chloride	0.002

[1] Including chloroform, bromoform, bromodichloromethane, and dibromochloromethane

APPENDIX C—RANGE OF CONCENTRATIONS FOR ESTABLISHING MEDIA PROTECTION STANDARDS FOR CARCINOGENS

Constituent name	Class	MaxAir (ug/m 3)	MinAir (ug/m 3)	Max-Water (mg/L)	MinWater (mg/L)	MaxSoil (mg/kg)	MinSoil (mg/kg)
Acetone	D						
Acetonitrile	D						
Acetophenone	D						
Acrylamide	B2	8E-02	8E-04	8E-04	8E-06	2E+01	2E-01
Acrylonitrile	B1	1E-00	1E-02	6E-03	6E-05	1E+02	1E-00
Aldicarb	D						
Aldrin	B2	2E-02	2E-04	2E-04	2E-06	4E-00	4E-02
Allyl alcohol	D						
Aluminum phosphide	D						
Aniline	B2			6E-01	6E-03	1E+04	1E+02
Antimony	D						
Arsenic	A	7E-03	7E-05				
Asbestos (2)	A	2E-00	2E-02				
Barium cyanide	D						
Barium, ionic	D						
Benzidine	A	2E-03	2E-05	2E-05	2E-07	3E-01	3E-03
Beryllium	B2	4E-02	4E-04	8E-04	8E-06	2E+01	2E-01
Bis(2-ethylhexyl)phthlate	B2			3E-01	3E-03	5E+03	5E+01
Bis(chloroethyl)ether	B2	3E-01	3E-03	3E-03	3E-05	6E+01	6E-01
Bromodichloromethane	B2			3E-03	3E-05	5E+01	5E-01
Bromoform	D						
Bromomethane	D						
Butyl benzyl phthalate	C						
Cadmium	B1	6E-02	6E-04				
Calcium cyanide	D						
Carbon disulfide	D						
Carbon tetrachloride	B2	3E-00	3E-02	3E-02	3E-04	5E+02	5E-00
Chloral	D						
Chlordane	B2	3E-01	3E-03	3E-03	3E-05	5E+01	5E-01
Chlorine cyanide	D						
Chlorobenzene	D						
Chloroform	B2	4E-00	4E-02	6E-01	6E-03	1E+04	1E+02
2-Chlorophenol	D						
Chromium (VI)	A	9E-03	9E-05				
Copper cyanide	D						
m-Cresol	D						
o-Cresol	D						
p-Cresol	D						
Cyanide	D						
Cyanogen	D						
Cyanogen bromide	D						
DDD	B2			1E-02	1E-04	3E+02	3E-00
DDE	B2			1E-02	1E-04	2E+02	2E-00
DDT	B2	1E-00	1E-02	1E-02	1E-04	2E+02	2E-00
Dibutyl phthalate	D						
Dibutylnitrosamine	B2	6E-02	6E-04	6E-04	6E-06	1E+01	1E-01
3,3'-Dichlorobenzidine	B2			8E-03	8E-05	2E+02	2E-00
Dichlorodifluormethane	D						
1,2-Dichloroethane	B2	4E-00	4E-02	4E-02	4E-04	8E+02	8E-00
1,1-Dichlorothylene	C	3E-01	3E-03	6E-03	6E-05	1E+02	1E-00
2,4-Dichlorophenol	D						
2,4-Dichlorophenoxyacetic acid	D						
1,3-Dichloropropene	B2						
Dieldrin	B2	2E-02	2E-04	2E-04	2E-06	4E-00	4E-02
Diethyl phthalate	D						

APPENDIX C—RANGE OF CONCENTRATIONS FOR ESTABLISHING MEDIA PROTECTION STANDARDS FOR CARCINOGENS—Continued

Constituent name	Class	MaxAir (ug/m 3)	MinAir (ug/m 3)	Max-Water (mg/L)	MinWater (mg/L)	MaxSoil (mg/kg)	MinSoil (mg/kg)
Diethylnitrosamine	B2	2E-03	2E-05	2E-05	2E-07	5E-01	5E-03
Dimethoate	D						
Dimethylnitrosamine	B2	7E-03	7E-05	7E-05	7E-07	1E-00	1E-02
m-Dinitrobenzene	D						
2,4-Dinitrophenol	D						
2,3-Dinitrotoluene (and 2,6-, mixture)	B2			5E-03	5E-05	1E+02	1E-00
1,4-Dioxane	B2			3E-01	3E-03	6E+03	6E+01
Diphenylamine	D						
1,2-Diphenylhydrazine	B2	4E-01	4E-03	4E-03	4E-05	9E+01	9E-01
Disulfoton	D						
Endosulfan	D						
Endothall	D						
Endrin	D						
Epichlorohydrin	B2	8E+01	8E-01	4E-01	4E-03	7E+03	7E+01
Ethylbenzene	D						
Ethylene dibromide	B2	5E-01	5E-03	4E-05	4E-07	8E-01	8E-03
Formaldehyde	B1	8E-00	8E-02				
Formic acid	D						
Glycidyaldehyde	D						
Heptachlor	B2	8E-02	8E-04	8E-04	8E-06	2E+01	2E-01
Heptachlor epoxide	B2	4E-02	4E-04	4E-04	4E-06	8E-00	8E-02
Hexachlordibenzo-p-dioxin	B2	6E-05	6E-07	6E-07	1E-08	1E-02	1E-04
Hexachlorobutadiene	C	4E-00	4E-02	4E-02	4E-04	9E+02	9E-00
alpha-Hexachlorocyclohexane	B2	6E-02	6E-04	6E-04	6E+06	1E-01	1E-01
beta-Hexachlorocyclohexane	C	2E-01	2E-03	2E-03	2E-05	4E+01	4E-01
Hexachlorocyclopentadiene	D						
Hexachloroethane	C	3E+01	3E-01	3E-01	3E-03	5E+03	5E+01
Hexachlorophene	D						
Hydrazine	B2	2E-02	2E-04	1E-03	1E-05	2E+01	2E-01
Hydrogen cyanide	D						
Hydrogen sulfite	D						
Isobutyl alcohol	D						
Isophorone	C			9E-01	9E-03	2E+04	2E+02
Lead	B2						
Lindane (gamma-hexachlorocyclohexane)	B2/C			3E-03	3E-05	5E+01	5E-01
m-Phenylenediamine	D						
Maleic anhydride	D						
Maleic hydrazide	D						
Mercury (inorganic)	D						
Methacrylonitrile	D						
Methomyl	D						
Methyl chlorocarbonate	D						
Methyl ethyl ketone	D						
Methyl isobutyl ketone	D						
Methyl parathion	D						
Methylene chloride	B	3E+01	3E-01	5E-01	5E-03	9E+03	9E+01
n-Nitroso-di-n-butylamine	B2	6E-02	6E-04	6E-04	6E+06	1E-01	1E-01
n-Nitroso-n-ethylurea	B						
n-Nitroso-n-methylethylamine	B2			2E-04	2E-06	3E-00	3E-02
n-Nitrosodi-n-propylamine	B2			5E-04	5E-06	1E+01	1E-01
n-Nitrosodiethanolamine	B2			1E-03	1E-05	3E+01	3E-01
n-Nitrosodiphenylamine	B2			7E-01	7E-03	1E+04	1E+02
n-Nitrosopyrrolidine	B2	2E-01	2E-03	2E-03	2E-05	3E+01	3E-01
Nickel	D						
Nickel refinery dust	A	4E-01	4E-03				
Nitric oxide	D						
Nitrobenzene	D						
Nitrogen dioxide	D						
Osmium tetroxide	D						
Parathion	C						
Pentachlorobenzene	D						
Pentachloronitrobenzene	C	1E-00	1E-02				
Pentachlorophenol	D						
Phenol	D						
Phenyl mercuric acetate	D						
Phosphine	D						
Phthalic anhydride	D						
Polychlorinated biphenyls	B2			5E-04	5E-06	9E-00	9E-02
Potassium cyanide	D						
Potassium silver cyanide	D						
Pronamide	D						
Pyridine	D						
Selenious acid	D						
Selenourea	D						
Silver	D						
Silver cyanide	D						
Sodium cyanide	D						
Strychnine	D						

APPENDIX C—RANGE OF CONCENTRATIONS FOR ESTABLISHING MEDIA PROTECTION STANDARDS FOR CARCINOGENS—Continued

Constituent name	Class	MaxAir (ug/m 3)	MinAir (ug/m 3)	Max-Water (mg/L)	MinWater (mg/L)	MaxSoil (mg/kg)	MinSoil (mg/kg)
Styrene	C						
1,1,1,2-Tetrachlorethane	C	1E+01	1E-01	1E-01	3E+03	3E+03	3E+01
1,2,4,5-Tetrachlorobenzene	D						
1,1,1,2-Tetrachloroethane	C	1E+01	1E-01	1E-01	1E-03	3E+03	3E+01
1,1,2,2-Tetrachloroethane	C	2E-00	2E-02	2E-02	2E-04	4E+02	4E-00
Tetrachloroethylene	B2	1E+02	1E-00	7E-02	7E-04	1E+03	1E+01
2,3,4,6-Tetrachlorophenol	D						
Tetraethyl lead	D						
Tetraethyldithiopyrophosphate	D						
Thallic oxide	D						
Thallium acetate	D						
Thallium carbonate	D						
Thallium chloride	D						
Thallium nitrate	D						
Thallium sulfate	D						
Thiosemicarbazide	D						
Thiram	D						
Toluene	D						
Toxaphene	B2	3E-01	3E-03	3E-03	3E-05	6E+01	6E-01
1,2,4-Trichlorobenzene	D						
1,1,1,Trichloroethane	D						
1,1,2-Trichloroethane	C	6E-00	6E-02	6E-02	6E-04	1E+03	1E+01
Trichloroethylene	B2			3E-01	3E-03	6E+03	6E+01
Trichloromonofluoromethane	D						
2,4,5-Trichlorophenol	D						
2,4,6-Trichlorophenol	B2	2E+01	2E-01	2E-01	2E-03	4E+03	4E+01
2,4,5-Trichlorophenoxyacetic acid	D						
1,2,3-Trichloropropane	D						
Vanadium pentoxide	D						
Xylenes	D						
Zinc cyanide	D						
Zinc phosphide	D						

Appendix D: Recommended Exposusre Assumptions for Use in Deriving Action Levels

(Sections 264.521 (a)(2); (b); (c)(3); and (d))

1. In deriving action levels for hazardous constituents in ground-water, assume a water intake of 2 liters/day for 70 kg adult/70 year lifetime exposure period.

2. In deriving action levels for hazardous constituents in air, assume air intake of 20 cubic meters/day for 70 kg adult/70 year lifetime exposure period.

3. In deriving action levels for hazardous constituents in soil, which are known or suspected to be carcinogens, assume soil intake of 0.1 gram/day for 70 kg adult/70 year lifetime exposure period.

4. In deriving action levels for hazardous constituents in soil, other than those which are known or suspected to be carcinogens, assume soil intake of 0.2 gram/day for 16 kg child/5 year exposure period (age 1–6).*

5. In deriving action levels for hazardous constituents in surface water designated by the State for use as a drinking water source, assume a water intake of 2 liters/day for 70 kg adult/70 year lifetime exposure period, unless intake of aquatic organisms is also of concern.

*Not to be averaged over a 70-year lifetime.

Appendix E: Examples of Calculations of Action Levels

I. Governing Equations for Calculating Action Levels

A. *Systemic Toxicants*

$C_m = [RfD*W]/[I*A]$

where:

C_m = action level in medium (units are medium-dependent);

RfD = reference dose (mg/kg/day);

W = body weight (kg);

I = intake assumption (units are medium-dependent); and

A = absorption factor [1] (dimensionless).

B. *Carcinogenic Constituents*

$C_m = [R*W*LT]/[CSF*I*A*ED]$

where:

C_m = action level in medium (units are medium-dependent);

R = assumed risk level (dimensionless) (10^{-6} for class A & B; 10^{-5} for class C carcinogens);

W = body weight (kg);

LT = assumed lifetime (years);

CSF = carcinogenic slope factor $(mg/kg/day)^{-1}$;

I = intake assumption (units are medium-dependent);

A = absorption factor (dimensionless); and

ED = exposure duration (years).

[1] Assumed to be 1 for this appendix, based upon the assumption that the human absorption rate will be the same as the rate in the study upon which the RfD or CPF was developed.

II. Example Calculations for Hazardous Constituents in Air

A. *Systemic Toxicants*

Example calculation for 2,4-dinitrophenol:

$C_a = [0.002\ (mg/kg/d)*1000\ (\mu g/mg)*70(kg)]/[20\ (m^3/d)*1] = 7.0\ \mu g/m^3$

where:

C_a = action level in air ($\mu g/m^3$)

RfD = 0.002 mg/kg/day

W = 70 kg adult

I = 20 m^3/day

A = 1

B. *Carcinogenic Constituents*

Example calculation for 1,1,2,2-tetrachloroethane:

$C_a = [10^{-6}*1000\ (\mu g/mg)*70\ (yrs)*70\ (kg)]/[0.20\ (mg/kg/day)^{-1}*20\ (m^3/day)*1*70\ (yrs)] = .175\ \mu g/m$

where:

C_a = action level in air ($\mu g/m^3$)

R = 10^{-6} (1,1,2,2-Tetrachloroethane is a Class C carcinogen)

W = 70 kg adult

LT = 70 year lifetime

CSF = 0.20 $(mg/kg/day)^{-1}$

I = 20 m^3/day

A = 1

ED = 70 year exposure duration

III. Sample Calculation for Hazardous Constituents in Water

A. *Systemic Toxicants*

Sample calculation for toluene:

$C_w = [0.30\ (mg/kg/day)*70\ (kg)]/[2\ (L/day)*1] = 10.5\ mg/L$

where:

C_w = action level in water (mg/L)

RfD = 0.30 mg/kg/day for toluene
W = 70 kg adult
I = 2 L/day
A = 1

B. *Carcinogenic Constituents*

Sample calculation for 1,1,2,2,-tetrachloroethane:

$C_w = [10^{-6} * 70\ (kg) * 70\ (yr)]/[0.20\ (mg/kg/day)^{-1} * 2\ (L/day) * 1 * 70\ (yr)] = 1.75E-03\ mg/L$

where:
C_w = action level in water (mg/L)
R = 10^{-6} (1,1,2,2-Tetrachloroethane is a Class C carcinogen)
W = 70 kg adult
LT = 70 year lifetime
CSF = 0.20 $(mg/kg/day)^{-1}$
I = 2 L/day
A = 1
ED = 70 year exposure duration

IV. Sample Calculations for Hazardous Constituents in Soils

A. *Systemic Toxicants*

Example calculations for toluene:

$C_s = [0.30\ (mg/kg/day) * 16\ (kg)]/[0.2\ (g/day) * 1 * 0.001\ (kg/g] = 24.000\ mg/kg$

where:
C_s = action level in soil (mg/kg)
RfD = 0.30 mg/kg/day for toluene
W = 16 kg (5 year old child)
I = 0.2 g/day
A = 1

B. *Carcinogenic Constituents*

Sample calculation for 1,1,2,2,-tetrachloroethane:

$C_s = [10^{-6} * 70\ (kg) * 70\ (yrs)]/[0.20\ (mg/kg/day)^{-1} * 0.1\ (g/day) * 0.001\ (kg/g) * 1 * 70\ (yrs)] = 35.0\ mg/kg$

where:
C_s = action level in soil (mg/kg)
R = 10^{-6} (1,1,2,2-tetrachloroethane is a Class C carcinogen)
W = 70 kg adult
LT = 70 year lifetime
CSF = 0.20 $(mg/kg/day)^{-1}$
I = 0.1 g/day
A = 1
ED = 70 year exposure duration

APPENDIX F—LIST OF CONSTITUENTS SHOWING ACTION LEVEL SOURCE DATA

Constituent name	Class	Noncarcinogenic effects		Carcinogenic effects	
		Oral RFD (mg/kg/d)	Inhalation RFD (mg/kg/d)	Oral slope factor (mg/kg/d)-1	Inhalation slope factor (mg/kg/d) [1]
Acetone	D	1.0E−01			
Acetonitrile	D	6.0E−03			
Acetophenone	D	1.0E−01	5.0E−05		
Acrylamide	B2	2.0E−04		4.5E−00	4.5E−00
Acrylonitrile	B1			5.4E−01	2.4E−01
Aldicarb	D	1.3E−03			
Aldrin	B2	3.0E−05		1.7E+01	1.7E+01
Allyl alcohol	D	5.0E−03			
Aluminum phosphide	D	4.0E−04			
Aniline	B2			5.7E−03	
Antimony	D	4.0E−04			
Arsenic	A	1.0E−03			5.0E+01
Asbestos (2)	A				2.3E−01
Barium cyanide	D	7.0E−02			
Barium, ionic	D	5.0E−02	1.0E−04		
Benzidine	A	3.0E−03		2.3E+02	2.3E+02
Beryllium	B2	5.0E−03		4.3E−00	8.4E−00
Bis(2-ethylhexyl)phthlate	B2	2.0E−02		1.4E−02	
Bis(chloroethyl)ether	B2			1.1E−00	1.1E−00
Bromodichloromethane	B2	2.0E−02		1.3E−00	
Bromoform	D	2.0E−02			
Bromomethane	D	1.4E−03	8.0E−03		
Butyl benzyl phthalate	C	2.0E−01			
Cadmium	B1	5.0E−04			6.1E−00
Calcium cyanide	D	4.0E−02			
Carbon disulfide	D	1.0E−01			
Carbon tetrachloride	B2	7.0E−04		1.3E−01	1.3E−01
Chloral	D	2.0E−03			
Chlordane	B2	6.0E−05		1.3E−00	1.3E−00
Chlorine cyanide	D	5.0E−02			
Chlorobenzene	D	2.0E−02	5.0E−03		
Chloroform	B2	1.0E−02		6.1E−03	8.1E−02
2-Chlorophenol	D	5.0E−03			
Chromium (VI)	A	5.0E−03			4.1E+01
Copper cyanide	D	5.0E−03			
m-Cresol	D	5.0E−02			
o-Cresol	D	5.0E−02			
p-Cresol	D	5.0E−02			
Cyanide	D	2.0E−02			
Cyanogen	D	4.0E−02			
Cyanogen bromide	D	9.0E−02			
DDD	B2			2.4E−01	
DDE	B2			3.4E−01	
DDT	B2	5.0E−04		3.4E−01	3.4E−01
Dibutyl phthalate	D	1.0E−01			
Dibutylnitrosamine	B2			5.4E−00	5.4E−00
3,3'-Dichlorobenzidine	B2			4.5E−01	
Dichlorodifluoromethane	D	2.0E−01	5.0E−02		
1,2-Dichloroethane	B2			9.1E−02	9.1E−02
1,1-Dichloroethylene	C	9.0E−03		6.0E−01	1.2E−00
2,4-Dichlorophenol	D	3.0E−03			
2,4-Dichlorophenoxyacetic acid	D	1.0E−02			
1,3-Dichloropropene	B2	3.0E−04			
Dieldrin	B2	5.0E−05		1.6E+01	1.6E+01
Diethyl phthalate	D	8.0E−01			
Diethylnitrosamine	B2			1.5E+02	1.5E+02

APPENDIX F—LIST OF CONSTITUENTS SHOWING ACTION LEVEL SOURCE DATA—Continued

Constituent name	Class	Noncarcinogenic effects		Carcinogenic effects	
		Oral RFD (mg/kg/d)	Inhalation RFD (mg/kg/d)	Oral slope factor (mg/kg/d)-1	Inhalation slope factor (mg/kg/d) [1]
Dimethoate	D	2.0E−02			
Dimethylnitrosamine	B2			5.1E+01	5.1E+01
m-Dinitrobenzene	D	1.0E−04			
2,4-Dinitrophenol	D	2.0E−03			
2,3-Dinitrotoluene (and 2,6-, mixture)	B2			6.8E−01	
1,4-Dioxane	B2			1.1E−02	
Diphenylamine	D	2.5E−02			
1,2-Diphenylhydrazine	B2			8.0E−01	8.0E−01
Disulfoton	D	4.0E−05			
Endosulfan	D	5.0E−05			
Endothall	D	2.0E−02			
Endrin	D	3.0E−04			
Epichlorohydrin	B2	2.0E−03		9.9E−03	4.2E−03
Ethylbenzene	D	1.0E−01			
Ethylene dibromide	B2			8.5E+01	7.6E−01
Formaldehyde	B1				4.5E−02
Formic acid	D	2.0E−00			
Glycidyaldehyde	D	4.0E−04			
Heptachlor	B2	5.0E−04		4.5E−00	4.5E−00
Heptachlor epoxide	B2	1.3E−05		9.1E−00	9.1E−00
Hexachlordibenzo-p-dioxin	B2			6.2E+03	6.2E+03
Hexachlorobutadiene	C	2.0E−03		7.8E−02	7.8E−02
alpha-Hexachlorocyclohexane	B2			6.3E−00	6.3E−00
beta-Hexachlorocyclohexane	C			1.8E−00	1.8E−00
Hexachlorocyclopentadiene	D	7.0E−03	2.0E−05		
Hexachloroethane	C	1.0E−03		1.4E−02	1.4E−02
Hexachlorophene	D	3.0E−04			
Hydrazine	B2			3.0E−00	1.7E+01
Hydrogen cyanide	D	2.0E−02			
Hydrogen sulfide	D	3.0E−03			
Isobutyl alcohol	D	3.0E−01			
Isophorone	C	2.0E−01		4.1E−03	
Lead	B2				
Lindane (gamma-hexachlorocyclohexane)	B2/C	3.0E−04		1.3E−00	
m-Phenylenediamine	D	6.0E−03			
Maleic anhydride	D	1.0E−01			
Maleic hydrazide	D	5.0E−01			
Mercury (inorganic)	D	3.0E−04			
Methacrylonitrile	D	1.0E−04	2.0E−04		
Methomyl	D	2.5E−02			
Methyl chlorocarbonate	D				
Methyl ethyl ketone	D	5.0E−02	9.0E−02		
Methyl isobutyl ketone	D	5.0E−02	2.0E−02		
Methyl parathion	D	2.5E−04			
Methylene chloride	B	6.0E−02		7.5E−03	1.4E−02
n-Nitroso-di-n-butylamine	B2			5.4E−00	5.4E−00
n-Nitroso-n-ethylurea	B				
n-Nitroso-n-methylethylamine	B2			2.2E+01	
n-Nitrosodi-n-propylamine	B2			7.0E−00	
n-Nitrosodiethanolamine	B2			2.8E−00	
n-Nitrosodiethylamine	B2			4.9E−03	
n-Nitrosopyrrolidine	B2			2.1E−00	2.1E−00
Nickel	D	2.0E−02			
Nickel refinery dust	A				8.4E−01
Nitric oxide	D	1.0E−01			
Nitrobenzene	D	5.0E−04	60E−04		
Nitrogen dioxide	D	1.0E−00			
Osmium tetroxide	D	1.0E−05			
Parathion	C	6.0E−03			
Pentachlorobenzene	D	8.0E−04			
Pentachloronitrobenzene	C	3.0E−03			2.5E−01
Pentachlorophenol	D	3.0E−02			
Phenol	D	6.0E−01			
Phenyl mercuric acetate	D	8.0E−05			
Phosphine	D	3.0E−04			
Phthalic anhydride	D	2.0E−00			
Polychlorinated biphenyls	B2			7.7E−00	
Potassium cyanide	D	5.0E−02			
Potassium silver cyanide	D	2.0E−01			
Pronamide	D	7.5E−02			
Pyridine	D	1.0E−03			
Selenious acid	D	3.0E−03			
Selenourea	D	5.0E−03			
Silver	D	3.0E−03			
Silver cyanide	D	1.0E−01			
Sodium cyanide	D	4.0E−02			

APPENDIX F—LIST OF CONSTITUENTS SHOWING ACTION LEVEL SOURCE DATA—Continued

Constituent name	Class	Noncarcinogenic effects		Carcinogenic effects	
		Oral RFD (mg/kg/d)	Inhalation RFD (mg/kg/d)	Oral slope factor (mg/kg/d)-1	Inhalation slope factor (mg/kg/d) [illegible]
Strychnine	D	3.0E−04			
Styrene	C	2.0E−01			
1,1,1,2-Tetrachlorethane	C	3.0E−02		2.6E−02	2.6E−02
1,2,4,5-Tetrachlorobenzene	D	3.0E−04			
1,1,1,2-Tetrachloroethane	C	3.0E−02		2.6E−02	2.6E−02
1,1,2,2-Tetrachloroethane	C			2.0E−01	2.0E−01
Tetrachloroethylene	B2	1.0E−02		5.1E−02	3.3E−03
2,3,4,6-Tetrachlorophenol	D	3.0E−02			
Tetraethyl lead	D	1.0E−07			
Tetraethyldithiopyrophosphate	D	5.0E−04			
Thallic oxide	D	7.0E−05			
Thallium acetate	D	9.0E−05			
Thallium carbonate	D	8.0E−05			
Thallium chloride	D	8.0E−05			
Thallium nitrate	D	9.0E−05			
Thallium sulfate	D	8.0E−05			
Thiosemicarbazide	D	6.0E−03			
Thiram	D	5.0E−03			
Toluene	D	3.0E−01	2.0E−00		
Toxaphene	B2			1.1E−00	1.1E−00
1,2,4-Trichlorobenzene	D	2.0E−02	3.0E−03		
1,1,1-Trichloroethane	D	9.0E−02	3.0E−01		
1,1,2-Trichloroethane	C	4.0E−03		5.7E−02	5.7E−02
Trichloroethylene	B2			1.1E−02	
Trichloromonofluoromethane	D	3.0E−01	2.0E−01		
2,4,5-Trichlorophenol	D	1.0E−01			
2,4,6-Trichlorophenol	B2			2.0E−02	2.0E−02
2,4,5-Trichlorophenoxyacetic acid	D	1.0E−02			
1,2,3-Trichloropropane	D	6.0E−03			
Vanadium pentoxide	D	9.0E−03			
Xylenes	D	2.0E−00	3.0E−01		
Zinc cyanide	D	5.0E−02			
Zinc phosphide	D	3.0E−04			

For the reasons set out in the preamble, 40 CFR parts 264, 265, 270, and 271 are proposed to be amended as follows:

PART 264—STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES

1. The authority citation for part 264 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6924, and 6925.

2. Section 264.1 is amended by revising paragraphs (d) and (g) introductory text to read as follows:

§ 264.1 Purpose, scope and applicability.

* * * * *

(d) The requirements of this part apply to a person disposing of hazardous waste by means of underground injection subject to a permit issued under an Underground Injection control (UIC) program approved or promulgated under the Safe Drinking Water Act only to the extent they are required by § 144.14 of this chapter and to the extent they are included in a RCRA permit by rule granted to such a person under part 270 of this chapter.

* * * * *

(g) Except as required under subpart S of this part governing releases from solid waste management units, the requirements of this part do not apply to:

* * * * *

§ 264.101 [Removed]

3. In 40 CFR part 264, subpart F, it is proposed to remove § 264.101.

4. In 40 CFR part 264, subpart G, it is proposed to amend § 264.113 by redesignating paragraphs (a)(1)(ii) as (a)(1)(iii) and (b)(1)(ii) as (b)(1)(iii), and by adding new paragraphs (a)(1)(ii) and (b)(1)(ii) to read as follows:

§ 264.113 Closure time allowed for closure.

* * * * *

(a) * * *

(1) * * *

(ii) Corrective action required at the unit or the facility under subpart S will delay the completion of partial or final closure; or

* * * * *

(b) * * *

(1) * * *

(ii) Corrective action required at the unit or the facility under subpart S will delay the completion of partial or final closure; or

* * * * *

5. 40 CFR part 264 is amended by adding subpart S to read as follows:

Subpart S—Corrective Action for Solid Waste Management Units

264.500 Purpose and applicability.
264.501 Definitions.
264.502–264.509 [Reserved].
264.510 Requirement to perform remedial investigations.
264.511 Scope of remedial investigations.
264.512 Plans for remedial investigations.
264.513 Reports of remedial investigations.
264.514 Determination of no further action.
264.515–264.519 [Reserved]
264.520 Requirement to perform corrective measure study.
264.521 Action levels.
264.522 Scope of corrective measure studies.
264.523 Plans for corrective measure studies.
264.524 Reports of corrective measure studies.
264.525 Selection of remedy
264.526 Permit modification for remedy.
264.527 Remedy design.
264.528 Progress reports.
264.529 Review of remedy implementation.
264.530 Completion of remedies.

APPENDIX D

DRMO Storage Shed - Analytical Data

(Source: Reference 5, 7)

TABLE 9

EVALUATION OF SOIL CONTAMINATION
DEFENSE REUTILIZATION & MARKETING OFFICE STORAGE

	pH	BARIUM	BERYLLIUM	CADMIUM	CHROMIUM	LEAD	MERCURY	NICKEL	SELENIUM	SILVER
THRESHOLD	6.5 4.3	51.29	2.00	1.25	26.51	146.92	1.00	10.11	0.20	1.00
SAMPLE										
A-1	8.6 X	152.00 X	0.30	5.06 X	11.90	272.00 X	0.020	32.00 X	0.20	2.86 X
A-2	9.1 X	27.30	0.30	1.56 X	3.41	31.20	0.020	6.83	0.20	0.50
A-3	9.2 X	61.70 X	0.30	4.42 X	6.31	209.00 X	0.029	12.10 X	0.20	0.50
A-4	10.1 X	54.40 X	0.30	3.16 X	8.26	331.00 X	0.214	24.30 X	0.20	0.97
A-5	9.3 X	21.00	0.30	1.91 X	3.81	34.30	0.197	7.15	0.20	0.50
A-6	8.1 X	34.60	0.30	5.09 X	7.68	343.00 X	0.235	15.80 X	0.20	0.50
A-7	8.5 X	67.30 X	0.30	2.10 X	9.54	242.00 X	0.256	13.40 X	0.20	0.50
A-8	8.5 X	20.40	0.30	1.00	4.27	34.70	0.211	5.22	0.20	0.50
A-9	8.5 X	28.80	0.30	1.07	5.85	122.00	0.079	6.34	0.20	3.38 X
B-1	9.2 X	133.00 X	0.30	6.04 X	10.60	113.00	0.181	38.60 X	0.20	2.88 X
B-2	8.7 X	153.00 X	0.30	5.76 X	11.50	405.00 X	0.202	38.40 X	0.20	0.99
B-3	9.1 X	202.00 X	0.30	6.42 X	30.30 X	1114.00 X	0.204	35.80 X	0.20	0.50
B-4	8.6 X	51.40 X	0.30	4.51 X	15.40	739.00 X	0.219	23.50 X	0.20	1.00
B-5	8.5 X	64.30 X	0.30	6.58 X	28.40 X	1515.00 X	0.216	48.30 X	0.20	1.00
B-6	8.5 X	78.80 X	0.30	5.80 X	81.30 X	1041.00 X	0.187	68.40 X	0.20	0.50
B-7	8.4 X	49.60	0.30	1.57 X	10.80	191.00 X	0.187	8.84	0.20	0.98
B-8	8.6 X	64.30 X	0.30	2.16 X	10.30	208.00 X	0.196	12.30 X	0.20	0.50
B-9	8.4 X	12.30	0.30	0.54	4.94	35.50	0.228	7.40	0.20	0.50
C-3	8.6 X	34.00	0.30	1.31 X	5.82	172.00 X	0.189	11.20 X	0.20	0.95
C-4	8.4 X	46.60	0.30	2.23 X	12.40	384.00 X	0.112	10.00	0.20	0.50
C-5	9.0 X	57.20 X	0.30	2.70 X	34.90 X	371.00 X	0.106	19.50 X	0.20	1.00
C-6	9.1 X	56.30 X	0.30	2.64 X	15.90	647.00 X	0.081	15.90 X	0.20	0.50
C-7	10.2 X	48.40	0.30	2.56 X	10.10	254.00 X	0.070	17.80 X	0.20	0.50
C-8	8.0 X	41.90	0.30	3.35 X	20.90	460.00 X	0.188	22.50 X	0.20	2.34 X
C-9	8.4 X	129.00 X	0.30	5.40 X	12.20	275.00 X	0.084	41.30 X	0.20	2.44 X
C-1	8.9 X	98.50 X	0.44	5.12 X	15.60	349.00 X	0.044	38.00 X	0.20	2.48 X
C-2	8.7 X	108.00 X	0.30	4.67 X	12.90	601.00 X	0.045	38.20 X	0.20	0.50

TABLE 9 (CONTINUED)

	pH	BARIUM	BERYLLIUM	CADMIUM	CHROMIUM	LEAD	MERCURY	NICKEL	SELENIUM	SILVER
THRESHOLD	6.5	51.29	2.00	1.25	26.51	146.92	1.00	10.11	0.20	1.00
	4.3									
SAMPLE										
D-1	8.8 X	130.00 X	0.30	5.48 X	22.70	410.00 X	0.104	43.40 X	0.20	1.97 X
D-2	9.0 X	182.00 X	0.30	4.87 X	13.40	486.00 X	0.059	34.80 X	0.20	2.48 X
D-3	8.4 X	54.80 X	0.30	3.24 X	19.90	643.00 X	0.213	26.40 X	0.20	0.50
D-4	8.2 X	61.60 X	0.30	3.67 X	26.30	3460.00 X	7.620 X	29.30 X	0.20	0.50
D-5	9.3 X	32.30	0.30	1.64 X	10.40	61.10	0.133	8.44	0.20	0.50
D-6	9.0 X	33.80	0.30	2.53 X	5.96	172.00 X	0.103	68.00 X	0.20	0.99
D-7	8.7 X	21.50	0.30	1.05	4.99	26.40	0.057	5.99	0.20	0.50
D-8	8.6 X	17.90	0.30	0.99	4.97	9.45	0.046	5.47	0.20	0.50
D-9	8.8 X	71.70 X	0.30	4.73 X	8.96	149.00 X	0.054	27.40 X	0.20	1.49 X
E-1	8.2 X	130.00 X	0.53	4.85 X	16.50	482.00 X	0.280	2270.00 X	0.20	4.37 X
E-2	8.3 X	121.00 X	0.30	3.95 X	10.10	271.00 X	0.121	20.70 X	0.20	1.44 X
E-3	9.0 X	43.60	0.30	2.11 X	10.30	333.00 X	0.227	12.70 X	0.20	0.98
E-4	8.5 X	38.40	0.30	1.90 X	5.69	345.00 X	0.531	7.11	0.20	0.95
E-5	8.6 X	39.00	0.30	2.25 X	4.50	75.50	0.547	8.00	0.20	0.50
E-6	9.6 X	27.40	0.30	1.78 X	4.81	156.00 X	0.101	6.26	0.20	0.50
E-7	8.6 X	18.70	0.30	1.68 X	11.80	256.00 X	0.065	13.30 X	0.20	0.50
E-8	7.9 X	50.30	0.30	3.34 X	436.00 X	1421.00 X	0.193	25.40 X	0.20	1.00
E-9	8.6 X	178.00 X	0.30	4.90 X	9.72	96.20	0.058	32.80 X	0.20	2.31 X
ST-1	8.8 X	4880.00 X	0.30	4.23 X	38.90 X	1879.00 X	0.163	46.20 X	0.20	0.50
ST-2	8.6 X	39.80	0.30	3.01 X	20.90	680.00 X	0.067	22.80 X	0.20	0.97
ST-3	7.7 X	79.80 X	0.30	3.88 X	89.80 X	2612.00 X	0.035	29.60 X	0.20	0.91
ST-4	8.1 X	79.40 X	0.30	4.34 X	26.00	864.00 X	0.095	32.40 X	0.20	1.00
ST-5	8.7 X	40.00	0.30	4.23 X	15.90	914.00 X	0.093	23.60 X	0.20	0.91
ST-6	8.1 X	74.4 X	0.30	6.52 X	99.9 X	4362 X	0.257	34.7 X	0.20	0.91
ST-7	8.7 X	35.4	0.30	2.08 X	10.7	200 X	0.054	13.6 X	0.20	0.5
ST-8	8.3 X	43.6	0.30	2.34 X	9.84	283 X	0.106	17.8 X	0.20	0.94

SOUTHERN DIVISION NAVAL FACILITIES

DELIVERY ORDER # 0097

DRMO STORAGE SHED SOIL SAMPLES

CHARLESTON, SC NAVAL SHIPYARD

ETC #	Sample I.D.	Date	Results (as received ppm) pH	Barium	Cadmium	Chromium	Lead	Mercury	Nickel	Silver
170	A-1-1	3/28	8.1	14.1	<0.1	-	8.78	-	3.05	<0.5
171	A-1-2	3/28	8.1	92.8	<0.1	-	10.3	-	21.0	1.29
172	A-1-3	3/28	7.8	22.8	<0.1	-	9.40	-	1.79	<0.5
173	A-2-1	3/28	7.9	-	<0.1	-	-	-	-	-
174	A-2-2	3/28	8.3	-	<0.1	-	-	-	-	-
175	A-2-3	3/28	8.1	-	<0.1	-	-	-	-	-
176	A-3-1	3/28	5.5	1.75	<0.1	-	12.3	-	<1.0	-
177	A-3-2	3/28	7.5	15.4	<0.1	-	12.6	-	<1.0	-
178	A-3-3	3/28	8.1	36.2	<0.1	-	17.9	-	20.9	-
179	A-4-1	3/28	6.4	3.07	<0.1	-	11.0	-	<1.0	-
180	A-4-2	3/28	8.2	25.0	2.36	-	24.5	-	5.35	-
181	A-4-3	3/28	7.8	10.6	<0.1	-	17.4	-	3.67	-
182	A-5-1	3/28	4.3	-	<0.1	-	-	-	-	-
183	A-5-2	3/28	8.2	-	<0.1	-	-	-	-	-
184	A-5-3	3/28	7.8	-	1.86	-	-	-	-	-
185	A-6-1	3/28	4.8	-	<0.1	-	<2.5	-	<1.0	-
186	A-6-2	3/28	8.1	-	<0.1	-	8.67	-	2.89	-
187	A-6-3	3/28	8.0	-	<0.1	-	13.3	-	12.3	-
188	A-7-1	3/28	5.1	10.0	<0.1	-	6.97	-	<1.0	-
189	A-7-2	3/28	8.1	10.9	<0.1	-	8.18	-	2.34	-
190	A-7-3	3/28	7.9	60.0	<0.1	-	13.7	-	17.0	-
191	A-8-1	3/28	4.9	-	-	-	-	-	-	-
192	A-8-2	3/28	8.4	-	-	-	-	-	-	-
193	A-8-3	3/28	8.4	-	-	-	-	-	-	-
194	A-9-1	3/28	5.9	-	-	-	-	-	-	<0.5
195	A-9-2	3/28	8.3	-	-	-	-	-	-	<0.5
196	A-9-3	3/28	8.0	-	-	-	-	-	-	<0.5
197	B-1-1	3/28	8.3	12.0	<0.1	-	-	-	3.98	<0.5
198	B-1-2	3/28	8.3	7.93	<0.1	-	-	-	<1.0	<0.5
199	B-1-3	3/28	8.2	16.9	<0.1	-	-	-	7.19	<0.5
200	B-2-1	3/28	7.4	<1.5	<0.1	-	7.45	-	<1.0	-
201	B-2-2	3/28	8.2	16.5	<0.1	-	10.8	-	7.06	-
202	B-2-3	3/28	8.3	68.0	<0.1	-	17.5	-	16.1	-
203	B-3-1	3/28	7.1	<1.5	<0.1	6.03	<2.5	-	<1.0	-
204	B-3-2	3/28	7.4	6.38	<0.1	16.9	15.5	-	<1.0	-
205	B-3-3	3/28	7.2	68.0	<0.1	35.8	14.5	-	20.4	-
206	B-4-1	3/28	5.2	<1.5	<0.1	-	9.60	-	<1.0	-
207	B-4-2	3/28	8.0	21.1	<0.1	-	11.8	-	9.31	-
208	B-4-3	3/28	8.1	52.2	<0.1	-	17.0	-	16.5	-
209	B-5-1	3/28	5.4	4.36	<0.1	2.54	4.72	-	<1.0	-
210	B-5-2	3/28	7.9	11.7	<0.1	15.0	11.2	-	7.01	-
211	B-5-3	3/28	8.3	55.5	<0.1	25.0	15.5	-	15.5	-

SOUTHERN DIVISION NAVAL FACILITIES

DELIVERY ORDER # 0097

DRMO STORAGE SHED SOIL SAMPLES

CHARLESTON, SC NAVAL SHIPYARD

ETC #	Sample I.D.	Date	Results (as received ppm)							
			pH	Barium	Cadmium	Chromium	Lead	Mercury	Nickel	Silver
300	E-8-2	3/29	8.0	-	<0.1	32.7	10.6	-	18.9	-
301	E-8-3	3/29	7.6	-	<0.1	14.3	15.2	-	10.1	-
302	E-9-1	3/29	7.5	5.99	<0.1	-	-	-	<1.0	<0.5
303	E-9-2	3/29	7.7	30.6	<0.1	-	-	-	11.6	<0.5
304	E-9-3	3/29	7.3	10.2	<0.1	-	-	-	<1.0	<0.5
305	ST-1-1	3/30	4.5	<1.5	<0.1	2.46	<2.5	-	<1.0	-
306	ST-1-2	3/30	7.8	9.99	<0.1	4.76	<2.5	-	<1.0	-
307	ST-1-3	3/30	7.9	35.6	<0.1	35.6	14.4	-	24.4	-
308	ST-2-1	3/30	6.8	-	<0.1	-	<2.5	-	<1.0	-
309	ST-2-2	3/30	8.0	-	<0.1	-	<2.5	-	<1.0	-
310	ST-2-3	3/30	8.0	-	<0.1	-	13.2	-	11.7	-
311	ST-3-1	3/30	4.7	7.97	<0.1	1.49	<2.5	-	<1.0	-
312	ST-3-2	3/30	8.5	<1.5	<0.1	6.98	7.48	-	<1.0	-
313	ST-3-3	3/30	8.3	35.0	<0.1	17.5	9.99	-	6.99	-
314	ST-4-1	3/30	7.5	9.04	<0.1	-	34.3	-	1.90	-
315	ST-4-2	3/30	7.5	7.98	<0.1	-	19.5	-	3.99	-
316	ST-4-3	3/30	7.8	14.4	<0.1	-	60.0	-	4.46	-
317	ST-5-1	3/30	4.9	-	<0.1	-	5.97	-	<1.0	-
318	ST-5-2	3/30	8.5	-	<0.1	-	12.5	-	<1.0	-
319	ST-5-3	3/30	8.2	-	<0.1	-	14.0	-	19.0	-
320	ST-6-1	3/30	7.3	<1.5	<0.1	3.50	<2.5	-	<1.0	-
321	ST-6-2	3/30	8.3	13.6	<0.1	11.2	<2.5	-	1.46	-
322	ST-6-3	3/30	8.4	10.5	<0.1	6.50	<2.5	-	<1.0	-
323	ST-7-1	3/30	5.2	-	<0.1	-	<2.5	-	<1.0	-
324	ST-7-2	3/30	8.1	-	<0.1	-	9.24	-	8.26	-
325	ST-7-3	3/30	8.1	-	<0.1	-	11.9	-	11.4	-
326	ST-8-1	3/30	5.5	-	<0.1	-	<2.5	-	<1.0	-
327	ST-8-2	3/30	8.2	-	<0.1	-	6.46	-	<1.0	-
328	ST-8-3	3/30	7.9	-	<0.1	-	12.8	-	14.3	-

SOUTHERN DIVISION NAVAL FACILITIES

DELIVERY ORDER # 0097

DRMO STORAGE SHED SOIL SAMPLES

CHARLESTON, SC NAVAL SHIPYARD

ETC #	Sample I.D.	Date	Results (as received ppm) pH	Barium	Cadmium	Chromium	Lead	Mercury	Nickel	Silver
255	D-2-2	3/29	8.5	9.81	<0.1	-	10.8	-	3.43	<0.5
256	D-2-3	3/29	8.3	43.9	<0.1	-	18.5	-	23.4	<0.5
257	D-3-1	3/29	8.2	11.6	<0.1	-	11.6	-	3.38	-
258	D-3-2	3/29	8.2	10.3	<0.1	-	11.8	-	15.2	-
259	D-3-3	3/29	8.3	35.2	<0.1	-	17.3	-	14.9	-
260	D-4-1	3/29	5.7	<1.5	<0.1	-	14.9	<0.02	<1.0	-
261	D-4-2	3/29	8.3	<1.5	<0.1	-	7.81	<0.02	<1.0	-
262	D-4-3	3/29	8.3	36.6	<0.1	-	13.1	<0.02	18.3	-
263	D-5-1	3/29	5.8	-	<0.1	-	-	-	-	-
264	D-5-2	3/29	8.3	-	<0.1	-	-	-	-	-
265	D-5-3	3/29	8.1	-	<0.1	-	-	-	-	-
266	D-6-1	3/29	8.0	-	<0.1	-	<2.5	-	<1.0	-
267	D-6-2	3/29	8.3	-	<0.1	-	<2.5	-	<1.0	-
268	D-6-3	3/29	8.1	-	<0.1	-	12.9	-	11.3	-
269	D-7-1	3/29	6.6	-	-	-	-	-	-	-
270	D-7-2	3/29	8.0	-	-	-	-	-	-	-
271	D-7-3	3/29	8.2	-	-	-	-	-	-	-
272	D-8-1	3/29	7.0	-	-	-	-	-	-	-
273	D-8-2	3/29	8.3	-	-	-	-	-	-	-
274	D-8-3	3/29	8.2	-	-	-	-	-	-	-
275	D-9-1	3/29	7.8	10.2	<0.1	-	12.1	-	3.88	<0.5
276	D-9-2	3/29	8.2	27.8	<0.1	-	60.4	-	15.1	<0.5
277	D-9-3	3/29	8.2	17.2	<0.1	-	15.8	-	3.82	<0.5
278	E-1-1	3/29	8.5	19.8	<0.1	-	20.3	-	6.45	<0.5
279	E-1-2	3/29	8.4	22.9	<0.1	-	11.9	-	14.8	<0.5
280	E-1-3	3/29	8.6	54.3	<0.1	-	20.7	-	21.7	<0.5
281	E-2-1	3/29	8.4	19.5	<0.1	-	73.6	-	8.54	<0.5
282	E-2-2	3/29	8.3	15.4	<0.1	-	8.85	-	3.72	<0.5
283	E-2-3	3/29	8.2	26.9	<0.1	-	10.0	-	8.69	<0.5
284	E-3-1	3/29	8.1	-	<0.1	-	5.65	-	2.83	-
285	E-3-2	3/29	8.0	-	<0.1	-	7.37	-	2.95	-
286	E-3-3	3/29	8.3	-	<0.1	-	6.04	-	3.25	-
287	E-4-1	3/29	8.3	-	<0.1	-	49.1	-	-	-
288	E-4-2	3/29	7.8	-	<0.1	-	10.7	-	-	-
289	E-4-3	3/29	7.9	-	<0.1	-	10.5	-	-	-
290	E-5-1	3/29	8.3	-	<0.1	-	-	-	-	-
291	E-5-2	3/29	8.3	-	<0.1	-	-	-	-	-
292	E-5-3	3/29	8.1	-	<0.1	-	-	-	-	-
293	E-6-1	3/29	6.9	-	<0.1	-	6.65	-	-	-
294	E-6-2	3/29	8.1	-	<0.1	-	8.39	-	-	-
295	E-6-3	3/29	7.7	-	<0.1	-	12.1	-	-	-
296	E-7-1	3/29	7.6	-	<0.1	-	5.84	-	<1.0	-
297	E-7-2	3/29	8.0	-	<0.1	-	15.0	-	27.3	-
298	E-7-3	3/29	7.4	-	<0.1	-	10.6	-	2.75	-
299	E-8-1	3/29	6.8	-	<0.1	2.31	<2.5	-	<1.0	-

SOUTHERN DIVISION NAVAL FACILITIES

DELIVERY ORDER # 0097

DRMO STORAGE SHED SOIL SAMPLES

CHARLESTON, SC NAVAL SHIPYARD

ETC #	Sample I.D.	Date	Results (as received ppm)							
			pH	Barium	Cadmium	Chromium	Lead	Mercury	Nickel	Silver
212	B-6-1	3/28	5.7	<1.5	<0.1	3.34	8.35	-	<1.0	-
213	B-6-2	3/28	8.2	33.9	<0.1	26.3	16.7	-	10.0	-
214	B-6-3	3/28	8.4	74.9	<0.1	26.0	15.6	-	16.8	-
215	B-7-1	3/28	7.2	-	2.46	-	11.4	-	-	-
216	B-7-2	3/28	8.3	-	<0.1	-	9.61	-	-	-
217	B-7-3	3/28	8.2	-	<0.1	-	13.1	-	-	-
218	B-8-1	3/28	5.9	<1.5	<0.1	-	6.81	-	<1.0	-
219	B-8-2	3/28	8.0	11.7	0.72	-	8.13	-	<1.0	-
220	B-8-3	3/28	7.8	68.4	<0.1	-	11.9	-	14.2	-
221	B-9-1	3/28	5.5	-	-	-	-	-	-	-
222	B-9-2	3/28	8.0	-	-	-	-	-	-	-
223	B-9-3	3/28	8.1	-	-	-	-	-	-	-
224	C-1-1	3/28	8.5	10.2	<0.1	-	8.80	-	1.35	<0.5
225	C-1-2	3/28	8.6	26.9	<0.1	-	11.0	-	9.96	<0.5
226	C-1-3	3/28	8.4	62.8	<0.1	-	12.8	-	18.8	<0.5
227	C-2-1	3/28	7.3	7.15	<0.1	-	7.80	-	<1.0	-
228	C-2-2	3/28	8.4	15.3	<0.1	-	13.4	-	1.91	-
229	C-2-3	3/28	7.7	20.7	<0.1	-	21.1	-	2.07	-
230	C-3-1	3/28	7.1	-	3.25	-	<2.5	-	1.39	-
231	C-3-2	3/28	7.5	-	<0.1	-	12.5	-	1.69	-
232	C-3-3	3/28	7.9	-	<0.1	-	10.1	-	22.0	-
233	C-4-1	3/28	4.5	-	<0.1	-	<2.5	-	-	-
234	C-4-2	3/28	7.9	-	0.52	-	8.24	-	-	-
235	C-4-3	3/28	7.7	-	<0.1	-	11.7	-	-	-
236	C-5-1	3/29	5.2	<1.5	3.65	3.08	<2.5	-	<1.0	-
237	C-5-2	3/29	8.2	53.4	<0.1	31.9	9.88	-	16.6	-
238	C-5-3	3/29	8.1	78.5	<0.1	33.4	9.54	-	18.0	-
239	C-6-1	3/29	4.9	<1.5	<0.1	-	<2.5	-	1.45	-
240	C-6-2	3/29	8.4	8.31	<0.1	-	8.31	-	2.19	-
241	C-6-3	3/29	8.1	51.4	<0.1	-	17.4	-	15.2	-
242	C-7-1	3/29	5.3	-	<0.1	-	<2.5	-	<1.0	-
243	C-7-2	3/29	8.1	-	<0.1	-	21.1	-	13.0	-
244	C-7-3	3/29	8.1	-	<0.1	-	19.3	-	18.4	-
245	C-8-1	3/29	5.1	-	0.43	-	8.66	-	1.44	<0.5
246	C-8-2	3/29	8.0	-	<0.1	-	9.02	-	3.61	<0.5
247	C-8-3	3/29	8.3	-	<0.1	-	18.6	-	17.6	<0.5
248	C-9-1	3/29	8.1	12.8	<0.1	-	<2.5	-	1.56	<0.5
249	C-9-2	3/29	8.3	27.5	<0.1	-	14.7	-	15.6	<0.5
250	C-9-3	3/29	8.1	14.9	<0.1	-	11.2	-	9.33	<0.5
251	D-1-1	3/29	8.6	12.1	<0.1	-	12.6	-	5.80	<0.5
252	D-1-2	3/29	8.3	16.2	<0.1	-	12.3	-	2.45	<0.5
253	D-1-3	3/29	8.3	23.8	<0.1	-	15.3	-	18.8	<0.5
254	D-2-1	3/29	8.1	7.48	<0.1	-	9.97	-	2.99	<0.5

APPENDIX E

Pesticide Mixing Area - Analytical Data

(Source: Reference 12)

pH MEASUREMENTS OF WATER SAMPLES
COLLECTED FROM MONITOR WELLS AT THE
PESTICIDE-MIXING AREA,
FEBRUARY 12, 1982[1]

Well Number	pH
WPA-1	6.02
WPA-2	6.04

[1] Measured at the time of sample collection.

ENERGY RESOURCES CO. INC

INORGANIC ANALYSIS

- Report Sheet -
- µg/l

Analyzed for: Geraghty & Miller
Sediments - waters

ERCO ID	CLIENT ID	As
IC-82-		
	Waters	µg/l
576	WPA-1	<10
577	WPA-2	<10
577 ERCO	DUPLICATE	<10

If customer has any questions regarding analysis, refer to sample in question by its ERCO ID#.

Sample Rcvd. 2/17/82 Reported by Lab

Date Analysis Completed 3/16/82 Checked by [illegible]

ENERGY RESOURCES CO. INC

INORGANIC ANALYSIS

- Report Sheet -
µg/gm dry wgt.

Analyzed for: Geraghty & Miller
Sediments

ERCO ID	CLIENT ID	As
IC-82		
554	PA-1	6.3
555	PA-2	2.8
556	PA-3	3.9
556	ERCO DUPLICATE	3.0
557	PA-4	1.1
558	PA-5	2.9
559	PA-6	4.2
560	PA-7	5.7
561	PA-8	4.8

If customer has any questions regarding analysis, refer to sample in question by its ERCO ID#.

Sample Rcvd. 2/17/82 Reported by Lau

Date Analysis Completed 3/16/82 Checked by NGL

ENERGY RESOURCES CO. INC.

HERBICIDE ANALYSES

ERCO ID	G&M ID	2,4-D (µg/l) Det. Limit	2,4-D (µg/l) Conc.	2,4,5-TP (µg/l) Det. Limit	2,4,5-TP (µg/l) Conc.
28-552	WPA-1	0.05	ND	0.02	ND
28-553	WPA-2	0.05	ND	0.02	ND
28-554	PA-1	5.0	ND	1.5	ND
28-555	PA-2	5.0	ND	1.5	ND
28-556	PA-3	5.0	ND	1.5	ND
28-557	PA-4	5.0	ND	1.5	ND
28-558	PA-5	5.0	ND	1.5	ND
28-559	Soil Blank	5.0	ND	1.5	ND
28-560	PA-7	5.0	ND	1.5	ND
28-561	PA-8	5.0	ND	1.5	ND
28-562	PA-9	5.0	ND	1.5	ND

ND = none detected

Reported by: George Perry

Checked by: DW

[redacted] ENE[redacted] RESO[redacted] CON[redacted] INC[redacted] S[redacted] Rc[redacted]2/1[redacted]

Date Analysis Completed: 3/25/82

Analyzed for:

Compounds	Client ID	WPA-1	WPA-2	PA-1	PA-2	PA-3	PA-4	PA-5	blank	PA-6	PA-7	PA-8
		28-552	28-553	28-554	28-555	28-556	28-557	28-558	28-559	28-560	28-561	28-561
1. 89P	aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2. 90P	dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3. 91P	chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4. 92P	4,4'-DDT	ND	ND	100	40	880	7	6	ND	20	200	4
5. 93P	4,4'-DDE	ND	ND	230	40	350	4	7	ND	15	250	3
6. 94P	4,4'-DDD	ND	ND	11	7	150	ND	ND	ND	1	18	ND
7. 95P	α-endosulfan	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
8. 96P	β-endosulfan	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9. 97P	endosulfan sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
10. 98P	endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11. 99P	endrin aldehyde	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
12. 100P	heptachlor	ND	ND	ND	ND	2	ND	ND	ND	ND	1.0	ND
13. 101P	heptachlor epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
14. 102P	α-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
15. 103P	β-BHC	ND	ND	ND	ND	1	ND	ND	ND	ND	1	ND
16. 104P	γ-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
17. 105P	δ-BHC	ND	ND	ND	ND	2	ND	ND	ND	ND	1	ND
18. 106P	PCB-1242	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
19. 107P	PCB-1254	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
20. 108P	PCB-1221	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
21. 109P	PCB-1232	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
22. 110P	PCB-1248	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
23. 111P	PCB-1260	ND	ND	39	ND	100	2	2	ND	7	36	1
24. 112P	PCB-1016	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
25. 113P	toxaphene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

*-1-9 ng/l

All results in µg/l (ppb) or ng/gm

Reported by: [illegible]

Checked by: [illegible]

ENVIRONMENTAL
SCIENCE
CORPORATION

P.O. BOX 616
NUT STREET • MIDDLETOWN, CONN. 06457
TELEPHONE: 347-6961

Laboratory Report

LAB. REPORT NO.
C-0440

State Certification No. PH-0476

CLIENT

Commanding Officer
Southern Division
Naval Facilities Command
2144 Melbourne Street
P.O. Box 10068
Charleston, S.C. 29411

DATE May 17, 1982

CLIENT PHONE NO (803) 743-5510

SPECIAL INSTRUCTIONS

0004

SAMPLE DESCRIPTION	TEST	RESULTS	
Pesticide Mixing Area 2" Sample #1	D,P DDT	5.3	µg/ml (ppm)
	P,P DDT	<0.01	µg/gr (ppm)
	DDT total	5.3	µg/ml
	2,4 D	<0.01	µg/gr (ppm)
	2,4,5 TP (Silvex)	0.51	µg/gr (ppm)
Pesticide Mixing Area 2" Sample #2	D,D DDT	0.08	µg/gr
	P,P DDT	1.4	µg/gr
	Total DDT	1.48	µg/gr (ppm)
	2,4 D	0.09	µg/gr (ppm)
	2,4,5 TP (Silvex)	<0.01	µg/gr (ppm)

ANALYSES OF SOIL SAMPLES COLLECTED BY NAVAL PERSONNEL, May 1982.

REMARKS

June 15, 1982
DATE REPORTED

LABORATORY DIRECTOR

APPENDIX F

Public Works Storage Yard - Analytical Data

(Source: Reference 3, 5, 7)

GENERAL ENGINEERING LABORATORIES
1313 Ashley River Road
Charleston, S.C. 29407
P.O. Box 30712
Charleston, S.C. 29417
Phone (803) 556-8171

Engineering Consulting
Chemical Analysis

Laboratory Certification Number 10120

CLIENT: ANDERSON EXCAVATING & WRECKING CO.
1824 SO. 20th STREET
OMAHA , NE 68106
CONTACT: MR. LANNY L. LEVELL

DATE: 02/27/87
RELEASED BY: G.M. Grow
for GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC1

PARAMETER	SAMPLE ID : AREA 4 ST-2+50 25' WEST LAB ID : 87020965 DATE RECEIVED: 02/25/87
BARIUM	38.1 ppm
CADMIUM	2.15 ppm
CHROMIUM	25.0 ppm
LEAD	149 ppm
ACID DIGESTION	YES
CRESOL	<1.0 ppm
PENTACHLOROPHENOL	<1.0 ppm
AROCLOR 1016	<1 ppm
AROCLOR 1221	<1 ppm
AROCLOR 1232	<1 ppm
AROCLOR 1242	<1 ppm
AROCLOR 1248	<1 ppm
AROCLOR 1254	<1 ppm
AROCLOR 1260	<1 ppm
AROCLOR 1262	<1 ppm
EXTRACTION & CONCENTRATION	YES

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1313 Ashley River Road
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P.O. Box 30712
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Chemical Analysis

Laboratory Certification Number 10120

CLIENT: ANDERSON EXCAVATING & WRECKING CO.
1824 SO. 20th STREET
OMAHA , NE 68106
CONTACT: MR. LANNY L. LEVELL

DATE: 03/03/87

RELEASED BY: G M Greene
for GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC2

	SAMPLE ID :	C-3 A	C-3 B	C-3 C	C-3 D
	LAB ID :	87030026	87030027	87030028	87030029
PARAMETER	DATE RECEIVED:	03/02/87	03/02/87	03/02/87	03/02/87
CADMIUM		0.71 ppm	0.20 ppm	0.89 ppm	<0.20 ppm
LEAD		199 ppm	648 ppm	215 ppm	112 ppm
ACID DIGESTION		YES	YES	YES	YES

GENERAL ENGINEERING LABORATORIES
1313 Ashley River Road
Charleston, S.C. 29407
P.O. Box 30712
Charleston, S.C. 29417
Phone (803) 556-8171

Engineering Consulting
Chemical Analysis

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1824 SO. 20th STREET
OMAHA , NE 68106
CONTACT: MR. LANNY L. LEVELL

DATE: 03/03/87
RELEASED BY: for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC2

PARAMETER	SAMPLE ID :	C-3 E	C-3 F	C-3 G	SITE 250 A
	LAB ID :	87030030	87030031	87030032	87030033
	DATE RECEIVED:	03/02/87	03/02/87	03/02/87	03/02/87
CADMIUM					1.30 ppm
LEAD		686 ppm	103 ppm	76.2 ppm	126 ppm
ACID DIGESTION		YES	YES	YES	YES

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RELEASED BY: G.M. Greene
: GEORGE G. GREENE PE,PHD

CC/FC: AEWC/AEWC2

	SAMPLE ID :	SITE 250 B	SITE 250 C	SITE 250 D	SITE 250 E
	LAB ID :	87030034	87030035	87030036	87030037
PARAMETER	DATE RECEIVED:	03/02/87	03/02/87	03/02/87	03/02/87
CADMIUM		1.18 ppm	3.70 ppm	1.32 ppm	<0.20 ppm
LEAD		61.0 ppm	254 ppm	66.4 ppm	<1.00 ppm
ACID DIGESTION		YES	YES	YES	YES

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OMAHA , NE 68106
CONTACT: MR. LANNY L. LEVELL

DATE: 03/03/87

RELEASED BY: AM Grove
for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC1

	SAMPLE ID :	ST. 200 A	ST. 200 B	ST. 200 C	ST. 200 D
	LAB ID :	87030038	87030039	87030040	87030041
PARAMETER	DATE RECEIVED:	03/02/87	03/02/87	03/02/87	03/02/87
CADMIUM		0.38 ppm	1.11 ppm	2.28 ppm	0.35 ppm
ACID DIGESTION		YES	YES	YES	YES

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CONTACT: MR. LANNY L. LEVELL

DATE: 03/03/87
RELEASED BY: G.M.Greene
for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC2

PARAMETER	SAMPLE ID	ST. 200 E	ST. 240 A	ST. 240 B	ST. 240 C
	LAB ID	87030042	87030043	87030044	87030045
	DATE RECEIVED	03/02/87	03/02/87	03/02/87	03/02/87
CADMIUM		0.96 ppm			
CHROMIUM			26.5 ppm	27.4 ppm	13.4 ppm
ACID DIGESTION		YES	YES	YES	YES

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DATE: 03/03/87

RELEASED BY: for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC2

PARAMETER	SAMPLE ID :	ST. 240 D	ST. 240 E
	LAB ID :	87030046	87030047
	DATE RECEIVED:	03/02/87	03/02/87
CHROMIUM		22.2 ppm	12.6 ppm
ACID DIGESTION		YES	YES

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CONTACT: MR. LANNY L. LEVELL

DATE: 03/04/87
RELEASED BY: for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC2

PARAMETER	SAMPLE ID :	B-2 A	B-2 B	B-2 C	B-2 D
	LAB ID :	87030048	87030049	87030050	87030051
	DATE RECEIVED:	03/03/87	03/03/87	03/03/87	03/03/87
BARIUM		13.2 ppm	43.0 ppm		
CADMIUM		0.38 ppm	2.96 ppm		
CHROMIUM		3.58 ppm	10.6 ppm		
LEAD		85.8 ppm	119 ppm	120 ppm	120 ppm
ACID DIGESTION		YES	YES	YES	YES

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OMAHA , NE 68106
CONTACT: MR. LANNY L. LEVELL

DATE: 03/04/87

RELEASED BY: A.M. Greene
for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC2

	SAMPLE ID :	B-2 E	B-2 F	B-2 G
	LAB ID :	87030052	87030053	87030054
PARAMETER	DATE RECEIVED:	03/03/87	03/03/87	03/03/87
LEAD		16.9 ppm	19.0 ppm	73.1 ppm
ACID DIGESTION		YES	YES	YES

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OMAHA , NE 68106
CONTACT: MR. LANNY L. LEVELL

DATE: 03/05/87
RELEASED BY: A M Greene
for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC3

PARAMETER	SAMPLE ID	B-2 A	B-2 B	B-2 C	B-2 D
		03/04/87	03/04/87	03/04/87	03/04/87
	LAB ID	87030156	87030157	87030158	87030159
	DATE RECEIVED	03/04/87	03/04/87	03/04/87	03/04/87
CADMIUM		1.20 ppm	0.36 ppm	0.38 ppm	0.20 ppm
ACID DIGESTION		YES	YES	YES	YES

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1824 SO. 20th STREET
OMAHA , NE 68106
CONTACT: MR. LANNY L. LEVELL

DATE: 03/05/87

RELEASED BY: A M Crane
for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC3

PARAMETER	SAMPLE ID :	B-2 E	ST. 200 A	ST. 200 B	ST. 200 C
		03/04/87	03/04/87	03/04/87	03/04/87
	LAB ID :	87030160	87030161	87030162	87030163
	DATE RECEIVED:	03/04/87	03/04/87	03/04/87	03/04/87
CADMIUM		0.98 ppm	2.00 ppm	1.37 ppm	1.11 ppm
ACID DIGESTION		YES	YES	YES	YES

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CONTACT: MR. LANNY L. LEVELL

DATE: 03/05/87
RELEASED BY: G M Greene
for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC3

PARAMETER	SAMPLE ID : ST. 200 E 03/04/87 LAB ID : 87030164 DATE RECEIVED: 03/04/87
CADMIUM	0.34 ppm
ACID DIGESTION	YES

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CONTACT: MR. LANNY L. LEVELL

DATE: 03/05/87

RELEASED BY: G.M. Greene
GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC2

PARAMETER	SAMPLE ID : DATE RECEIVED:	ST. 240 A 03/04/87	ST. 240 B 03/04/87	ST. 240 C 03/04/87	ST. 240 D 03/04/87
	LAB ID :	87030165	87030166	87030167	87030168
CHROMIUM		6.08 ppm	<1.00 ppm	2.67 ppm	20.9 ppm
ACID DIGESTION		YES	YES	YES	YES

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OMAHA , NE 68106
CONTACT: MR. LANNY L. LEVELL

DATE: 03/05/87
RELEASED BY: A.M. Greene
for: GEORGE G. GREENE PE,PHD

CC/FC: AEWC/AEWC2

PARAMETER	SAMPLE ID :	ST. 250 A	ST. 250 B	ST. 250 C	ST. 250 D
		03/04/87	03/04/87	03/04/87	03/04/87
	LAB ID :	87030169	87030170	87030171	87030172
	DATE RECEIVED:	03/04/87	03/04/87	03/04/87	03/04/87
CADMIUM		0.94 ppm	0.96 ppm	1.37 ppm	0.98 ppm
LEAD				37.8 ppm	48.4 ppm
ACID DIGESTION		YES	YES	YES	YES

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DATE: 03/05/87
RELEASED BY: for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC2

	SAMPLE ID :	ST. 250 E 03/04/87
	LAB ID :	87030173
PARAMETER	DATE RECEIVED:	03/04/87
CADMIUM		1.18 ppm
ACID DIGESTION		YES

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OMAHA , NE 68106
CONTACT: MR. LANNY L. LEVELL

DATE: 03/05/87
RELEASED BY: G.M. Greene
for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC3

PARAMETER	SAMPLE ID :	C-3 A	C-3 B	C-3 C	C-3 D
		03/04/87	03/04/87	03/04/87	03/04/87
	LAB ID :	87030174	87030175	87030176	87030177
	DATE RECEIVED:	03/04/87	03/04/87	03/04/87	03/04/87
LEAD		278 ppm	33.9 ppm	80.4 ppm	295 ppm
ACID DIGESTION		YES	YES	YES	YES

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1824 SO. 20th STREET
OMAHA , NE 68106
CONTACT: MR. LANNY L. LEVELL

DATE: 03/06/87

RELEASED BY: A.M. Crane
for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC3

	SAMPLE ID :	C-3 A 30" 15'W 5'N	C-3 B 30" 20'W.	C-3 C 30" 15'W 5'S	C-3 D 30" 15'S 5'W
	LAB ID :	87030240	87030241	87030242	87030243
PARAMETER	DATE RECEIVED:	03/06/87	03/06/87	03/06/87	03/06/87
LEAD		38.2 ppm	27.6 ppm	44.3 ppm	72.4 ppm
ACID DIGESTION		YES	YES	YES	YES

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DATE: 03/06/87

RELEASED BY: G.M. Greene
for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC3

	SAMPLE ID :	C-3 E 30" 15'S 5'E	C-3 F 30" 20'S 5'E	ST. 250 A 25'W 15'SE 30"	ST. 250 B 25'W 5'W OF A 30"
	LAB ID :	87030244	87030245	87030246	87030247
PARAMETER	DATE RECEIVED:	03/06/87	03/06/87	03/06/87	03/06/87
CADMIUM				0.53 ppm	1.00 ppm
LEAD		34.2 ppm	28.7 ppm		
ACID DIGESTION		YES	YES	YES	YES

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OMAHA , NE 68106
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DATE: 03/06/87

RELEASED BY: A.M. Greene
for GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC3

	SAMPLE ID :	ST. 250 C 25'W 5'N 30"	ST. 250 D 56'E 10'N 18"	ST. 250 E 61'E 5'N 18"	ST. 250 F 56'E 30"
	LAB ID :	87030248	87030249	87030250	87030251
PARAMETER	DATE RECEIVED:	03/06/87	03/06/87	03/06/87	03/06/87
CADMIUM		0.78 ppm	1.07 ppm	1.18 ppm	3.33 ppm
ACID DIGESTION		YES	YES	YES	YES

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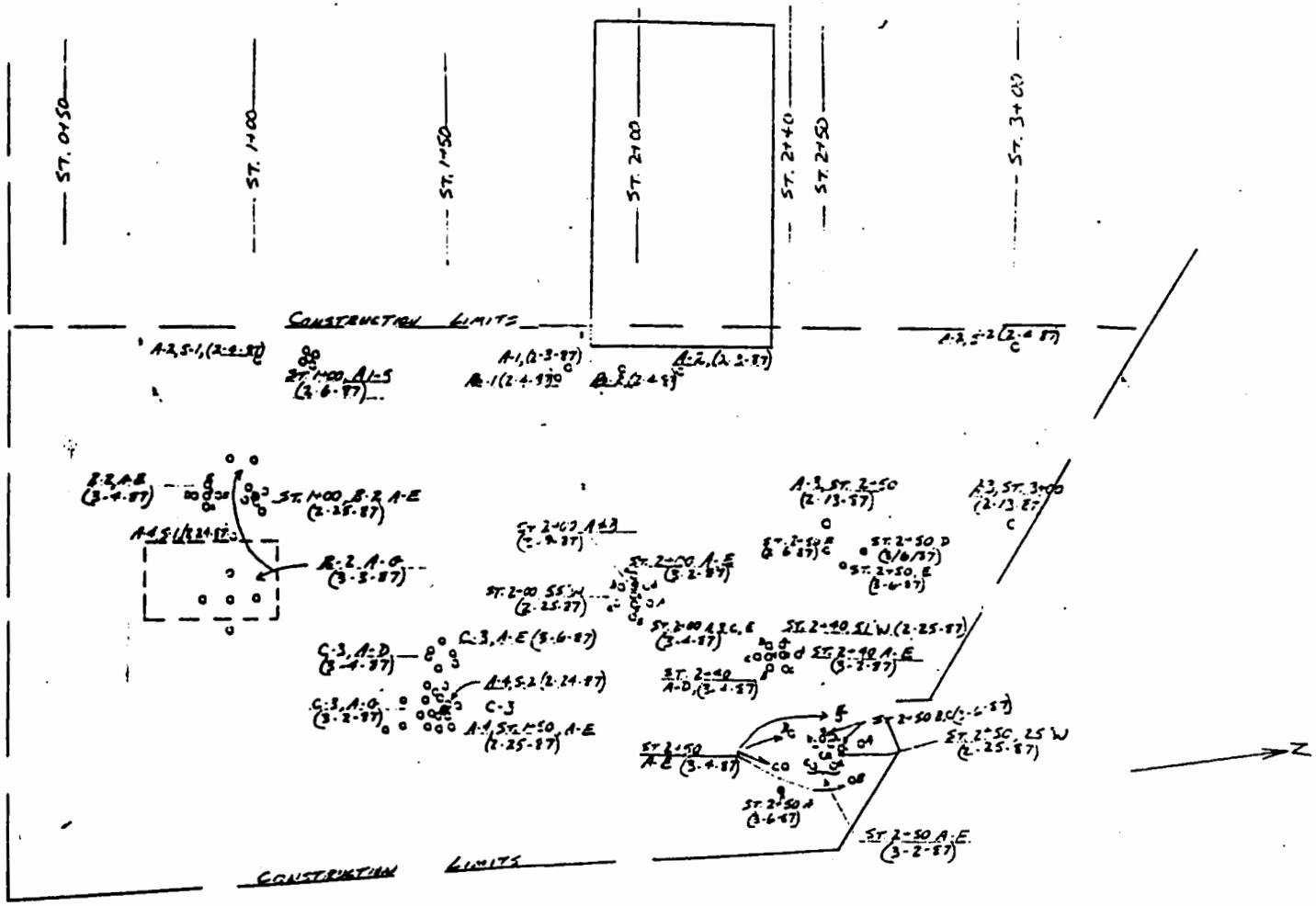
OMAHA , NE 68106
CONTACT: MR. LANNY L. LEVELL

DATE: 03/10/87

RELEASED BY: A.M. Crawl
for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC2

PARAMETER			
	SAMPLE ID :	ST. 200 A	ST. 200 B
		03/09/87	03/09/87
	LAB ID :	87030289	87030290
	DATE RECEIVED:	03/09/87	03/09/87
CADMIUM		0.59 ppm	<0.20 ppm
ACID DIGESTION		YES	YES



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engineering consulting & chemical analysis
1313 Ashley River Rd.
Charleston, S.C. 29407
(803) 556-8171

DRAWN BY	CHECKED BY	CLIENT CODE	DATE
ALPRIANT			

REV NO	DATE	CHECKED BY

PROJECT SAMPLE SITE
HAZARDOUS WASTE STORAGE YARD
CHARLESTON NAVAL SHIPYARD

DRAWING NO 1

APPENDIX F-1

Particial Closure Completed 1986

Cold Storage Warehouse (Building #193)

GENERAL ENGINEERING LABORATORIES
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OMAHA , NE 68106
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DATE: 02/06/87
RELEASED BY: A.M. Crane
for GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC1

PARAMETER	SAMPLE ID :	A-1	A-2
	LAB ID :	87020117	87020118
	DATE RECEIVED:	02/03/87	02/03/87
BARIUM		34.8 ppm	23.6 ppm
CADMIUM		0.38 ppm	0.20 ppm
CHROMIUM		6.73 ppm	9.33 ppm
LEAD		15.6 ppm	19.6 ppm
ACID DIGESTION		YES	YES
CRESOL		<1.0 ppm	<1.0 ppm
PENTACHLOROPHENOL		<1.0 ppm	<1.0 ppm
AROCLOR 1016		<1 ppm	<1 ppm
AROCLOR 1221		<1 ppm	<1 ppm
AROCLOR 1232		<1 ppm	<1 ppm
AROCLOR 1242		<1 ppm	<1 ppm
AROCLOR 1248		<1 ppm	<1 ppm
AROCLOR 1254		<1 ppm	<1 ppm
AROCLOR 1260		<1 ppm	<1 ppm
AROCLOR 1262		<1 ppm	<1 ppm
EXTRACTION & CONCENTRATION		YES	YES

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DATE: 02/06/87

RELEASED BY: G.M. Greene
Dr. GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC1

PARAMETER	SAMPLE ID :	AREA 2 SAMPLE #1	AREA 2 SAMPLE #2
	LAB ID :	87020163	87020164
	DATE RECEIVED:	02/04/87	02/04/87
BARIUM		16.0 ppm	17.4 ppm
CADMIUM		0.40 ppm	0.79 ppm
CHROMIUM		24.5 ppm	18.7 ppm
LEAD		483 ppm	50.6 ppm
ACID DIGESTION		YES	YES
CRESOL		<1.0 ppm	<1.0 ppm
PENTACHLOROPHENOL		<1.0 ppm	<1.0 ppm
AROCLOR 1016		<1 ppm	<1 ppm
AROCLOR 1221		<1 ppm	<1 ppm
AROCLOR 1232		<1 ppm	<1 ppm
AROCLOR 1242		<1 ppm	<1 ppm
AROCLOR 1248		<1 ppm	<1 ppm
AROCLOR 1254		<1 ppm	<1 ppm
AROCLOR 1260		<1 ppm	<1 ppm
AROCLOR 1262		<1 ppm	<1 ppm
EXTRACTION & CONCENTRATION		YES	YES

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RELEASED BY: G.M. Greene
Dr. GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC1

PARAMETER	SAMPLE ID :	AREA 2 SAMPLE #1	AREA 2 SAMPLE #2
	LAB ID :	87020163	87020164
	DATE RECEIVED:	02/04/87	02/04/87
BARIUM		16.0 ppm	17.4 ppm
CADMIUM		0.40 ppm	0.79 ppm
CHROMIUM		24.5 ppm	18.7 ppm
LEAD		483 ppm	50.6 ppm
ACID DIGESTION		YES	YES
CRESOL		<1.0 ppm	<1.0 ppm
PENTACHLOROPHENOL		<1.0 ppm	<1.0 ppm
AROCLOR 1016		<1 ppm	<1 ppm
AROCLOR 1221		<1 ppm	<1 ppm
AROCLOR 1232		<1 ppm	<1 ppm
AROCLOR 1242		<1 ppm	<1 ppm
AROCLOR 1248		<1 ppm	<1 ppm
AROCLOR 1254		<1 ppm	<1 ppm
AROCLOR 1260		<1 ppm	<1 ppm
AROCLOR 1262		<1 ppm	<1 ppm
EXTRACTION & CONCENTRATION		YES	YES

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CONTACT: MR. LANNY L. LEVELL

DATE: 02/09/87
RELEASED BY: A.M. Greene
for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC1

PARAMETER	SAMPLE ID :	STA. 100 AREA 1 6"	STA. 100 AREA 2 6"	STA. 100 AREA 3 6"	STA. 100 AREA 4 6"
	LAB ID :	87020240	87020241	87020242	87020243
	DATE RECEIVED:	02/06/87	02/06/87	02/06/87	02/06/87
BARIUM		22.9 ppm	48.6 ppm	14.9 ppm	9.80 ppm
CADMIUM		<0.20 ppm	<0.20 ppm	0.53 ppm	<0.20 ppm
CHROMIUM		8.44 ppm	3.33 ppm	3.36 ppm	4.67 ppm
LEAD		26.2 ppm	50.2 ppm	28.5 ppm	21.6 ppm
ACID DIGESTION		YES	YES	YES	YES
CRESOL		<1.0 ppm	<1.0 ppm	<1.0 ppm	<1.0 ppm
PENTACHLOROPHENOL		<1.0 ppm	<1.0 ppm	<1.0 ppm	<1.0 ppm
AROCLOR 1016		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1221		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1232		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1242		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1248		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1254		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1260		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1262		<1 ppm	<1 ppm	<1 ppm	<1 ppm
EXTRACTION & CONCENTRATION		YES	YES	YES	YES

GENERAL ENGINEERING LABORATORIES
1313 Ashley River Road
Charleston, S.C. 29407
P.O. Box 30712
Charleston, S.C. 29417
Phone (803) 556-8171

Engineering Consulting
Chemical Analysis

Laboratory Certification Number 10120

CLIENT: ANDERSON EXCAVATING & WRECKING CO.
1824 SO. 20th STREET
OMAHA , NE 68106
CONTACT: MR. LANNY L. LEVELL

DATE: 02/09/87
RELEASED BY: for: GEORGE E. GREENE PE,PHD

CC/FC: AEWC/AEWC1

PARAMETER	SAMPLE ID : STA. 100 AREA 5 18"	LAB ID : 87020244 DATE RECEIVED: 02/06/87
BARIUM		21.9 ppm
CADMIUM		0.27 ppm
CHROMIUM		8.04 ppm
LEAD		40.2 ppm
ACID DIGESTION		YES
CRESOL		<1.0 ppm
PENTACHLOROPHENOL		<1.0 ppm
AROCLOR 1016		<1 ppm
AROCLOR 1221		<1 ppm
AROCLOR 1232		<1 ppm
AROCLOR 1242		<1 ppm
AROCLOR 1248		<1 ppm
AROCLOR 1254		<1 ppm
AROCLOR 1260		<1 ppm
AROCLOR 1262		<1 ppm
EXTRACTION & CONCENTRATION		YES

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Engineering Consulting
Chemical Analysis

Laboratory Certification Number 10120

CLIENT: ANDERSON EXCAVATING & WRECKING CO.
1824 SO. 20th STREET
OMAHA , NE 68106

DATE: 02/13/87

CONTACT: MR. LANNY L. LEVELL

RELEASED BY: W. Bryan [illegible] for GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC1

PARAMETER	SAMPLE ID :	AREA 3 ST-2+50 50' EAST	AREA 3 ST-3+00 50' EAST
	LAB ID :	87020481	87020482
	DATE RECEIVED:	02/13/87	02/13/87
BARIUM		20.0 ppm	16.3 ppm
CADMIUM		0.73 ppm	1.17 ppm
CHROMIUM		14.0 ppm	17.8 ppm
LEAD		66.9 ppm	36.0 ppm
ACID DIGESTION		YES	YES
CRESOL		<1.0 ppm	<1.0 ppm
PENTACHLOROPHENOL		<1.0 ppm	<1.0 ppm
AROCLOR 1016		<1 ppm	<1 ppm
AROCLOR 1221		<1 ppm	<1 ppm
AROCLOR 1232		<1 ppm	<1 ppm
AROCLOR 1242		<1 ppm	<1 ppm
AROCLOR 1248		<1 ppm	<1 ppm
AROCLOR 1254		<1 ppm	<1 ppm
AROCLOR 1260		<1 ppm	<1 ppm
AROCLOR 1262		<1 ppm	<1 ppm
EXTRACTION & CONCENTRATION		YES	YES

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Chemical Analysis

Laboratory Certification Number 10120

CLIENT: ANDERSON EXCAVATING & WRECKING CO.
1824 SO. 20th STREET
OMAHA , NE 68106
CONTACT: MR. LANNY L. LEVELL

DATE: 02/25/87
RELEASED BY: A.M. Crow
for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC1

PARAMETER	SAMPLE ID :	AREA 4 SAMPLE 1	AREA 4 SAMPLE 2
	LAB ID :	87020824	87020825
	DATE RECEIVED:	02/24/87	02/24/87
BARIUM		18.9 ppm	7.17 ppm
CADMIUM		0.72 ppm	0.54 ppm
CHROMIUM		32.0 ppm	26.0 ppm
LEAD		304 ppm	168 ppm
CRESOL		<1.0 ppm	<1.0 ppm
PENTACHLOROPHENOL		<1.0 ppm	<1.0 ppm
AROCLOR 1016		<1 ppm	<1 ppm
AROCLOR 1221		<1 ppm	<1 ppm
AROCLOR 1232		<1 ppm	<1 ppm
AROCLOR 1242		<1 ppm	<1 ppm
AROCLOR 1248		<1 ppm	<1 ppm
AROCLOR 1254		<1 ppm	<1 ppm
AROCLOR 1260		<1 ppm	<1 ppm
AROCLOR 1262		<1 ppm	<1 ppm
EXTRACTION & CONCENTRATION		YES	YES

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Engineering Consulting
Chemical Analysis

Laboratory Certification Number 10120

CLIENT: ANDERSON EXCAVATING & WRECKING CO.
1824 SO. 20th STREET
OMAHA , NE 68106
CONTACT: MR. LANNY L. LEVELL

DATE: 02/27/87
RELEASED BY: G.M. Greene
for: GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC1

PARAMETER	SAMPLE ID :	AREA 4 ST-1+50 C-3-A 18"	AREA 4 ST-1+50 C-3-B 6"	AREA 4 ST-1+50 C-3-C 6"	AREA 4 ST-1+50 C-3-D 6"
	LAB ID :	87020953	87020954	87020955	87020956
	DATE RECEIVED:	02/25/87	02/25/87	02/25/87	02/25/87
BARIUM		23.3 ppm	13.9 ppm	14.5 ppm	23.9 ppm
CADMIUM		1.18 ppm	0.44 ppm	0.21 ppm	3.35 ppm
CHROMIUM		18.8 ppm	19.1 ppm	<1.00 ppm	21.4 ppm
LEAD		49.6 ppm	134 ppm	159 ppm	537 ppm
ACID DIGESTION		YES	YES	YES	YES
CRESOL		<1.0 ppm	<1.0 ppm	<1.0 ppm	<1.0 ppm
PENTACHLOROPHENOL		<1.0 ppm	<1.0 ppm	<1.0 ppm	<1.0 ppm
AROCLOR 1016		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1221		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1232		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1242		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1248		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1254		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1260		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1262		<1 ppm	<1 ppm	<1 ppm	<1 ppm
EXTRACTION & CONCENTRATION		YES	YES	YES	YES

Engineering Consulting
Chemical Analysis

GENERAL ENGINEERING LABORATORIES
1313 Ashley River Road
Charleston, S.C. 29407

P.O. Box 30712
Charleston, S.C. 29417
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Laboratory Certification Number 10120

CLIENT: ANDERSON EXCAVATING & WRECKING CO.
1824 SO. 20th STREET
OMAHA , NE 68106

DATE: 02/27/87

CONTACT: MR. LANNY L. LEVELL

RELEASED BY: A.M. Crane
for GEORGE C. GREENE PE,PHD

CC/FC: AEWC/AEWC1

PARAMETER	SAMPLE ID :	AREA 4 ST-1+50 C-3-E 6"	AREA 4 ST-1+00 B-2-A 18"	AREA 4 ST-1+00 B-2-B 6"	AREA 4 ST-1+00 B-2-C 6"
	LAB ID :	87020957	87020958	87020959	87020960
	DATE RECEIVED:	02/25/87	02/25/87	02/25/87	02/25/87
BARIUM		8.46 ppm	49.4 ppm	15.4 ppm	64.9 ppm
CADMIUM		0.35 ppm	1.07 ppm	0.74 ppm	0.87 ppm
CHROMIUM		17.3 ppm	24.5 ppm	24.7 ppm	27.7 ppm
LEAD		128 ppm	374 ppm	123 ppm	172 ppm
ACID DIGESTION		YES	YES	YES	YES
CRESOL		<1.0 ppm	<1.0 ppm	<1.0 ppm	<1.0 ppm
PENTACHLOROPHENOL		<1.0 ppm	<1.0 ppm	<1.0 ppm	<1.0 ppm
AROCLOR 1016		<1 ppm	< 1 ppm	<1 ppm	<1 ppm
AROCLOR 1221		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1232		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1242		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1248		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1254		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1260		<1 ppm	<1 ppm	<1 ppm	<1 ppm
AROCLOR 1262		<1 ppm	<1 ppm	<1 ppm	<1 ppm
EXTRACTION & CONCENTRATION		YES	YES	YES	YES

ENERGY RESOURCES CO. INC.
SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS

IENT Geraghty & Miller

IENT I.D. SLF-2

CO I.D. 13-1255

DATE SAMPLE RECEIVED 2/17/82

DATE ANALYSIS COMPLETED 3/1/82

	ACID COMPOUNDS	ug/l
A	2,4,6-trichlorophenol	ND
A	p-chloro-m-cresol	ND
A	2-chlorophenol	ND
A	2,4-dichlorophenol	ND
A	2,4-dimethylphenol	ND
A	2-nitrophenol	ND
A	4-nitrophenol	ND
A	2,4-dinitrophenol	ND
A	4,6-dinitro-o-cresol	ND
A	pentachlorophenol	ND
A	phenol	ND

	BASE/NEUTRAL COMPOUNDS	
	acenaphthene	ND
	benzidine	ND
	1,2,4-trichlorobenzene	ND
	hexachlorobenzene	ND
B	hexachloroethane	ND
B	bis(2-chloroethyl)ether	ND
B	2-chloronaphthalene	ND
B	1,2-dichlorobenzene	ND
B	1,3-dichlorobenzene	ND
B	1,4-dichlorobenzene	*
B	3,3-dichlorobenzidine	ND
B	2,4-dinitrotoluene	*
B	2,6-dinitrotoluene	ND
B	1,2-diphenylhydrazine	ND
B	fluoranthene	ND
B	4-chlorophenyl phenyl ether	ND

	BASE NEUTRAL COMPOUNDS	ug/l
41B	4-bromophenyl phenyl ether	ND
42B	bis(2-chloroisopropyl)ether	ND
43B	bis(2-chloroethoxy)methane	ND
52B	hexachlorobutadiene	ND
53B	hexachlorocyclopentadiene	ND
54B	isophorone	ND
55B	naphthalene	ND
56B	nitrobenzene	ND
61B	N-nitrosodimethylamine	ND
62B	N-nitrosodiphenylamine	ND
63B	N-nitrosodi-n-propylamine	ND
66B	bis(2-ethylhexyl)phthalate	*
67B	butyl benzyl phthalate	ND
68B	di-n-butyl phthalate	ND
69B	di-n-octyl phthalate	ND
70B	diethyl phthalate	*
71B	dimethyl phthalate	ND
72B	benzo(a)anthracene	ND
73B	benzo(a)pyrene	ND
74B	3,4-benzofluoranthene	ND
75B	benzo(k)fluoranthene	ND
76B	chrysene	ND
77B	acenaphthylene	ND
78B	anthracene	ND
79B	benzo(ghi)perylene	ND
80B	fluorene	ND
81B	phenanthrene	ND
82B	dibenzo(a,h)anthracene	ND
83B	indeno(1,2,3-cd)pyrene	ND
84B	pyrene	ND
129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

ND = Not detected
NA = Not applicable
* = 1-9 ug/l

Reported by: [illegible]

Checked by: C. Ladgen

ENERGY RESOURCES CO. INC.
SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS

ıENT Geraghty & Miller

IENT I.D. LF-1

CO I.D. 13-1256

DATE SAMPLE RECEIVED 2/17/82

DATE ANALYSIS COMPLETED 3/1/82

	ACID COMPOUNDS	ug/l
4	2,4,6-trichlorophenol	ND
4	p-chloro-m-cresol	ND
4	2-chlorophenol	ND
.	2,4-dichlorophenol	ND
4	2,4-dimethylphenol	ND
4	2-nitrophenol	ND
4	4-nitrophenol	ND
'	2,4-dinitrophenol	ND
4	4,6-dinitro-o-cresol	ND
4	pentachlorophenol	ND
4	phenol	ND

	BASE/NEUTRAL COMPOUNDS	
	acenaphthene	ND
	benzidine	ND
	1,2,4-trichlorobenzene	ND
	hexachlorobenzene	ND
;	hexachloroethane	ND
;	bis(2-chloroethyl)ether	ND
;	2-chloronaphthalene	ND
,	1,2-dichlorobenzene	ND
;	1,3-dichlorobenzene	ND
.	1,4-dichlorobenzene	ND
.	3,3-dichlorobenzidine	ND
	2,4-dinitrotoluene	ND
	2,6-dinitrotoluene	ND
.	1,2-diphenylhydrazine	ND
	fluoranthene	ND
	4-chlorophenyl phenyl ether	ND

ND = Not detected
NA = Not applicable
* = 1-9 ug/l

	BASE NEUTRAL COMPOUNDS	ug/
418	4-bromophenyl phenyl ether	ND
428	bis(2-chloroisopropyl)ether	ND
438	bis(2-chloroethoxy)methane	ND
528	hexachlorobutadiene	ND
538	hexachlorocyclopentadiene	ND
548	isophorone	ND
558	naphthalene	ND
568	nitrobenzene	ND
618	N-nitrosodimethylamine	ND
628	N-nitrosodiphenylamine	*
638	N-nitrosodi-n-propylamine	ND
668	bis(2-ethylhexyl)phthalate	
678	butyl benzyl phthalate	ND
688	di-n-butyl phthalate	*
698	di-n-octyl phthalate	ND
708	diethyl phthalate	*
718	dimethyl phthalate	ND
728	benzo(a)anthracene	ND
738	benzo(a)pyrene	ND
748	3,4-benzofluoranthene	ND
758	benzo(k)fluoranthene	ND
768	chrysene	ND
778	acenaphthylene	ND
788	anthracene	ND
798	benzo(ghi)perylene	ND
808	fluorene	ND
818	phenanthrene	ND
828	dibenzo(a,h)anthracene	ND
838	indeno(1,2,3-cd)pyrene	ND
848	pyrene	ND
1298	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

Reported by: [illegible]

Checked by: C. Podgers

ENERGY RESOURCES CO. INC.
SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS

CLIENT Geraghty & Miller

CLIENT I.D. LF-3

LAB I.D. 13-1257

DATE SAMPLE RECEIVED 2/17/82

DATE ANALYSIS COMPLETED 3/1/82

ACID COMPOUNDS	µg/l
2,4,6-trichlorophenol	ND
p-chloro-m-cresol	ND
2-chlorophenol	ND
2,4-dichlorophenol	ND
2,4-dimethylphenol	ND
2-nitrophenol	ND
4-nitrophenol	ND
2,4-dinitrophenol	ND
4,6-dinitro-o-cresol	ND
pentachlorophenol	ND
phenol	ND

BASE/NEUTRAL COMPOUNDS	
acenaphthene	ND
benzidine	ND
1,2,4-trichlorobenzene	ND
hexachlorobenzene	ND
hexachloroethane	ND
bis(2-chloroethyl)ether	ND
2-chloronaphthalene	ND
1,2-dichlorobenzene	ND
1,3-dichlorobenzene	ND
1,4-dichlorobenzene	ND
3,3-dichlorobenzidine	ND
2,4-dinitrotoluene	ND
2,6-dinitrotoluene	ND
1,2-diphenylhydrazine	ND
fluoranthene	ND
4-chlorophenyl phenyl ether	ND

	BASE NEUTRAL COMPOUNDS	µg/l
41B	4-bromophenyl phenyl ether	ND
42B	bis(2-chloroisopropyl)ether	ND
43B	bis(2-chloroethoxy)methane	ND
52B	hexachlorobutadiene	ND
53B	hexachlorocyclopentadiene	ND
54B	isophorone	ND
55B	naphthalene	ND
56B	nitrobenzene	ND
61B	N-nitrosodimethylamine	ND
62B	N-nitrosodiphenylamine	ND
63B	N-nitrosodi-n-propylamine	ND
66B	bis(2-ethylhexyl)phthalate	18
67B	butyl benzyl phthalate	ND
68B	di-n-butyl phthalate	ND
69B	di-n-octyl phthalate	ND
70B	diethyl phthalate	*
71B	dimethyl phthalate	ND
72B	benzo(a)anthracene	ND
73B	benzo(a)pyrene	ND
74B	3,4-benzofluoranthene	ND
75B	benzo(k)fluoranthene	ND
76B	chrysene	ND
77B	acenaphthylene	ND
78B	anthracene	ND
79B	benzo(ghi)perylene	ND
80B	fluorene	ND
81B	phenanthrene	ND
82B	dibenzo(a,h)anthracene	ND
83B	indeno(1,2,3-cd)pyrene	ND
84B	pyrene	ND
129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

ND = Not detected
= Not applicable
* = 1-9 ug/l

Reported by: [illegible]

Checked by: C. [illegible]

ENERGY RESOURCES CO. INC.
SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS

IENT Geraghty & Miller

IENT I.D. LF-4

:O I.D. 13-1258

DATE SAMPLE RECEIVED 2/17/82

DATE ANALYSIS COMPLETED 3/1/82

ACID COMPOUNDS	ug/l
2,4,6-trichlorophenol	ND
p-chloro-m-cresol	ND
2-chlorophenol	ND
2,4-dichlorophenol	ND
2,4-dimethylphenol	ND
2-nitrophenol	ND
4-nitrophenol	ND
2,4-dinitrophenol	ND
4,6-dinitro-o-cresol	ND
pentachlorophenol	ND
phenol	ND

BASE/NEUTRAL COMPOUNDS	ug/l
acenaphthene	ND
benzidine	ND
1,2,4-trichlorobenzene	ND
hexachlorobenzene	ND
hexachloroethane	ND
bis(2-chloroethyl)ether	ND
2-chloronaphthalene	ND
1,2-dichlorobenzene	ND
1,3-dichlorobenzene	ND
1,4-dichlorobenzene	ND
3,3-dichlorobenzidine	ND
2,4-dinitrotoluene	ND
2,6-dinitrotoluene	ND
1,2-diphenylhydrazine	ND
fluoranthene	ND
4-chlorophenyl phenyl ether	ND

	BASE NEUTRAL COMPOUNDS	ug/l
418	4-bromophenyl phenyl ether	ND
428	bis(2-chloroisopropyl)ether	ND
438	bis(2-chloroethoxy)methane	ND
528	hexachlorobutadiene	ND
538	hexachlorocyclopentadiene	ND
548	isophorone	ND
558	naphthalene	ND
568	nitrobenzene	ND
618	N-nitrosodimethylamine	ND
628	N-nitrosodiphenylamine	ND
638	N-nitrosodi-n-propylamine	ND
668	bis(2-ethylhexyl)phthalate	*
678	butyl benzyl phthalate	ND
688	di-n-butyl phthalate	*
698	di-n-octyl phthalate	ND
708	diethyl phthalate	*
718	dimethyl phthalate	ND
728	benzo(a)anthracene	ND
738	benzo(a)pyrene	ND
748	3,4-benzofluoranthene	ND
758	benzo(k)fluoranthene	ND
768	chrysene	ND
778	acenaphthylene	ND
788	anthracene	ND
798	benzo(ghi)perylene	ND
808	fluorene	ND
818	phenanthrene	ND
828	dibenzo(a,h)anthracene	ND
838	indeno(1,2,3-cd)pyrene	ND
848	pyrene	ND
1298	2,3,7,8-tetrachlorodibenzo-p-dioxin	N

ND = Not detected
NA = Not applicable
* = 1-9 ug/l

Reported by: [illegible]

Checked by: C. [illegible]

ENERGY RESOURCES CO. INC.
SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS

IENT Geraghty & Miller

I NT I.D. 16-6

CO I.D. 13-1248

DATE SAMPLE RECEIVED 2/17/82

DATE ANALYSIS COMPLETED 3/1/82

	ACID COMPOUNDS	µg/l
\	2,4,6-trichlorophenol	*
\	p-chloro-m-cresol	ND
\	2-chlorophenol	ND
\	2,4-dichlorophenol	*
\	2,4-dimethylphenol	ND
\	2-nitrophenol	ND
\	4-nitrophenol	ND
\	2,4-dinitrophenol	ND
\	4,6-dinitro-o-cresol	*
\	pentachlorophenol	15
\	phenol	*

	BASE/NEUTRAL COMPOUNDS	
	acenaphthene	ND
	benzidine	ND
	1,2,4-trichlorobenzene	ND
	hexachlorobenzene	ND
	hexachloroethane	ND
	bis(2-chloroethyl)ether	ND
	2-chloronaphthalene	ND
	1,2-dichlorobenzene	ND
	1,3-dichlorobenzene	ND
	1,4-dichlorobenzene	ND
	3,3-dichlorobenzidine	ND
	2,4-dinitrotoluene	ND
	2,6-dinitrotoluene	ND
	1,2-diphenylhydrazine	ND
	fluoranthene	ND
	4-chlorophenyl phenyl ether	ND

	BASE NEUTRAL COMPOUNDS	µg/l
418	4-bromophenyl phenyl ether	ND
428	bis(2-chloroisopropyl)ether	ND
438	bis(2-chloroethoxy)methane	ND
528	hexachlorobutadiene	ND
538	hexachlorocyclopentadiene	ND
548	isophorone	ND
558	naphthalene	*
568	nitrobenzene	ND
618	N-nitrosodimethylamine	ND
628	N-nitrosodiphenylamine	ND
638	N-nitrosodi-n-propylamine	ND
668	bis(2-ethylhexyl)phthalate	*
678	butyl benzyl phthalate	ND
688	di-n-butyl phthalate	*
698	di-n-octyl phthalate	ND
708	diethyl phthalate	*
718	dimethyl phthalate	ND
728	benzo(a)anthracene	ND
738	benzo(a)pyrene	ND
748	3,4-benzofluoranthene	ND
758	benzo(k)fluoranthene	ND
768	chrysene	ND
778	acenaphthylene	ND
788	anthracene	ND
798	benzo(ghi)perylene	ND
808	fluorene	ND
818	phenanthrene	ND
828	dibenzo(a,h)anthracene	ND
838	indeno(1,2,3-cd)pyrene	*
848	pyrene	ND
1298	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

ND = Not detected
\ = Not applicable
* = 1-9 ug/l

Reported by: [illegible]

Checked by: CR Lopez

ENERGY RESOURCES CO. INC.
SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS

IENT Geraghty & Miller

IENT I.D. LF-7

CO I.D. 13-1249

DATE SAMPLE RECEIVED 2/17/82

DATE ANALYSIS COMPLETED 3/1/82

	ACID COMPOUNDS	ug/l
A	2,4,6-trichlorophenol	ND
A	p-chloro-m-cresol	ND
A	2-chlorophenol	ND
A	2,4-dichlorophenol	ND
A	2,4-dimethylphenol	ND
A	2-nitrophenol	ND
A	4-nitrophenol	ND
A	2,4-dinitrophenol	ND
A	4,6-dinitro-o-cresol	ND
A	pentachlorophenol	*
A	phenol	ND

	BASE/NEUTRAL COMPOUNDS	
	acenaphthene	ND
	benzidine	ND
	1,2,4-trichlorobenzene	ND
	hexachlorobenzene	ND
B	hexachloroethane	ND
B	bis(2-chloroethyl)ether	ND
B	2-chloronaphthalene	ND
B	1,2-dichlorobenzene	ND
B	1,3-dichlorobenzene	ND
B	1,4-dichlorobenzene	*
B	3,3-dichlorobenzidine	ND
	2,4-dinitrotoluene	ND
	2,6-dinitrotoluene	ND
	1,2-diphenylhydrazine	ND
	fluoranthene	ND
	4-chlorophenyl phenyl ether	ND

	BASE NEUTRAL COMPOUNDS	ug/l
41B	4-bromophenyl phenyl ether	ND
42B	bis(2-chloroisopropyl)ether	ND
43B	bis(2-chloroethoxy)methane	ND
52B	hexachlorobutadiene	ND
53B	hexachlorocyclopentadiene	ND
54B	isophorone	ND
55B	naphthalene	ND
56B	nitrobenzene	ND
61B	N-nitrosodimethylamine	ND
62B	N-nitrosodiphenylamine	ND
63B	N-nitrosodi-n-propylamine	ND
66B	bis(2-ethylhexyl)phthalate	90
67B	butyl benzyl phthalate	ND
68B	di-n-butyl phthalate	ND
69B	di-n-octyl phthalate	ND
70B	diethyl phthalate	*
71B	dimethyl phthalate	ND
72B	benzo(a)anthracene	ND
73B	benzo(a)pyrene	ND
74B	3,4-benzofluoranthene	ND
75B	benzo(k)fluoranthene	ND
76B	chrysene	ND
77B	acenaphthylene	ND
78B	anthracene	ND
79B	benzo(ghi)perylene	ND
80B	fluorene	ND
81B	phenanthrene	ND
82B	dibenzo(a,h)anthracene	ND
83B	indeno(1,2,3-cd)pyrene	ND
84B	pyrene	ND
129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

ND = Not detected
NA = Not applicable
* = 1-9 ug/l

Reported by: [illegible]

Checked by: C. Rodgers

ENERGY RESOURCES CO. INC.
SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS

IENT Geraghty & Miller

NT I.D. LF-8

CO I.D. 13-1250

DATE SAMPLE RECEIVED 2/17/82

DATE ANALYSIS COMPLETED 3/1/82

	ACID COMPOUNDS	µg/l
P	2,4,6-trichlorophenol	ND
	p-chloro-m-cresol	ND
A	2-chlorophenol	ND
	2,4-dichlorophenol	ND
	2,4-dimethylphenol	ND
A	2-nitrophenol	ND
	4-nitrophenol	ND
A	2,4-dinitrophenol	ND
P	4,6-dinitro-o-cresol	ND
	pentachlorophenol	ND
A	phenol	ND

	BASE/NEUTRAL COMPOUNDS	
	acenaphthene	ND
	benzidine	ND
	1,2,4-trichlorobenzene	ND
	hexachlorobenzene	ND
B	hexachloroethane	ND
	bis(2-chloroethyl)ether	ND
	2-chloronaphthalene	ND
B	1,2-dichlorobenzene	ND
	1,3-dichlorobenzene	ND
B	1,4-dichlorobenzene	ND
P	3,3-dichlorobenzidine	ND
	2,4-dinitrotoluene	ND
B	2,6-dinitrotoluene	ND
	1,2-diphenylhydrazine	ND
	fluoranthene	ND
B	4-chlorophenyl phenyl ether	ND

	BASE NEUTRAL COMPOUNDS	µg/l
41B	4-bromophenyl phenyl ether	ND
42B	bis(2-chloroisopropyl)ether	ND
43B	bis(2-chloroethoxy)methane	ND
52B	hexachlorobutadiene	ND
53B	hexachlorocyclopentadiene	ND
54B	isophorone	ND
55B	naphthalene	ND
56B	nitrobenzene	ND.
61B	N-nitrosodimethylamine	ND
62B	N-nitrosodiphenylamine	ND
63B	N-nitrosodi-n-propylamine	ND
66B	bis(2-ethylhexyl)phthalate	65
67B	butyl benzyl phthalate	ND
68B	di-n-butyl phthalate	*
69B	di-n-octyl phthalate	ND
70B	diethyl phthalate	*
71B	dimethyl phthalate	ND
72B	benzo(a)anthracene	ND
73B	benzo(a)pyrene	ND
74B	3,4-benzofluoranthene	ND
75B	benzo(k)fluoranthene	ND
76B	chrysene	ND
77B	acenaphthylene	ND
78B	anthracene	ND
79B	benzo(ghi)perylene	ND
80B	fluorene	ND
81B	phenanthrene	ND
82B	dibenzo(a,h)anthracene	ND
83B	indeno(1,2,3-cd)pyrene	ND
84B	pyrene	ND
129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

ND = Not detected
A = Not applicable
* = 1-9 ug/l

Reported by: [illegible]

Checked by: C. Rodgers

ENERGY RESOURCES CO. INC.
SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS

IENT Geraghty & Miller

IENT I.D. LF-9

CO I.D. 13-1251

DATE SAMPLE RECEIVED 2/17/82

DATE ANALYSIS COMPLETED 3/1/82

	ACID COMPOUNDS	ug/l
A	2,4,6-trichlorophenol	ND
A	p-chloro-m-cresol	ND
A	2-chlorophenol	ND
A	2,4-dichlorophenol	ND
A	2,4-dimethylphenol	ND
A	2-nitrophenol	ND
A	4-nitrophenol	ND
A	2,4-dinitrophenol	ND
A	4,6-dinitro-o-cresol	ND
A	pentachlorophenol	ND
A	phenol	ND

	BASE/NEUTRAL COMPOUNDS	
	acenaphthene	ND
	benzidine	ND
	1,2,4-trichlorobenzene	ND
	hexachlorobenzene	ND
B	hexachloroethane	ND
B	bis(2-chloroethyl)ether	ND
B	2-chloronaphthalene	ND
B	1,2-dichlorobenzene	ND
B	1,3-dichlorobenzene	ND
B	1,4-dichlorobenzene	ND
B	3,3-dichlorobenzidine	ND
	2,4-dinitrotoluene	ND
B	2,6-dinitrotoluene	ND
B	1,2-diphenylhydrazine	ND
B	fluoranthene	ND
B	4-chlorophenyl phenyl ether	ND

	BASE NEUTRAL COMPOUNDS	ug/l
418	4-bromophenyl phenyl ether	ND
428	bis(2-chloroisopropyl)ether	ND
438	bis(2-chloroethoxy)methane	ND
528	hexachlorobutadiene	ND
538	hexachlorocyclopentadiene	ND
548	isophorone	ND
558	naphthalene	ND
568	nitrobenzene	ND
618	N-nitrosodimethylamine	ND
628	N-nitrosodiphenylamine	ND
638	N-nitrosodi-n-propylamine	ND
668	bis(2-ethylhexyl)phthalate	*
678	butyl benzyl phthalate	ND
688	di-n-butyl phthalate	ND
698	di-n-octyl phthalate	ND
708	diethyl phthalate	ND
718	dimethyl phthalate	ND
728	benzo(a)anthracene	ND
738	benzo(a)pyrene	ND
748	3,4-benzofluoranthene	ND
758	benzo(k)fluoranthene	ND
768	chrysene	ND
778	acenaphthylene	ND
788	anthracene	ND
798	benzo(chi)perylene	ND
808	fluorene	ND
818	phenanthrene	ND
828	dibenzo(a,h)anthracene	ND
838	indeno(1,2,3-cd)pyrene	ND
848	pyrene	ND
1298	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

ND = Not detected
NA = Not applicable
* = 1-9 ug/l

Reported by: [illegible]

Checked by: C Rodgers

ENERGY RESOURCES CO. INC.
SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS

ENT Geraghty & Miller
IT I.D. LF-10
O I.D. 13-1252

DATE SAMPLE RECEIVED 2/17/82
DATE ANALYSIS COMPLETED 3/1/82

ACID COMPOUNDS	ug/l
2,4,6-trichlorophenol	ND
p-chloro-m-cresol	ND
2-chlorophenol	ND
2,4-dichlorophenol	*
2,4-dimethylphenol	ND
2-nitrophenol	ND
4-nitrophenol	ND
2,4-dinitrophenol	ND
4,6-dinitro-o-cresol	ND
pentachlorophenol	ND
phenol	*

BASE/NEUTRAL COMPOUNDS	
acenaphthene	*
benzidine	ND
1,2,4-trichlorobenzene	ND
hexachlorobenzene	ND
hexachloroethane	ND
bis(2-chloroethyl)ether	ND
2-chloronaphthalene	ND
1,2-dichlorobenzene	ND
1,3-dichlorobenzene	ND
1,4-dichlorobenzene	ND
3,3-dichlorobenzidine	ND
2,4-dinitrotoluene	ND
2,6-dinitrotoluene	ND
1,2-diphenylhydrazine	ND
fluoranthene	ND
4-chlorophenyl phenyl ether	ND

	BASE NEUTRAL COMPOUNDS	ug/l
41B	4-bromophenyl phenyl ether	ND
42B	bis(2-chloroisopropyl)ether	ND
43B	bis(2-chloroethoxy)methane	ND
52B	hexachlorobutadiene	ND
53B	hexachlorocyclopentadiene	ND
54B	isophorone	ND
55B	naphthalene	ND
56B	nitrobenzene	ND
61B	N-nitrosodimethylamine	ND
62B	N-nitrosodiphenylamine	ND
63B	N-nitrosodi-n-propylamine	ND
66B	bis(2-ethylhexyl)phthalate	23
67B	butyl benzyl phthalate	ND
68B	di-n-butyl phthalate	*
69B	di-n-octyl phthalate	ND
70B	diethyl phthalate	*
71B	dimethyl phthalate	ND
72B	benzo(a)anthracene	ND
73B	benzo(a)pyrene	ND
74B	3,4-benzofluoranthene	ND
75B	benzo(k)fluoranthene	ND
76B	chrysene	ND
77B	acenaphthylene	ND
78B	anthracene /phenanthrene	*
79B	benzo(ghi)perylene	ND
80B	fluorene	ND
81B	phenanthrene	See 78B
82B	dibenzo(a,h)anthracene	ND
83B	indeno(1,2,3-cd)pyrene	ND
84B	pyrene	ND
129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

ND = Not detected
= Not applicable
* = 1-9 ug/l

Reported by: [illegible]
Checked by: C. [illegible]

ENERGY RESOURCES CO. INC.
SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS

IENT Geraghty & Miller

IENT I.D. Procedural Blank

CO I.D. 13-1253

DATE SAMPLE RECEIVED 2/17/82

DATE ANALYSIS COMPLETED 3/1/82

	ACID COMPOUNDS	ug/l
A	2,4,6-trichlorophenol	ND
A	p-chloro-m-cresol	ND
A	2-chlorophenol	ND
A	2,4-dichlorophenol	ND
A	2,4-dimethylphenol	ND
A	2-nitrophenol	ND
A	4-nitrophenol	ND
A	2,4-dinitrophenol	ND
A	4,6-dinitro-o-cresol	ND
A	pentachlorophenol	ND
A	phenol	ND

	BASE/NEUTRAL COMPOUNDS	
	acenaphthene	ND
	benzidine	ND
	1,2,4-trichlorobenzene	ND
	hexachlorobenzene	ND
B	hexachloroethane	ND
B	bis(2-chloroethyl)ether	ND
B	2-chloronaphthalene	ND
B	1,2-dichlorobenzene	ND
B	1,3-dichlorobenzene	ND
B	1,4-dichlorobenzene	ND
B	3,3-dichlorobenzidine	ND
B	2,4-dinitrotoluene	ND
B	2,6-dinitrotoluene	ND
B	1,2-diphenylhydrazine	ND
B	fluoranthene	ND
B	4-chlorophenyl phenyl ether	ND

	BASE NEUTRAL COMPOUNDS	ug/l
41B	4-bromophenyl phenyl ether	ND
42B	bis(2-chloroisopropyl)ether	ND
43B	bis(2-chloroethoxy)methane	ND
52B	hexachlorobutadiene	ND
53B	hexachlorocyclopentadiene	ND
54B	isophorone	ND
55B	naphthalene	ND
56B	nitrobenzene	ND
61B	N-nitrosodimethylamine	ND
62B	N-nitrosodiphenylamine	ND
63B	N-nitrosodi-n-propylamine	ND
66B	bis(2-ethylhexyl)phthalate	*
67B	butyl benzyl phthalate	ND
68B	di-n-butyl phthalate	ND
69B	di-n-octyl phthalate	ND
70B	diethyl phthalate	ND
71B	dimethyl phthalate	ND
72B	benzo(a)anthracene	ND
73B	benzo(a)pyrene	ND
74B	3,4-benzofluoranthene	ND
75B	benzo(k)fluoranthene	ND
76B	chrysene	ND
77B	acenaphthylene	ND
78B	anthracene	ND
79B	benzo(ghi)perylene	ND
80B	fluorene	ND
81B	phenanthrene	ND
82B	dibenzo(a,h)anthracene	ND
83B	indeno(1,2,3-cd)pyrene	ND
84B	pyrene	ND
129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

ND = Not detected
NA = Not applicable
* = 1-9 ug/l

Reported by: [illegible]

Checked by: C. Pedersen

Sample Rcvd: 7/30/81
Date Analysis Completed: 8/7/81
All Results In: mg/l
Reported By:
Checked By:

ENERGY RESOURCES CO. INC.

VOLATILE ORGANICS ANALYSIS

- Report Sheet -

Analyzed for: Geraghty & Miller

Compounds (in order of elution)	DLF-1	SLF-1	SLF-2
Vinyl chloride			
Methylene chloride		0.09	0.57
1,1-dichloroethylene			
1,1-dichloroethane			
trans-1,2-dichloroethylene			
1,2-dichloroethane			
1,1,1-trichloroethane			
1,2-Dichloropropane			
Trichloroethylene			
1,1,2-Trichloroethane			
Tetrachloroethylene			
Chlorobenzene			
Unknown			

Comments: All blank spaces are ND's (none detected) (<0.05 mg/l, or 50 ppb)

Sample Rcvd: 7/30/81
Date Analysis Completed: 8/7/81
All Results In: mg/l
Reported By:
Checked By:

ENERGY RESOURCES CO. INC.

VOLATILE ORGANICS ANALYSIS

- Report Sheet -

Analyzed for: Geraghty & Miller

Compounds (in order of elution)	LF-1	LF-2	LF-3	LF-4	LF-5
Vinyl chloride					
Methylene chloride	0.07		0.22		
1,1-dichloroethylene					
1,1-dichloroethane					
trans-1,2-dichloroethylene					
1,2-dichloroethane					
1,1,1-trichloroethane					
1,2-Dichloropropane					
Trichloroethylene					
1,1,2-Trichloroethane					
Tetrachloroethylene					
Chlorobenzene		0.05			
Unknown					

Comments: All blank spaces are ND's (none detected) (<0.05 mg/l, or 50 ppb)

Sample Rcvd: 2/17/82
Date Analysis Completed: 3/15/82
All Results In: µg/l (ppb)
Reported By: [illegible]
Checked By: [illegible]

ENERGY RESOURCES CO. INC.

VOLATILE ORGANICS ANALYSIS

- Report Sheet -

Analyzed for: G & M SC Navy

Compounds (in order of elution)	LF-6 13-1248	LF-7 13-1249*	LF-8 13-1250	LF-9 13-1251	LF-10 13-1252**
Vinyl chloride		24			
Methylene chloride	3.2	2.2	650	1600	145
1,1-dichloroethylene					
1,1-dichloroethane					
1,2-dichloroethylene					
Chloroform	5.4	1.2	1.3	3.1	
1,2-dichloroethane					
1,1,1-trichloroethane					
Carbon tetrachloride					
Bromodichloromethane					
Trichloroethylene					
Dibromochloromethane			2.5	3.4	
Bromoform					
Tetrachloroethylene					

Comments: All blank spaces are ND's (none detected).
*2.9 ppb chlorobenzene
**~2 ppb. 1,2-dichloropropane (tentati· ID)

ENERGY RESOURCES CO. INC

PCB ANALYSIS

Sample Rcvd: 2/17/82

Date Analysis Completed: 3/22/82

All Results In: µg/l (ppb)

Reported By: [illegible]

Checked By: [illegible]

Analyzed for: Geraghty & Miller

Client ID:		LF-6	LF-7	LF-8	LF-9	LF-10	Procedural Blank	SLF-1	SLF-2	LF-1	LF-3	LF-4
	DET. LIMIT	13-1248	13-1249	13-1250	13-1251	13-1252	13-1253	13-1254	13-1255	13-1256	13-1257	13-1258
Aroclor 1221	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1232	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1016	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1242	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1248	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1254	0.1	0.1	ND	<.1	ND	ND	ND	ND	<.1	<.1	ND	ND
Aroclor 1260	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor 1262	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Comments:

ND = not detected.

pH MEASUREMENTS OF WATER SAMPLES
COLLECTED FROM MONITOR WELLS
AT THE LANDFILL AREA[1]

Well Number	pH 7/28/81	pH 2/15/82
LF-1	7.40	7.20
LF-2	7.55	-
LF-3	7.40	7.39
LF-4	7.35	7.32
LF-5	7.80	-
LF-6	-	8.02
LF-7	-	7.02
LF-8	-	7.50
LF-9	-	7.19
LF-10	-	8.74
SLF-1	-	7.04
SLF-2	7.70	7.42
DLF-1	8.85	-

[1] Measured at the time of sample collection.

APPENDIX F-2

Public Works Storage Yard

Surface to Six Inch Soil Samples

TABLE 3

EVALUATION OF SOIL CONTAMINATION
PUBLIC WORKS STORAGE YARD (OLD CORRAL)

	pH	BARIUM	BERYLLIUM	CADMIUM	CHROMIUM	LEAD	MERCURY	NICKEL	SELENIUM	SILVER
THRESHOLD	6.5 4.3	51.29	2.00	1.25	26.51	146.92	1.00	10.11	0.20	1.00
SAMPLE										
AA-1	8.2 X	71.00 X	0.44	1.23	14.80	154.00 X	0.075	9.37	0.20	0.50
AA-2	7.9 X	17.70	0.30	0.10	6.07	12.10	0.020	2.33	0.20	0.50
AA-3	7.1 X	36.50	0.30	1.12	8.42	29.50	0.020	11.70 X	0.20	0.50
AA-4	7.1 X	25.60	0.30	0.87	10.40	45.20	0.114	8.26	0.20	0.50
AA-5	7.9 X	14.90	0.30	0.10	5.43	8.60	0.020	2.71	0.20	0.50
AA-6	5.1	15.60	0.30	0.10	5.03	8.23	0.020	3.66	0.20	0.50
Z-1	8.1 X	22.80	0.30	1.93 X	15.10	71.50	0.079	7.73	0.20	0.50
Z-2	8.5 X	44.90	0.30	2.17 X	28.00 X	105.00	0.134	15.90 X	0.20	0.50
Z-3	8.6 X	98.80 X	0.30	3.49 X	16.90	63.20	0.020	24.80 X	0.20	1.80 X
Z-4	9.0 X	64.50 X	0.30	5.06 X	12.60	68.90	0.020	36.20 X	0.20	2.62 X
Z-5	8.7 X	99.80 X	0.30	3.23 X	10.30	97.20	0.114	18.10 X	0.20	1.29 X
Z-6	8.3 X	48.70	0.30	4.19 X	17.30	114.00	0.065	67.50 X	0.20	2.41 X
Z-7	8.2 X	30.80	0.46	1.21	28.70 X	77.80	0.183	12.50 X	0.20	0.50
Y-1	8.3 X	45.20	0.30	1.31 X	28.20 X	92.40	0.079	11.70 X	0.20	0.50
Y-2	8.6 X	69.00 X	0.30	2.58 X	12.30	61.80	0.062	17.80 X	0.20	2.12 X
Y-3	8.9 X	92.20 X	0.30	2.58 X	12.40	79.30	0.046	21.80 X	0.20	1.49 X
Y-4	8.8 X	32.50	0.30	0.53	8.25	34.00	0.057	9.71	0.20	0.50
Y-5	10.3 X	51.60 X	0.30	2.56 X	11.90	110.00	2.910 X	14.60 X	0.20	0.50
Y-6	9.0 X	98.90 X	0.30	5.05 X	12.00	76.60	0.107	15.80 X	0.20	1.28 X
Y-7	8.5 X	118.00 X	0.30	4.39 X	11.50	67.40	0.020	30.30 X	0.20	2.56 X
Y-8	8.2 X	20.10	0.30	0.69	9.86	68.60	0.099	9.00	0.20	0.50
X-4	9.0 X	62.50 X	0.30	4.25 X	12.20	73.20	0.020	29.30 X	0.20	2.44 X
X-5	8.7 X	71.00 X	0.30	3.57 X	12.80	64.40	0.123	26.90 X	0.20	1.76 X
X-6	9.3 X	157.00 X	0.30	5.14 X	9.12	61.30	0.020	36.90 X	0.20	3.32 X
X-7	8.7 X	174.00 X	0.30	5.43 X	9.67	67.70	0.020	36.80 X	0.20	3.22 X
X-8	8.7 X	90.80 X	0.30	3.77 X	11.90	56.10	0.053	27.80 X	0.20	1.98 X

TABLE 3 (CONTINUED)

	pH	BARIUM	BERYLLIUM	CADMIUM	CHROMIUM	LEAD	MERCURY	NICKEL	SELENIUM	SILVER
THRESHOLD	6.5	51.29	2.00	1.25	26.51	146.92	1.00	10.11	0.20	1.00
	4.3									
SAMPLE										
W-4	8.3 X	46.90	0.40	1.35 X	39.40 X	178.00 X	0.151	12.50 X	0.20	0.50
W-5	9.5 X	144.00 X	0.30	4.83 X	8.93	61.00	0.020	33.80 X	0.20	2.97 X
W-6	8.6 X	119.00 X	0.30	3.74 X	11.80	62.90	0.067	32.70 X	0.20	2.37 X
W-7	8.4 X	75.40 X	0.30	3.33 X	5.96	32.80	0.020	22.30 X	0.20	1.49 X
W-8	9.1 X	169.00 X	0.30	4.66 X	9.24	53.50	0.021	34.70 X	0.20	2.69 X
W-9	8.5 X	60.10 X	0.44	2.19 X	15.10	68.40	0.082	15.60 X	0.20	0.50
V-5	8.6 X	116.00 X	0.30	2.67 X	16.00	90.40	0.134	22.80 X	0.20	0.97
V-6	8.3 X	86.40 X	0.30	9.38 X	20.60	160.00 X	0.734	35.40 X	0.20	0.82
V-7	8.9 X	44.80	0.30	1.48 X	16.60	85.90	0.154	16.60 X	0.20	0.50
U-6	8.9 X	49.30	0.30	2.68 X	12.20	44.60	0.044	9.47	0.20	0.50
SP-13	8.2 X	44.50	0.30	3.90 X	13.80	194.00 X	0.020	29.80 X	0.20	2.29 X
SP-14	8.3 X	33.90	0.30	2.99 X	12.00	982.00 X	0.020	22.40 X	0.20	1.50 X
SP-15	8.1 X	31.80	0.30	1.82 X	18.20	90.40	0.054	13.60 X	0.20	0.91
SP-16	8.8 X	42.80	0.30	4.52 X	9.62	64.90	0.020	35.10 X	0.20	8.66 X
SP-17	8.2 X	42.30	0.30	5.27 X	9.45	62.10	0.028	38.80 X	0.20	3.48 X
SP-18	8.2 X	36.50	0.30	2.88 X	12.50	70.10	0.079	21.60 X	0.20	1.44 X
SP-19	9.0 X	81.20 X	0.30	1.34 X	55.70 X	399.00 X	0.105	19.20 X	0.20	0.50
SP-20	8.3 X	39.00	0.30	3.39 X	9.49	684.00 X	0.029	25.00 X	0.20	2.50 X
SP-21	8.3 X	58.40 X	0.30	6.78 X	9.82	59.40	0.051	36.80 X	0.20	2.95 X
SP-22	8.5 X	36.80	0.30	1.52 X	8.75	66.30	0.104	8.29	0.20	0.50
SP-23	8.4 X	39.40	0.30	2.36 X	18.80	54.40	0.090	12.00 X	0.20	0.50
SP-24	8.3 X	66.20 X	0.30	4.82 X	8.27	61.10	0.020	34.00 X	0.20	2.68 X
SP-25	9.4 X	45.80	0.30	3.51 X	9.35	57.00	0.028	34.10 X	0.20	2.34 X
SP-26	8.2 X	29.70	0.30	2.19 X	22.40	108.00	0.201	16.10 X	0.20	0.97
SP-27	8.1 X	30.60	0.30	0.48	11.00	45.00	0.226	3.78	0.20	0.50

APPENDIX F-3

Public Works Storage Yard

Supplemental Samples Collected at 1-,2-, and 3-Foot Intervals

SOUTHERN DIVISION NAVAL FACILITIES

DELIVERY ORDER # 0096

OLD CORRAL SOIL SAMPLES

CHARLESTON, SC NAVAL SHIPYARD

ETC #	Sample I.D.	Date	Results (as received ppm) pH	Barium	Cadmium	Chromium	Lead	Mercury	Nickel	Silver
1	W8-1	3/21	7.7	18.7	<0.1	-	-	-	<1.0	<0.5
2	W8-2	3/21	8.0	27.8	<0.1	-	-	-	6.73	1.34
3	W8-3	3/21	8.4	25.0	<0.1	-	-	-	10.6	<0.5
4	W9-1	3/21	8.0	36.1	<0.1	-	-	-	11.3	-
5	W9-2	3/21	7.9	23.9	<0.1	-	-	-	7.51	-
6	W9-3	3/21	8.2	22.9	<0.1	-	-	-	8.71	-
7	W7-1	3/21	8.2	29.4	<0.1	-	-	-	8.90	<0.5
8	W7-2	3/21	7.7	25.5	<0.1	-	-	-	10.6	<0.5
9	W7-3	3/21	8.2	19.2	<0.1	-	-	-	10.2	<0.5
10	W6-1	3/21	8.1	27.3	<0.1	-	-	-	13.1	0.64
11	W6-2	3/21	8.2	17.5	<0.1	-	-	-	7.97	<0.5
12	W6-3	3/21	8.5	19.0	<0.1	-	-	-	8.85	<0.5
13	W5-1	3/21	9.4	46.1	<0.1	-	-	-	8.20	1.17
14	W4-1	3/21	7.4	-	<0.1	4.46	12.4	-	2.23	-
15	W4-2	3/21	7.4	-	<0.1	2.86	12.9	-	1.19	-
16	V6-1	3/21	8.4	13.8	<0.1	-	34.3	-	2.32	-
17	V6-2	3/21	8.4	21.4	<0.1	-	32.4	-	10.6	-
18	V6-3	3/21	8.4	16.8	<0.1	-	23.1	-	7.33	-
19	V7-1	3/21	8.7	-	<0.1	-	-	-	1.96	-
20	U6-1	3/21	7.7	-	<0.1	-	-	-	-	-
21	U6-2	3/21	7.7	-	<0.1	-	-	-	-	-
22	U6-3	3/21	8.2	-	<0.1	-	-	-	-	-
23	V5-1	3/21	8.1	21.1	<0.1	-	-	-	5.64	-
24	X4-1	3/21	8.3	20.1	<0.1	-	-	-	3.50	<0.5
25	X4-2	3/21	8.8	24.6	<0.1	-	-	-	4.43	<0.5
26	X5-1	3/21	7.3	30.7	<0.1	-	-	-	14.3	<0.5
27	X5-2	3/21	7.4	22.5	<0.1	-	-	-	10.2	<0.5
28	X5-3	3/21	8.5	21.7	<0.1	-	-	-	10.7	<0.5
29	X6-1	3/21	7.5	26.2	<0.1	-	-	-	11.3	<0.5
30	X6-2	3/21	7.7	20.5	<0.1	-	-	-	11.0	<0.5
31	X6-3	3/21	8.5	23.8	<0.1	-	-	-	10.9	<0.5
32	X7-1	3/21	7.8	22.0	<0.1	-	-	-	7.65	<0.5
33	X7-2	3/21	8.1	23.6	<0.1	-	-	-	11.1	<0.5
34	X7-3	3/21	8.1	18.4	<0.1	-	-	-	8.72	<0.5
35	X8-1	3/21	7.2	23.3	<0.1	-	-	-	8.82	<0.5
36	X8-2	3/21	8.0	20.2	<0.1	-	-	-	9.48	<0.5
37	X8-3	3/21	8.3	31.1	<0.1	-	-	-	12.0	<0.5
38	Y8-1	3/21	7.6	-	-	-	-	-	-	-
39	Y8-2	3/21	7.4	-	-	-	-	-	-	-
40	Y8-3	3/21	7.6	-	-	-	-	-	-	-

SOUTHERN DIVISION NAVAL FACILITIES

DELIVERY ORDER # 0096

OLD CORRAL SOIL SAMPLES

CHARLESTON, SC NAVAL SHIPYARD

ETC #	Sample I.D.	Date	Results (as received ppm) pH	Barium	Cadmium	Chromium	Lead	Mercury	Nickel	Silver
41	Z7-1	3/22	7.7	-	-	27.9	-	-	13.9	-
42	Z7-2	3/22	7.1	-	-	22.7	-	-	10.3	-
43	Z7-3	3/22	8.0	-	-	20.3	-	-	8.40	-
44	Y6-1	3/22	8.2	38.7	<0.1	-	-	-	7.97	<0.5
45	Y6-2	3/22	8.2	19.2	<0.1	-	-	-	5.89	<0.5
46	Y6-3	3/22	8.3	27.9	<0.1	-	-	-	8.83	<0.5
47	Y7-1	3/22	7.8	34.0	<0.1	-	-	-	10.6	<0.5
48	Y7-2	3/22	7.6	28.1	<0.1	-	-	-	8.78	<0.5
49	Y7-3	3/22	7.9	27.1	<0.1	-	-	-	8.27	<0.5
50	Y5-1	3/22	8.2	65.8	<0.1	-	-	0.154	6.67	-
51	Y5-2	3/22	8.0	25.2	<0.1	-	-	<0.02	7.48	-
52	Y5-3	3/22	8.4	16.6	<0.1	-	-	<0.02	7.17	-
53	Z5-1	3/22	7.7	22.9	<0.1	-	-	-	3.20	<0.5
54	Z4-1	3/22	8.1	31.1	<0.1	-	-	-	4.97	<0.5
55	Z6-1	3/22	7.6	-	<0.1	-	-	-	10.9	<0.5
56	Z6-2	3/22	7.1	-	<0.1	-	-	-	11.0	<0.5
57	Z6-3	3/22	7.8	-	<0.1	-	-	-	8.81	<0.5
58	AA6-1	3/22	6.3	-	-	-	-	-	-	-
59	AA6-2	3/22	7.3	-	-	-	-	-	-	-
60	AA6-3	3/22	8.0	-	-	-	-	-	-	-
61	AA5-1	3/22	8.3	-	-	-	-	-	-	-
62	AA5-2	3/22	8.5	-	-	-	-	-	-	-
63	AA5-3	3/22	8.5	-	-	-	-	-	-	-
64	AA4-1	3/22	7.5	-	-	-	-	-	-	-
65	AA4-2	3/22	8.2	-	-	-	-	-	-	-
66	AA4-3	3/22	8.5	-	-	-	-	-	-	-
67	AA3-1	3/22	6.3	-	-	-	-	-	5.44	-
68	AA3-2	3/22	6.2	-	-	-	-	-	2.86	-
69	AA3-3	3/22	7.9	-	-	-	-	-	8.09	-
70	AA2-1	3/22	6.9	-	-	-	-	-	-	-
71	AA1-1	3/22	8.1	62.9	-	-	72.7	-	-	-
72	AA1-2	3/22	8.8	23.9	-	-	30.1	-	-	-
73	AA1-3	3/22	8.4	24.9	-	-	34.6	-	-	-
74	Y3-1	3/22	7.3	71.2	<0.1	-	-	-	7.86	<0.5
75	Y3-2	3/22	8.5	26.5	<0.1	-	-	-	4.11	<0.5
76	Y3-3	3/22	7.9	24.1	<0.1	-	-	-	10.1	<0.5
77	Y4-1	3/22	8.3	-	-	-	-	-	-	-
78	Y2-1	3/22	7.5	23.1	<0.1	-	-	-	2.53	<0.5
79	Y2-2	3/22	7.1	19.1	<0.1	-	-	-	<1.0	<0.5
80	Z2-1	3/22	6.6	-	<0.1	14.3	-	-	4.51	-
81	Z3-1	3/22	7.7	36.4	<0.1	-	-	-	15.8	<0.5
2	SP14-1	3/22	7.8	-	<0.1	-	462	-	4.95	<0.5
3	SP14-2	3/22	6.6	-	<0.1	-	31.5	-	5.31	<0.5
84	SP14-3	3/22	7.7	-	<0.1	-	24.6	-	7.09	<0.5

SOUTHERN DIVISION NAVAL FACILITIES
DELIVERY ORDER # 0096
OLD CORRAL SOIL SAMPLES
CHARLESTON, SC NAVAL SHIPYARD

ETC #	Sample I.D.	Date	Results (as received ppm) pH	Barium	Cadmium	Chromium	Lead	Mercury	Nickel	Silver
85	SP13-1	3/23	8.0	-	<0.1	-	22.9	-	13.7	<0.5
86	SP15-1	3/23	5.5	-	<0.1	-	-	-	3.13	-
87	SP16-1	3/23	6.7	-	<0.1	-	-	-	2.71	<0.5
88	SP17-1	3/23	7.6	-	<0.1	-	-	-	1.96	<0.5
89	SP17-2	3/23	6.0	-	<0.1	-	-	-	2.79	<0.5
90	SP17-3	3/23	7.9	-	<0.1	-	-	-	4.82	<0.5
91	SP18-1	3/23	7.3	-	<0.1	-	-	-	3.94	<0.5
92	SP18-2	3/23	7.4	-	<0.1	-	-	-	2.54	<0.5
93	SP18-3	3/23	8.4	-	<0.1	-	-	-	12.0	<0.5
94	SP19-1	3/23	7.7	22.7	1.19	9.40	11.3	-	2.21	-
95	SP19-2	3/23	8.1	42.1	2.33	13.4	271	-	66.9	-
96	SP19-3	3/23	8.1	21.4	<0.1	22.4	20.9	-	10.5	-
97	SP20-1	3/23	6.5	-	<0.1	-	7.66	-	1.21	<0.5
98	SP20-2	3/23	8.0	-	<0.1	-	41.2	-	9.67	<0.5
99	SP20-3	3/23	8.2	-	<0.1	-	20.9	-	7.62	<0.5
00	SP21-1	3/23	8.1	32.0	<0.1	-	-	-	6.69	<0.5
101	SP21-2	3/23	8.3	32.8	<0.1	-	-	-	10.5	<0.5
102	SP21-3	3/23	8.3	25.1	<0.1	-	-	-	5.94	<0.5
103	SP22-1	3/23	9.2	-	<0.1	-	-	-	-	-
104	SP23-1	3/23	8.2	-	<0.1	-	-	-	3.49	-
105	SP24-1	3/23	7.1	35.5	<0.1	-	-	-	11.4	<0.5
106	SP24-2	3/23	7.6	19.4	<0.1	-	-	-	8.62	<0.5
107	SP24-3	3/23	8.2	26.5	2.47	-	-	-	10.3	<0.5
108	SP25-1	3/23	8.2	-	<0.1	-	-	-	8.04	<0.5
109	SP25-2	3/23	8.6	-	6.61	-	-	-	9.87	<0.5
110	SP25-3	3/23	8.8	-	11.5	-	-	-	5.86	<0.5
111	SP26-1	3/23	7.3	-	11.1	-	-	-	12.3	-
112	SP26-2	3/23	7.1	-	<0.1	-	-	-	12.3	-
113	SP26-3	3/23	8.2	-	<0.1	-	-	-	7.72	-
114	SP27-1	3/23	8.3	-	-	-	-	-	-	-
115	SP27-2	3/23	8.3	-	-	-	-	-	-	-
116	SP27-3	3/23	8.1	-	-	-	-	-	-	-
117	Z1-1	3/23	8.7	-	11.1	-	-	-	-	-
118	Y1-1	3/24	8.1	-	<0.1	3.95	-	-	<1.0	-
119	BG1-2	3/24	8.8	-	-	-	-	-	-	-
120	BG2-2	3/24	5.4	-	-	-	-	-	-	-
121	BG3-2	3/24	5.0	-	-	-	-	-	-	-

APPENDIX G

PCB Transformer Storage Area - Analytical Data

(Source: Reference 12)

GENERAL ENGINEERING LABORATORIES

Full Service Chemical Testing and Analysis

Office & Lab.
1313 Ashley River Road
Charleston, S.C.
Phone (803) 556-8171

Mailing Address
P.O. Box 30712
Charleston, S.C. 29407

Analysis Sheet

Client Geraghty & Miller, Inc. P.O. Box 271173 Tampa, Florida 33688	Date July 16, 1981 P.O. No. Requested by Mr. Peter Palmer

Sample Identification

Analysis of Soil Samples for PCBs

Results

Sample Identification	PCB Concentration
Sample A	<10 mg/kg
Sample B	<10 mg/kg
Sample C	<10 mg/kg
Sample D	<10 mg/kg
Sample E	<10 mg/kg
Sample F	<10 mg/kg

By George C. Greene

George C. Greene, PhD

ENERGY RESOURCES CO. INC

INORGANIC ANALYSIS

- Report Sheet -
µg/gm dry wgt.

Analyzed for: Geraghty & Miller
Sediments

ERCO ID	CLIENT ID	As
IC-82		
562	OC-1	6.7
563	OC-2	6.0
564	OC-3	15.5
565	OC-4	4.1
566	OC-5	2.1
567	OC-6	10.2
568	OC-7	7.3
569	OC-8	6.9

If customer has any questions regarding analysis, refer to sample in question by its ERCO ID#.

Sample Rcvd. 2/17/82 Reported by Lab

Date Analysis Completed 3/16/82 Checked by NEL

ENERGY RESOURCES CO. INC

INORGANIC ANALYSIS

- Report Sheet -
µg/gm dry wgt. - µg/l

Analyzed for: Geraghty & Miller
Sediments - waters

ERCO ID	CLIENT ID	As
IC-82-		
	Sediments	µg/gm
570	OC-9	3.9
570	ERCO DUPLICATE	3.3
571	OC-10	5.1
572	OC-11	2.8
573	OC-12	1.3
	Waters	µg/l
574	WOC-1	19
575	WOC-2	13

If customer has any questions regarding analysis, refer to sample in question by its ERCO ID#.

Sample Rcvd. 2/17/82 Reported by Lab

Date Analysis Completed 3/16/82 Checked by [illegible]

ENERGY RESOURCES CO. INC.
PESTICIDE ANALYSIS REPORT

Analyzed for: Geraghty & Miller All results in: µg/l (ppb)

Client ID:		WOC-1	WOC-2
89P	aldrin	ND	ND
90P	dieldrin	ND	ND
91P	chlordane	ND	ND
92P	4,4'-DDT	0.2	ND
93P	4,4'-DDE	ND	ND
94P	4,4'-DDD	ND	0.1
95P	alpha-endosulfan	ND	ND
96P	beta-endosulfan	ND	ND
97P	endosulfan sulfate	ND	ND
98P	endrin	ND	ND
99P	endrin aldehyde	ND	ND
100P	heptachlor	ND	ND
101P	heptachlor epoxide	ND	ND
102P	alpha-BHC	ND	1.0
103P	beta-BHC	ND	ND
104P	gamma-BHC	ND	1.0
105P	delta-BHC	ND	1.0
106P	PCB-1242	ND	ND
107P	PCB-1254	ND	ND
108P	PCB-1221	ND	ND
109P	PCB-1232	ND	ND
110P	PCB-1248	ND	ND
111P	PCB-1260	0.2	0.6
112P	PCB-1016	ND	ND
113P	toxaphene	ND	ND

Sample Received: 2/17/82 Reported by: E Kwang
Date Completed: 3/25/82 Checked by: [illegible]
Comments: ND = not detected (less than 1. µg/l)

ENERGY RESOURCES CO. INC.
PESTICIDE ANALYSIS REPORT

Analyzed for: Geraghty & Miller All results in: ng/gm (ppb)

Client ID:		OC-1	OC-2	OC-3	OC-4	OC-5
89P	aldrin	ND	ND	ND	ND	ND
90P	dieldrin	ND	ND	ND	ND	ND
91P	chlordane	ND	ND	ND	ND	ND
92P	4,4'-DDT	28,000.	4,400.	1,600.	100.	7.
93P	4,4'-DDE	11,000.	3,600.	1,300.	230.	9.
94P	4,4'-DDD	6,100.	1,400.	720.	7.	1.
95P	alpha-endosulfan	ND	ND	ND	ND	ND
96P	beta-endosulfan	ND	ND	ND	ND	ND
97P	endosulfan sulfate	ND	ND	ND	ND	ND
98P	endrin	ND	ND	ND	ND	ND
99P	endrin aldehyde	ND	ND	ND	ND	ND
100P	heptachlor	7.	ND	1.	2.	1.
101P	heptachlor epoxide	ND	ND	ND	ND	ND
102P	alpha-BHC	60.	2.	2.	ND	ND
103P	beta-BHC	120.	77.	ND	ND	ND
104P	gamma-BHC	150.	ND	ND	ND	ND
105P	delta-BHC	780.	4.	17.	1.	ND
106P	PCB-1242	ND	ND	ND	ND	ND
107P	PCB-1254	ND	ND	ND	ND	ND
108P	PCB-1221	ND	ND	ND	ND	ND
109P	PCB-1232	ND	ND	ND	ND	ND
110P	PCB-1248	ND	ND	ND	ND	ND
111P	PCB-1260	ND	62,000.	37,000.	675.	150.
112P	PCB-1016	ND	ND	ND	ND	ND
113P	toxaphene	ND	ND	ND	ND	ND

Sample Received: 2/17/82 Reported by: E. Kwong
Date Completed: 3/25/82 Checked by: [illegible]
Comments: ND = not detected (less than 1. ng/gm)

ENERGY RESOURCES CO. INC.
PESTICIDE ANALYSIS REPORT

Analyzed for: Geraghty & Miller All results in: ng/gm (ppb)

Client ID:		OC-6	OC-7	OC-8	OC-9	OC-10
89P	aldrin	ND	ND	ND	ND	ND
90P	dieldrin	ND	ND	ND	ND	ND
91P	chlordane	ND	ND	ND	ND	ND
92P	4,4'-DDT	1,100.	13,000.	3,200.	29.	11,000.
93P	4,4'-DDE	560.	3,300.	600.	18.	2,900.
94P	4,4'-DDD	94.	2,700.	1,400.	17.	2,600.
95P	alpha-endosulfan	ND	ND	ND	ND	ND
96P	beta-endosulfan	ND	ND	ND	ND	ND
97P	endosulfan sulfate	ND	ND	ND	ND	ND
98P	endrin	ND	ND	ND	ND	ND
99P	endrin aldehyde	ND	ND	ND	ND	ND
100P	heptachlor	1.	1.	ND	ND	10.
101P	heptachlor epoxide	ND	ND	ND	ND	ND
102P	alpha-BHC	ND	2.	1.	1.	5.
103P	beta-BHC	ND	20.	14.	ND	45.
104P	gamma-BHC	1.	44.	22.	ND	43.
105P	delta-BHC	1.	150.	88.	1.	171.
106P	PCB-1242	ND	ND	ND	ND	ND
107P	PCB-1254	ND	ND	ND	ND	ND
108P	PCB-1221	ND	ND	ND	ND	ND
109P	PCB-1232	ND	ND	ND	ND	ND
110P	PCB-1248	ND	ND	ND	ND	ND
111P	PCB-1260	3,200.	3,000.	1,100.	170.	530.
112P	PCB-1016	ND	ND	ND	ND	ND
113P	toxaphene	ND	ND	ND	ND	ND

Sample Received: 2/17/82 Reported by: E. Kwong
Date Completed: 3/25/82 Checked by: [illegible]
Comments: ND = not detected (less than 1. ng/gm)

ENERGY RESOURCES CO. INC.
PESTICIDE ANALYSIS REPORT

Analyzed for: Geraghty & Miller All results in: ng/gm (ppb)

Client ID:		OC-11	OC-12	Blank	OC-9*	OC-10*
89P	aldrin	ND	ND	ND	ND	ND
90P	dieldrin	ND	ND	ND	ND	ND
91P	chlordane	ND	ND	ND	ND	ND
92P	4,4'-DDT	40,000.	1,200.	ND	48.	14,000.
93P	4,4'-DDE	8,200.	590.	ND	20.	3,100.
94P	4,4'-DDD	6,900.	380.	ND	23.	3,000.
95P	alpha-endosulfan	ND	ND	ND	ND	ND
96P	beta-endosulfan	ND	ND	ND	ND	ND
97P	endosulfan sulfate	ND	ND	ND	ND	ND
98P	endrin	ND	ND	ND	ND	ND
99P	endrin aldehyde	ND	ND	ND	ND	ND
100P	heptachlor	29.	ND	ND	ND	8.
101P	heptachlor epoxide	ND	ND	ND	ND	ND
102P	alpha-BHC	25.	1.	ND	1.	10.
103P	beta-BHC	140.	2.	ND	ND	62.
104P	gamma-BHC	150.	3.	ND	ND	64.
105P	delta-BHC	660.	ND	ND	1.	240.
106P	PCB-1242	ND	ND	ND	ND	ND
107P	PCB-1254	ND	ND	ND	ND	ND
108P	PCB-1221	ND	ND	ND	ND	ND
109P	PCB-1232	ND	ND	ND	ND	ND
110P	PCB-1248	ND	ND	ND	ND	ND
111P	PCB-1260	11,000.	ND	ND	180.	510.
112P	PCB-1016	ND	ND	ND	ND	ND
113P	toxaphene	ND	ND	ND	ND	ND

Sample Received: 2/17/82 Reported by: E. Hwang
Date Completed: 3/25/82 Checked by: [signature]

Comments: ND = not detected (less than 1. ng/gm)
*Duplicate

pH MEASUREMENTS OF WATER SAMPLES
COLLECTED FROM MONITOR WELLS
AT THE ELECTRICAL TRANSFORMER STORAGE AREA,
FEBRUARY 12, 1982[1]

Well Number	pH
WOC-1	7.36
WOC-2	7.33

[1] Measured at the time of sample collection.

APPENDIX H

Oil Sludge Pit - Analytical Data

(Source: Reference 12)

ENERGY RESOURCES CO. INC.

INORGANIC CHEMISTRY LABORATORY

- Report of Chemical Analyses -

Client: Geraghty & Miller
Charleston, S.C.

ERCO ID	Client ID	Cl Concentration (gm/l)
51-928	OP-1	6.0
51-929	OP-3	1.4

Sample Rcvd. 7/30/81
Date Completed 8/25/81
Date of this rpt. 5/4/82
Reported by Kah
Checked by

Sample Rcvd: 8/3/81

Date Analysis Completed: 8/26/81

All Results In:

Reported By: Kathy Hemmerle

Checked By: Kab

ENERGY RESOURCES CO. INC.

POLYCHLORINATED BIPHENYLS (PCB)

- Report Sheet -

Analyzed for: Geraghty Miller

	Detection Limit	51-928 OP-1 28-312	51-929 OP-3 28-313
Aroclor 1221		ND	ND
Aroclor 1232		ND	ND
Aroclor 1016		ND	ND
Aroclor 1242		ND	ND
Aroclor 1248		ND	ND
Aroclor 1254		ND	ND
Aroclor 1260		.04ppb	ND
Aroclor 1262		ND	ND

Comments:

300B17/3-81

pH MEASUREMENTS OF WATER SAMPLES
COLLECTED FROM MONITOR WELLS AT THE
OIL-SLUDGE PIT AREA,
JULY 29, 1981[1]

Well Number	pH
OPW-1	7.50
OPW-3	6.40

[1] Measured at the time of sample collection.

ENERGY RESOURCES CO. INC

TRACE METAL ANALYSIS

- Report Sheet -

Analyzed for: Geraghty & Miller
Charleston, S.C.

mg/l unless otherwise stated

ERCO ID	CLIENT ID	F	NO^3	SO_4	TOC	COND umhos/cm
51-928	OP-1	--	--	<1	--	--
51-929	OP-3	--	--	780	--	--

If customer has any questions regarding analysis, refer to sample in question by its ERCO ID #.

Sample Rcvd. 7/30/81 Reported by Nat

Date Analysis Completed 8/25/81 Checked by Kah

Sample Rcvd: 7/30/81
Date Analysis Completed: 8/7/81
All Results In: mg/l
Reported By:
Checked By:

ENERGY RESOURCES CO. INC.

VOLATILE ORGANICS ANALYSIS

- Report Sheet -

Analyzed for: Geraghty & Miller

Compounds (in order of elution)	OP-1	OP-3
Vinyl chloride		
Methylene chloride	0.84	0.17
1,1-dichloroethylene		
1,1-dichloroethane		
trans-1,2-dichloroethylene		
1,2-dichloroethane		
1,1,1-trichloroethane		
1,2-Dichloropropane		
Trichloroethylene		
1,1,2-Trichloroethane		
Tetrachloroethylene		
Chlorobenzene		
Unknown	1.39	

Comments: All blank spaces are ND's (none detected) (<0.05 mg/l, or 50 ppb)

APPENDIX I

Closed Landfill - Analytical Data

(Source: Reference 9, 17)

APPENDIX I-1

Closed Landfill - Analytical Data

(Source: Reference 9)

ENERGY RESOURCES CO. INC

TRACE METAL ANALYSIS

- Report Sheet -

Analyzed for: Geraghty & Miller
Charleston, S.C.

mg/l unless otherwise stated

ERCO ID	CLIENT ID	F.	NO^3	SO_4	TOC	COND umhos/cm
51-920	LF-1	0.34-	<0.01	28	120	32,000
51-921	LF-2	0.16-	0.10	15	120	6,400
51-922	LF-3	0.29-	<0.01	<1	88	40,000
51-923	LF-4	0.56-	<0.01	600	100	31,000
51-924	LF-5	0.53-	<0.01	<1	150	36,000
51-925	SLF-1	0.52-	<0.01	<1	63	6,500
51-926	SLF-2	0.25-	<0.01	130	67	19,000
51-927	DLF-1	0.16-	0.25	37	57	580

If customer has any questions regarding analysis, refer to sample in question by its ERCO ID #.

Sample Rcvd. 7/30/81 Reported by [illegible]

Date Analysis Completed 8/25/81 Checked by [illegible]

ENERGY RESOURCES CO. INC

TRACE METAL ANALYSIS

- Report Sheet -

Analyzed for: Geraghty & Miller
Charleston, S.C.

ug/l unless otherwise stated

ERCO ID	CLIENT ID	Cd	Fe	Pb	Mg mg/l	Hg	Na mg/l
51-920	LF-1	<1	58	<5	760	0.4	6000
51-921	LF-2	<1	80	<5	110	<0.1	1200
51-922	LF-3	<1	600	<5	1020	<0.1	7200
51-923	LF-4	<1	4100	<5	560	<0.1	5100
51-924	LF-5	<1	310	<5	960	<0.1	6800
51-925	SLF-1	<1	1700	<5	140	<0.1	1000
51-926	SLF-2	<1	320	<5	140	<0.1	3000
51-927	DLF-1	<1	36	<5	1.6	<0.1	34

If customer has any questions regarding analysis, refer to sample in question by its ERCO ID #.

Sample Rcvd. 7/30/81 Reported by [illegible]

Date Analysis Completed 8/25/81 Checked by [illegible]

ENERGY RESOURCES CO. INC

INORGANIC ANALYSIS

- Report Sheet -
µg/l

Analyzed for: Geraghty & Miller
Waters

ERCO ID	CLIENT ID	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
IC-82-									
578	LF-6	15	380	<2	<5	<5	<0.1	<20	<1
579	LF-7	<10	1300	<2	<5	<5	<0.1	<20	<1
580	LF-8	66	590	<2	<5	18	<0.1	<20	<1
581	LF-9	<10	380	<2	<5	22	<0.1	<20	<1
581	ERCO DUPLICATE	--	370	<2	<5	22	<0.1	<20	<1
582	LF-10	<10	4620	<2	<5	<5	<0.1	<20	<1
583	SLF-1	<10	--	--	<5	--	--	<20	<1
584	SLF-2	<10	--	--	<5	--	--	<20	<1
585	LF-1	70	--	--	8.2	--	--	<20	<1
586	LF-3	24	--	--	<5	--	--	<20	<1
587	LF-4	<10	--	--	<5	--	--	<20	<1

If customer has any questions regarding analysis, refer to sample in question by its ERCO ID#.

Sample Rcvd. 2/17/82 Reported by [illegible]

Date Analysis Completed 3/16/82 Checked by [illegible]

ENERGY RESOURCES CO. INC.

INORGANIC CHEMISTRY LABORATORY

- Report of Chemical Analyses -

Client: Geraghty & Miller
Charleston, S.C.

ERCO ID	Client ID	Cl Concentration (gm/l)
51-920	LF-1	11.0
51-921	LF-2	1.6
51-922	LF-3	7.3
51-923	LF-4	7.2
51-924	LF-5	7.1
51-925	SLF-1	0.93
51-926	SLF-2	3.8
51-927	DLF-1	0.07

Sample Rcvd. 7/30/81
Date Completed 8/25/81
Date of this rpt. 5/4/82
Reported by Kah
Checked by

ENERGY RESOURCES CO. INC.
SUMMARY OF ORGANIC PRIORITY POLLUTANT ANALYSIS

IENT Geraghty & Miller

IENT I.D. SLF-1

CO I.D. 13-1254

DATE SAMPLE RECEIVED 2/17/82

DATE ANALYSIS COMPLETED 3/1/82

	ACID COMPOUNDS	µg/l
A	2,4,6-trichlorophenol	ND
A	p-chloro-m-cresol	ND
A	2-chlorophenol	ND
A	2,4-dichlorophenol	ND
A	2,4-dimethylphenol	ND
A	2-nitrophenol	ND
A	4-nitrophenol	ND
A	2,4-dinitrophenol	ND
A	4,6-dinitro-o-cresol	ND
A	pentachlorophenol	ND
A	phenol	ND

	BASE/NEUTRAL COMPOUNDS	
	acenaphthene	ND
	benzidine	ND
	1,2,4-trichlorobenzene	ND
	hexachlorobenzene	ND
B	hexachloroethane	ND
B	bis(2-chloroethyl)ether	ND
B	2-chloronaphthalene	ND
B	1,2-dichlorobenzene	ND
B	1,3-dichlorobenzene	ND
B	1,4-dichlorobenzene	*
B	3,3-dichlorobenzidine	ND
B	2,4-dinitrotoluene	ND
B	2,6-dinitrotoluene	ND
B	1,2-diphenylhydrazine	ND
B	fluoranthene	ND
B	4-chlorophenyl phenyl ether	ND

	BASE NEUTRAL COMPOUNDS	µg/l
418	4-bromophenyl phenyl ether	ND
428	bis(2-chloroisopropyl)ether	ND
438	bis(2-chloroethoxy)methane	ND
528	hexachlorobutadiene	ND
538	hexachlorocyclopentadiene	ND
548	isophorone	ND
558	naphthalene	ND
568	nitrobenzene	ND
618	N-nitrosodimethylamine	ND
628	N-nitrosodiphenylamine	ND
638	N-nitrosodi-n-propylamine	ND
668	bis(2-ethylhexyl)phthalate	*
678	butyl benzyl phthalate	ND
688	di-n-butyl phthalate	ND
698	di-n-octyl phthalate	ND
708	diethyl phthalate	*
718	dimethyl phthalate	ND
728	benzo(a)anthracene	ND
738	benzo(a)pyrene	ND
748	3,4-benzofluoranthene	ND
758	benzo(k)fluoranthene	ND
768	chrysene	ND
778	acenaphthylene	ND
788	anthracene	ND
798	benzo(ghi)perylene	ND
808	fluorene	ND
818	phenanthrene	ND
828	dibenzo(a,h)anthracene	ND
838	indeno(1,2,3-cd)pyrene	ND
848	pyrene	ND
1298	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

ND = Not detected
NA = Not applicable
* = 1-9 ug/l

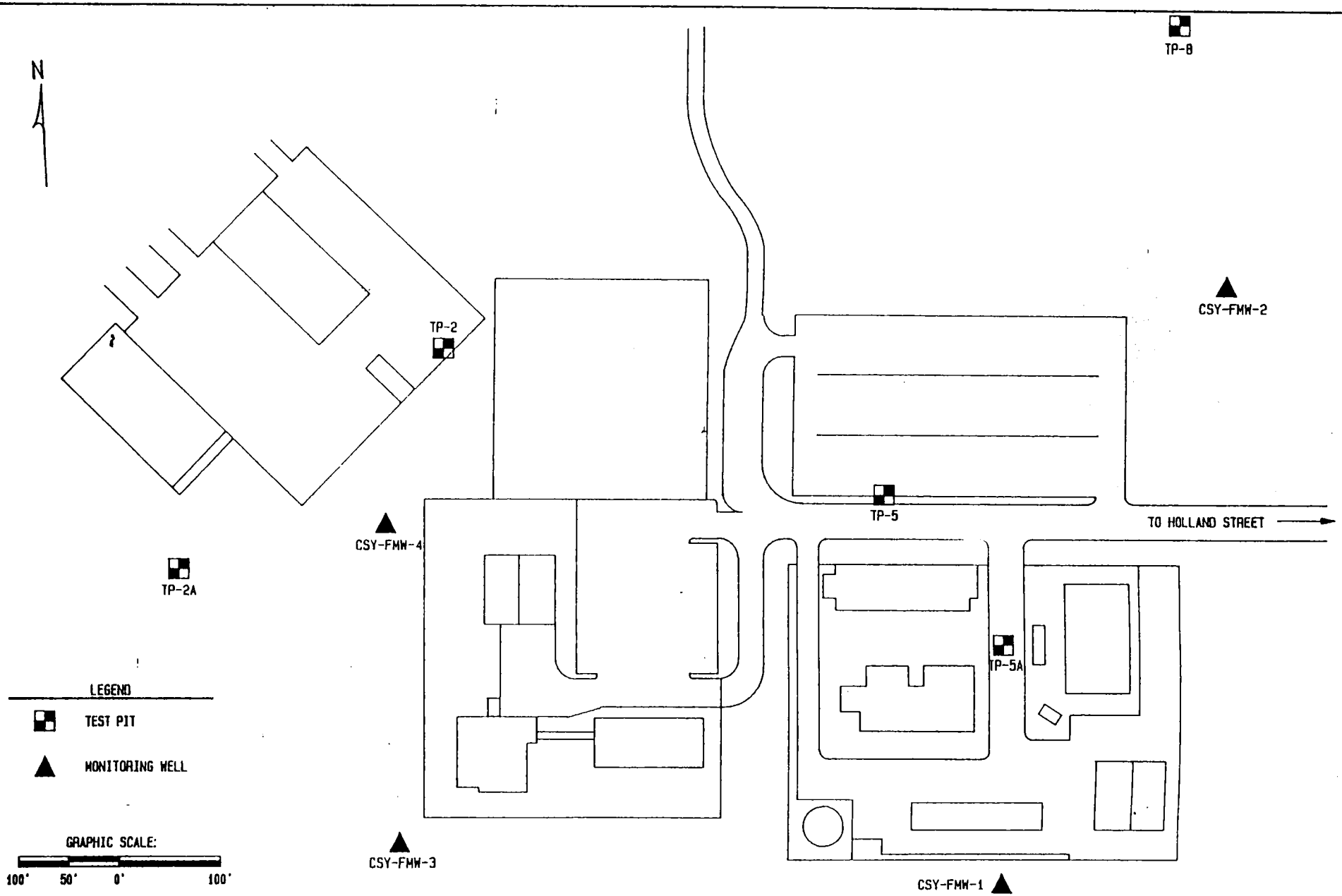
Reported by: [illegible]

Checked by: C. [illegible]

APPENDIX I-2

Closed Landfill - Test Pit Observations/Logs and Analytical Data

(Source - Reference 17)



ALE: 1" = 100'	DRAWN BY: WJM	REVISION DATE:	
TE: 4-18-91	CHECKED BY:	REVISION DATE:	
B NO.: CSWA219	OVED BY:	REVISION DATE:	

Westinghouse Environmental and Geotechnical Services, Inc.
840 Low Country Boulevard
Mt. Pleasant, South Carolina 29646
(803) 884-0005

TITLE: SITE PLAN
CHARLESTON NAVAL BASE
ADVANCED FIRE FIGHTING
CHARLESTON, SOUTH CAROLINA

FIGURE: 2

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

Ground Water Protection Division 2600 Bull Street Columbia, S.C. 29201 (803) 758-5213 Water Well Record

1. LOCATION OF WELL

County: Charleston System Name: CSY-FMW-3

Latitude: 32° 51' Longitude: 79° 57'

Distance And Direction from Road Intersections

1700' southwest of Bainbridge and Holland

Street address & City of Well Location

Sketch Map: (See example on back)

See Attached

2. CUTTING SAMPLES [x] Yes [ ] No

Geophysical Logs [ ] Yes (Please enclose) [x] No

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
rown Silty Sand	.5'	.5'
Gray Sandy Clay	1.5'	2'
Brown Silty Clay	3.5'	5.5'
Gray Clay	2'	7.5'

Indicate water bearing zones

1.2' - 5.5+

(use a 2nd sheet if needed)

3. REMARKS

4. OWNER OF WELL

Address Charleston Naval Base

Telephone No.

Engineer Address Saussy Engineering
230 Habersham Street
Savannah, GA 31412 (912) 223-5103

Telephone No

5. WELL DEPTH (Completed) ~~5.5~~ 5.5 ft. Date Started 04-11-91 Date Completed 04-11-91

6. [ ] Mud Rotary [ ] Jetted [x] Bored [ ] Dug [ ] Air Rotary [ ] Driven [ ] Cable tool [ ] Other

7. USE: [ ] Domestic [ ] Public Supply Permit No. ____ [ ] Indu [ ] Irrigation [ ] Air Conditioning [ ] Coin [xx] Test Well [ ] ____

8. CASING [x] Threaded [ ] Welded

Diam. Type [x] PVC [ ] Galvanized [ ] Steel [ ] Other

2 in. to .5 ft. depth

____ in. to ____ ft. depth

Height Above/Below Surface 0 ft. Weight ____ lbs. ft. Drive Shoe? [ ] Yes [ ] No

9. SCREEN

Type PVC Diam. 2"

Slot/Gauze 10 Length 5'

Set Between .5 ft. and 5.5 ft. NOTE: MULTIPLE SCR USE SECOND SHEET

____ ft. and ____ ft.

Sieve Analysis [ ] Yes (Please enclose) [x] No

10. STATIC WATER LEVEL

1.2' ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface

____ ft. after ____ hrs. pumping ____ G.P.M.

Pumping Test [ ] Yes (Please enclose) [x] No

Yield ____

12. WATER QUALITY

Chemical Analysis [x] Yes [ ] No Bacterial Analysis [ ] Yes [x] No

Please Enclose Lab Results

13. ARTIFICIAL FILTER (Gravel Pack) [x] Yes [ ] No

Installed from .5 ft. to 5.5 ft.

Effective size 0.513 uniformity coefficient 1.466

14. WELL GROUTED? [x] Yes [ ] No

Neat Cement [ ] Sand Cement [ ] Concrete [x] Other [x] Bentoni

Depth From 0.5 ft. to surface

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ Feet ____ Direc

____ Type Well disinfected [ ] Yes Type ____

upon completion [ ] No Amount ____

16. PUMP Date Installed ____ not installed [x]

Mfr. name ____ model no. ____

H.P. ____ volts ____ length of drop pipe ____ ft. capacity ____

TYPE: [ ] Submersible [ ] Jet (shallow) [ ] Turbine [ ] Jet (deep) [ ] Reciprocating [ ] Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my dire and this report is true to the best of my knowledge and belief.

REGISTERED BUSINESS NAME Hardin-Huber ADDRESS 1053 E. Lindsay Greensboro, NC 2

Signed for Rodney Fowler Greg Force CERT. NO. 855 5/15/91

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

Ground Water Protection Division | 2600 Bull Street | Columbia, S.C. 29201 | (803) 758-5213 | Water Well Record

1. LOCATION OF WELL

County: Charleston System Name: CSY-FMW-4

Latitude: 32° 51' Longitude: 79° 57'

Distance And Direction from Road Intersections

1500' southwest of Bainbridge and Holland

Street address & City of Well Location

Sketch Map: (See example on back)

See Attached

2. CUTTING SAMPLES [x] Yes [ ] No

Geophysical Logs [ ] Yes (Please enclose) [x] No

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Silty Sand	5'	5'
(w/tar beween 2-3.5')		
Light Brown Sandy Clay	2.5'	7.5'
With Organics		

* Indicate water bearing zones
1.75' - 7.5'+
(use a 2nd sheet if needed)

3. REMARKS

4. OWNER OF WELL
Address: Charleston Naval Base
Telephone No.

Engineer Address: Saussy Engineering
230 Habersham Street
Savannah, GA 31412
Telephone No. (912) 223-5103

5. WELL DEPTH (Completed) 7.5 ft. Date Started: 04-11-91 Date Completed: 04-11-91

6. [ ] Mud Rotary [ ] Jetted [x] Bored [ ] Dug
[ ] Air Rotary [ ] Driven [ ] Cable tool [ ] Other

7. USE: [ ] Domestic [ ] Public Supply Permit No ______ [ ] Indus
[ ] Irrigation [ ] Air Conditioning [ ] Comm
[x] Test Well [ ]

8. CASING [x] Threaded [ ] Welded
Diam.
Type [x] PVC [ ] Galvanized
[ ] Steel [ ] Other
2 in. to 2.5 ft. depth
___ in. to ___ ft. depth
Height Above/Below Surface 0 ft.
Weight ___ lbs./ft.
Drive Shoe? [ ] Yes [x] No

9. SCREEN
Type PVC Diam. 2"
Slot/Gauze 10 Length 5'
Set Between 2.5 ft. and 7.5 ft.
___ ft. and ___ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis [ ] Yes (Please enclose) [x] No

10. STATIC WATER LEVEL
1.75 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface
___ ft. after ___ hrs. pumping ___ G.P.M.
Pumping Test: [ ] Yes (Please enclose) [x] No
Yield

12. WATER QUALITY
Chemical Analysis [x] Yes [ ] No Bacterial Analysis [ ] Yes [x] No
Please Enclose Lab Results

13. ARTIFICIAL FILTER (Gravel Pack) [x] Yes [ ] No
Installed from 1.5 ft. to 7.5 ft.
Effective size ___ uniformity coefficient 1.466

14. WELL GROUTED? [ ] Yes [ ] No
Neat Cement [ ] Sand Cement [ ] Concrete [x] Other [x] Bentoni
Depth From 1.5 ft. to surface

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION ___ Feet ___ Direct
Type ___ Well disinfected upon completion [ ] Yes [ ] No Type ___ Amount ___

16. PUMP Date Installed ___ not installed [x]
Mfr. name ___ model no. ___
H.P. ___ volts ___ length of drop pipe ___ ft. capacity ___
TYPE: [ ] Submersible [ ] Jet (shallow) [ ] Turbine
[ ] Jet (deep) [ ] Reciprocating [ ] Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under m... and this report is true to the best of my knowledge and belief.

REGISTERED BUSINESS NAME: Hardin-Huber
ADDRESS: 1053 E. Lindsay S... Greensboro, NC 27...
Signed: [signature] Rodney Fowler
AUTHORIZED REPRESENTATIVE
CERT. NO. 855
Date 5/15/91

DHEC Exp. 96 (1/85) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

Ground Water Protection Division 2600 Bull Street Columbia, S.C. 29201 (803) 758-5213 Water Well Record

1. LOCATION OF WELL

County: Charleston System Name: CSY-FMW-2

Latitude: 32° 51' Longitude: 79° 57'

Distance And Direction from Road Intersections

800' south of Holland and Bainbridge

Street address & City of Well Location

Sketch Map: (See example on back)

See Attached

2. CUTTING SAMPLES [x] Yes [ ] No

Geophysical Logs [ ] Yes (Please enclose) [x] No

FORMATION DESCRIPTION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
rown-Black Silty Sand	3'	3'
(Topsoil)		
Tar, Trash, Sand	4.5	7.5

Indicate water bearing zones

3.45' - 7.5+

(use a 2nd sheet if needed)

3. REMARKS

4. OWNER OF WELL

Address Charleston Naval Base

Telephone No.

Engineer

Address Saussy Engineering
230 Habersham Street
Savannah, GA 31412 (912) 223-5103

Telephone No.

5. WELL DEPTH (Completed) 7.5 ft. Date Started 04-11-91 Date Completed 04-11-91

6. [ ] Mud Rotary [ ] Jetted [x] Bored [ ] Dug [ ] Air Rotary [ ] Driven [ ] Cable tool [ ] Other

7. USE: [ ] Domestic [ ] Public Supply Permit No. [ ] Indus [ ] Irrigation [ ] Air Conditioning [ ] Coloni [x] Test Well [ ]

8. CASING [x] Threaded [ ] Welded

Diam.

Type [x] PVC [ ] Galvanized [ ] Steel [ ] Other

2 in. to 2.5 ft. depth

in. to ft. depth

Height Above/Below Surface 0 ft.

Weight lbs./ft.

Drive Shoe? [ ] Yes [x] No

9. SCREEN

Type PVC Diam. 2"

Slot/Gauze 10 Length 5'

Set Between 2.5 ft. and 7.5 ft. NOTE: MULTIPLE SCRE USE SECOND SHEET

ft. and ft.

Sieve Analysis [ ] Yes (Please enclose) [x] No

10. STATIC WATER LEVEL

3.45' ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface

ft. after hrs. pumping G.P.M.

Pumping Test [ ] Yes (Please enclose) [x] No

Yield

12. WATER QUALITY

Chemical Analysis [x] Yes [ ] No Bacterial Analysis [ ] Yes [x] No

Please Enclose Lab Results

13. ARTIFICIAL FILTER (Gravel Pack) [x] Yes [ ] No

Installed from 1.5 ft. to 7.5 ft.

Effective size uniformity coefficient 1.466

14. WELL GROUTED? [ ] Yes [ ] No

Neat Cement [ ] Sand Cement [ ] Concrete [x] Other [x] Bentoni

Depth From ft. to ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: Feet Direct

Type Well disinfected upon completion [ ] Yes [ ] No Type Amount

16. PUMP Date Installed not installed [x]

Mfr. name model no.

H.P. volts length of drop pipe ft. capacity

TYPE: [ ] Submersible [ ] Jet (shallow) [ ] Turbine [ ] Jet (deep) [ ] Reciprocating [ ] Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direc and this report is true to the best of my knowledge and belief.

REGISTERED BUSINESS NAME Hardin-Huber ADDRESS 1053 E. Lindsay Greensboro, NC 2

Signed For Rodney Fowler Greg Force CERT. NO. 855 Date 5/15/91

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

Ground Water Protection Division 2600 Bull Street Columbia, S.C. 29201 (803) 758-5213 Water Well Record

1. LOCATION OF WELL

County: Charleston System Name: CSY-FMW-1

Latitude: 32° 51' Longitude: 79° 57'

Distance And Direction from Road Intersections

1500' south of Holland and Bainbridge

Street address & City of Well Location

Sketch Map (See example on back)

See Attached

2. CUTTING SAMPLES [x] Yes [ ] No

Geophysical Logs [ ] Yes (Please enclose) [x] No

FORMATION DESCRIPTION	*THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Brown Silty Sand	3'	3'
Black Silty Clay	4.5+	7.5

* Indicate water bearing zones

1.75' - 7.5'+

(use a 2nd sheet if needed)

3. REMARKS

4. OWNER OF WELL

Address Charleston Naval Base

Telephone No

Engineer Address Sa..ssy Engineering
230 Habersham Street
Savannah, GA 31412 (912) 223-5103

Telephone No

5. WELL DEPTH (Completed) 7.5 ft. Date Started 04-11-91 Date Completed 04-11-91

6. [ ] Mud Rotary [ ] Jetted [x] Bored [ ] Dug
[ ] Air Rotary [ ] Driven [ ] Cable tool [ ] Other

7. USE:
[ ] Domestic [ ] Public Supply Permit No ____ [ ] Industry
[ ] Irrigation [ ] Air Conditioning [ ] Commer
[xx] Test Well [ ] ____

8. CASING: [x] Threaded [ ] Welded

Diam.

Type: [X] PVC [ ] Galvanized
[ ] Steel [ ] Other

2 in. to 2.5 ft. depth

____ in. to ____ ft. depth

Height Above/Below Surface 0 ft

Weight ____ lbs/ft

Drive Shoe? [ ] Yes [X] No

9. SCREEN:

Type PVC Diam. 2"

Slot/Gauge 10 Length 5'

Set Between 2.5 ft. and 7.5 ft.

____ ft. and ____ ft.

NOTE: MULTIPLE SCREE USE SECOND SHEET

Sieve Analysis [ ] Yes (Please enclose) [xx] No

10. STATIC WATER LEVEL

1.75 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface

____ ft. after ____ hrs. pumping ____ G.P.M.

Pumping Test [ ] Yes (Please enclose) [X] No

Yield ____

12. WATER QUALITY

Chemical Analysis [X] Yes [ ] No Bacterial Analysis [ ] Yes [X] No

Please Enclose Lab Results

13. ARTIFICIAL FILTER (Gravel Pack) [xx] Yes [ ] No

Installed from 1.5 ft. to 7.5 ft.

Effective size ____ uniformity coefficient 1.466

14. WELL GROUTED? [ ] Yes [ ] No

Neat Cement [ ] Sand Cement [ ] Concrete [X] Other [X] Bentonit

Depth From 1.5 ft. to surface ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ Feet ____ Direction

____ Type Well disinfected upon completion [ ] Yes Type ____ [ ] No Amount ____

16. PUMP Date Installed ____ not installed [XX]

Mfr. name ____ model no. ____

H.P. ____ volts ____ length of drop pipe ____ ft. capacity ____ gp

TYPE: [ ] Submersible [ ] Jet (shallow) [ ] Turbine
[ ] Jet (deep) [ ] Reciprocating [ ] Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my and this report is true to the best of my knowledge and belief.

REGISTERED BUSINESS NAME Hardin-Huber ADDRESS 1053 E. Lindsa, Greensboro, NC 274

Signed For Rodney Fowler CERT. NO. 855

Date 5/15/91

AUTHORIZED REPRESENTATIVE

DHEC Exp. 96 (1/85) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

SPECTRUM
Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT	WESTINGHOUSE	DATE REPORTED:	04/18/91
SAMPLE LOCATION	TP-2/TRAIN. CNT.	EPA:	# FL095
SAMPLE NUMBER	002-041291	FL DRINKING WATER:	# 86144
DATE RECEIVED	04/12/91	FL ENVIRONMENTAL:	# E86006
DATE SAMPLED	04/11/91	GEORGIA:	# 828
SAMPLE TYPE	SOIL	SOUTH CAROLINA:	# 96015
SUBMITTER	DIRECT EXPRESS		

TEST		RESULTS	
LEAD,T	3050/7421	170.0	MG/KG D.W.
ARSENIC,T	3050/7060	4.60	MG/KG D.W.
BARIUM,T	3050/7080	35.	MG/KG D.W.
CADMIUM,T	3050/7131	.20	MG/KG D.W.
CHROMIUM,T	3050/7191	11.0	MG/KG D.W.
SELENIUM,T	3050/7740	.20	MG/KG D.W.
MERCURY,T	7471	<0.1	MG/KG D.W.
SILVER,T	3050/7760	<0.1	MG/KG D.W.
EPA 8240		NEGATIVE	
EPA 8270		POSITIVE	
pH OF SOLID	9045	8.0	

IF YOU HAVE ANY QUESTIONS PLEASE CONTACT ME.

DONALD S. MCCORQUODALE, JR. PH.D.
MICROBIOLOGIST

SPECTRUM Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE
SAMPLE: 002-041291/ TP-2 TRAIN. CNT. #219
DATA FILE: >41615::D4
DATE REPORTED: 4/17/91 2:28
DILUTION FACT: 5.00000

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING WATER: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

EPA METHOD 8240
PURGEABLE ORGANICS - SOILS -

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)	CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
67-64-1	ACETONE	0.0	5.00	95-50-1	o-DICHLOROBENZENE	0.0	1.00
75-05-8	ACETONITRILE	0.0	10.0	541-73-1	m-DICHLOROBENZENE	0.0	1.00
107-02-8	ACROLEIN	0.0	80.0	106-46-7	p-DICHLOROBENZENE	0.0	1.00
107-13-1	ACRYLONITRILE	0.0	20.0	156-60-5	trans,1,2-DICHLOROETHENE	0.0	1.00
71-43-2	BENZENE	0.0	1.00	78-87-5	1,2-DICHLOROPROPANE	0.0	1.00
100-44-7	BENZYL CHLORIDE	0.0	1.00	10061-01-5	cis,1,3-DICHLOROPROPENE	0.0	1.00
75-27-4	BROMODICHLOROMETHANE	0.0	1.00	10061-02-6	trans,1,3-DICHLOROPROPENE	0.0	1.00
75-25-2	BROMOFORM	0.0	1.00	100-41-4	ETHYLBENZENE	0.0	1.00
74-83-9	BROMOMETHANE	0.0	5.00	591-78-6	HEXANE	0.0	1.00
78-93-3	2-BUTANONE (MEK)	0.0	10.0	78-83-1	ISOBUTYL ALCOHOL	0.0	20.0
75-15-0	CARBON DISULFIDE	0.0	5.00	75-09-2	METHYLENE CHLORIDE	0.0	5.00
56-23-53	CARBON TETRACHLORIDE	0.0	1.00	108-10-1	4-METHYL-2-PENTANONE	0.0	10.0
108-90-7	CHLOROBENZENE	0.0	1.00	109-06-8	2-PICOLINE	0.0	
124-48-1	CHLORODIBROMOMETHANE	0.0	1.00	110-86-1	PYRIDINE	0.0	
75-00-3	CHLOROETHANE	0.0	5.00	100-42-5	STYRENE	0.0	1.00
110-75-8	2-CHLOROETHYLVINYLETHER	0.0	5.00	630-20-6	1,1,1,2-TETRACHLOROETHANE	0.0	1.00
67-66-3	CHLOROFORM	0.0	1.00	79-34-5	1,1,2,2-TETRACHLOROETHANE	0.0	1.00
74-87-3	CHLOROMETHANE	0.0	1.00	127-18-4	TETRACHLOROETHENE	0.0	1.00
96-12-8	1,2-DIBROMO-3-CHLOROPRO	0.0	1.00	108-88-3	TOLUENE	0.0	1.00
106-93-4	1,2-DIBROMOETHANE	0.0	1.00	71-55-6	1,1,1-TRICHLOROETHANE	0.0	1.00
74-95-3	DIBROMOMETHANE	0.0	1.00	79-00-5	1,1,2-TRICHLOROETHANE	0.0	1.00
764-41-0	1,4-DICHLORO-2-BUTENE	0.0	5.00	79-01-6	TRICHLOROETHENE	0.0	1.00
75-71-8	DICHLORODIFLUOROMETHANE	0.0	5.00	75-69-4	TRICHLOROFLUOROMETHANE	0.0	5.00
75-34-3	1,1-DICHLOROETHANE	0.0	1.00	96-18-4	1,2,3-TRICHLOROPROPANE	0.0	1.00
107-06-2	1,2-DICHLOROETHANE	0.0	1.00	108-05-4	VINYL ACETATE	0.0	5.00
75-35-4	1,1-DICHLOROETHENE	0.0	1.00	75-01-4	VINYL CHLORIDE	0.0	1.00
				1330-20-7	TOTAL XYLENES	0.0	1.00

LYLE A. JOHNSON - Chemist

* ACTUAL DETECTION LIMIT = METHOD DETECTION LIMIT x DILUTION FA
** BMDL - BELOW METHOD DETECTION LIMIT (A value of 0.0 = BMDL)

SPECTRUM Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE ENVIRO.
SAMPLE: 002-041291/ TP-2 TRAIN CNT #219
DATA FILE: >4B11A::D3
DATE REPORTED: 4/17/91 2:37
DILUTION FACT: 100.0000

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING WATER: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

EPA METHOD 8270
BASE/NEUTRALS AND ACIDS

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
83-32-9	ACENAPHTHENE	BMDL	0.50
208-96-8	ACENAPHTHYLENE	BMDL	0.50
98-86-2	ACETOPHENONE	BMDL	0.50
309-00-2	ALDRIN	BMDL	0.50
101-05-3	ANILAZINE	BMDL	10.0
62-53-3	ANILINE	BMDL	0.75
120-12-7	ANTHRACENE	BMDL	1.00
12674-11-2	AROCHLOR-1016	BMDL	5.00
11104-28-2	AROCHLOR-1221	BMDL	5.00
11141-16-5	AROCHLOR-1232	BMDL	5.00
53469-21-9	AROCHLOR-1242	BMDL	5.00
12672-29-6	AROCHLOR-1248	BMDL	5.00
11097-69-1	AROCHLOR-1254	BMDL	5.00
11096-82-5	AROCHLOR-1260	BMDL	5.00
86-50-0	AZINPHOS METHYL "GUTHION"	BMDL	5.00
101-27-9	BARBAN	BMDL	5.00
92-87-5	BENZIDINE	BMDL	20.0
65-85-0	BENZOIC ACID	BMDL	25.0
56-55-3	BENZO(a)ANTHRACENE	BMDL	0.75
205-99-2	BENZO(b)FLUORANTHENE	BMDL	0.75
207-08-9	BENZO(k)FLUORANTHENE	BMDL	1.00
191-24-2	BENZO(ghi)PERYLENE	BMDL	0.85
50-32-8	BENZO(a)PYRENE	BMDL	1.00
106-51-4	p-BENZOQUINONE	BMDL	1.00
100-51-6	BENZYL ALCOHOL	BMDL	1.00
319-84-6	BHC-alpha	BMDL	1.00
319-85-7	BHC-beta	BMDL	1.00
319-86-8	BHC-delta	BMDL	1.00
58-89-9	BHC-gamma "LINDANE"	BMDL	1.00
111-91-1	BIS(2-CHLOROETHOXY)METHANE	BMDL	1.00
111-44-4	BIS(2-CHLOROETHYL)ETHER	BMDL	1.00
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	BMDL	1.00
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	BMDL	1.00
101-55-3	4-BROMODIPHENYLETHER	BMDL	0.50
1689-84-5	BROMOXYNIL	BMDL	5.00
85-68-7	BUTYLBENZYLPHTHALATE	3580	1.00
2425-06-1	CAPTAFOL	BMDL	5.00
133-06-2	CAPTAN	BMDL	2.50
63-25-2	CARBARYL	BMDL	1.00
1563-66-2	CARBOFURAN	BMDL	1.00
786-19-6	CARBOPHENOTHION	BMDL	1.50
57-74-9	CHLORDANE	BMDL	5.00
470-90-6	CHLORFEVINPHOS	BMDL	1.00
106-47-8	4-CHLOROANILINE	BMDL	2.50
510-15-6	CHLOROBENZILATE	BMDL	1.00
59-50-7	4-CHLORO-3-METHYLPHENOL	BMDL	10.0
91-58-7	2-CHLORONAPHTHALENE	BMDL	1.00
95-57-8	2-CHLOROPHENOL	BMDL	1.00
7005-72-3	4-CHLORODIPHENYLETHER	BMDL	1.00
218-01-9	CHRYSENE	BMDL	2.50
56-72-4	COUMAPHOS	BMDL	2.50
7700-17-6	CROTOXYPHOS	BMDL	5.00
72-54-8	p'p'-DDD	BMDL	1.00
72-55-9	p'p'-DDE	BMDL	1.00
50-29-3	p'p'-DDT	BMDL	5.00

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
298-03-3	DEMETON-o	BMDL	1.00
126-75-0	DEMETON-s	BMDL	1.00
2303-16-4	cis-DIALLATE	BMDL	1.00
2303-16-4	trans-DIALLATE	BMDL	1.00
53-70-3	DIBENZO(ah)ANTHRACENE	BMDL	1.00
132-64-9	DIBENZOFURAN	BMDL	1.00
84-74-2	DI-n-BUTYLPHTHALATE	BMDL	1.00
117-80-6	DICHLONE	BMDL	5.00
95-50-1	1,2-DICHLOROBENZENE	BMDL	1.00
541-73-1	1,3-DICHLOROBENZENE	BMDL	1.00
106-46-7	1,4-DICHLOROBENZENE	BMDL	1.00
91-94-1	3,3-DICHLOROBENZIDINE	BMDL	20.0
120-83-2	2,4-DICHLOROPHENOL	BMDL	20.0
62-73-7	DICHLORVOS	BMDL	5.00
141-66-2	DICROTOPHOS	BMDL	5.00
60-57-1	DIELDRIN	BMDL	2.50
84-66-2	DIETHYLPHTHALATE	BMDL	1.00
60-51-5	DIMETHOATE	BMDL	2.50
105-67-9	2,4-DIMETHYLPHENOL	BMDL	2.00
131-11-3	DIMETHYLPHTHALATE	BMDL	1.00
528-29-0	m-DINITROBENZENE	BMDL	10.0
534-52-1	4,6-DINITRO-2-METHYLPHENOL	BMDL	40.0
51-28-5	2,4-DINITROPHENOL	BMDL	10.0
121-14-2	2,4-DINITROTOLUENE	BMDL	10.0
606-20-2	2,6-DINITROTOLUENE	BMDL	10.0
88-85-7	DINOSEB	BMDL	5.00
122-39-4	DIPHENYLAMINE	BMDL	2.50
122-66-7	1,2-DIPHENYLHYDRAZINE	BMDL	5.00
117-84-0	DI-n-OCTYLPHTHALATE	BMDL	5.00
298-04-4	DISULFOTON	BMDL	1.00
959-98-8	ENDOSULFAN I	BMDL	5.00
33212-65-9	ENDOSULFAN II	BMDL	5.00
1031-07-8	ENDOSULFAN SULFATE	BMDL	5.00
72-20-8	ENDRIN	BMDL	5.00
	ENDRIN KETONE	BMDL	1.00
2104-64-5	EPN	BMDL	1.00
563-12-2	ETHION	BMDL	1.00
52-85-7	FAMPHUR	BMDL	1.00
55-38-9	FENTHION	BMDL	1.00
33245-39-5	FLUCHLORALIN	BMDL	1.00
86-73-7	FLUORENE	BMDL	1.00
76-44-8	HEPATACHLOR	BMDL	1.00
1024-57-3	HEPTACHLOR EPOXIDE	BMDL	1.00
118-74-1	HEXACHLOROBENZENE	BMDL	1.00
87-68-3	HEXACHLOROBUTADIENE	BMDL	1.00
77-47-4	HEXACHLOROCYCLOPENTADIENE	BMDL	1.00
67-72-1	HEXACHLOROETHANE	BMDL	1.00
123-31-9	HYDROQUINONE	BMDL	1.00
193-39-5	INDENO(1,2,3-cd)PYRENE	BMDL	1.00
465-73-6	ISODRIN	BMDL	1.00
78-59-1	ISOPHORONE	BMDL	1.00
143-50-0	KEPONE	BMDL	1.00
21609-90-5	LEPTOPHOS	BMDL	1.00
121-75-5	MALATHION	BMDL	1.00

SPECTRUM Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTI HOUSE ENVIRO.
SAMPLE: 002- 91/ TP-2 TRAIN CNT #219
DATA FILE: >4B1 D3

EPA METHOD 8270
BASE/NEUTRALS AND ACIDS

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
72-43-5	METHOXYCHLOR-p'p'	BMDL	5.00
90-12-0	1-METHYLNAPHTHALENE	380	1.00
91-57-6	2-METHYLNAPHTHALENE	560	1.00
298-00-0	METHYL PARATHION	BMDL	1.00
95-48-7	2-METHYLPHENOL "o-CRESOL"	BMDL	5.00
108-39-4	3-METHYLPHENOL "m-CRESOL"	BMDL	5.00
106-44-5	4-METHYLPHENOL "p-CRESOL"	BMDL	5.00
7786-34-7	MEVINPHOS	BMDL	1.00
2385-85-5	MIREX	BMDL	5.00
6923-22-4	MONOCROTOPHOS	BMDL	5.00
300-76-5	NALED	BMDL	5.00
91-20-3	NAPHTHALENE	400	1.00
130-15-4	1,4-NAPHTHOQUINONE	BMDL	5.00
54-11-5	NICOTINE	BMDL	10.0
98-95-3	NITROBENZENE	BMDL	5.00
1836-75-5	NITROFEN	BMDL	5.00
88-75-5	2-NITROPHENOL	BMDL	5.00
100-02-7	4-NITROPHENOL	BMDL	5.00
62-75-9	n-NITROSODIMETHYLAMINE	BMDL	10.0
86-30-6	n-NITROSODIPHENYLAMINE	BMDL	10.0
621-64-7	n-NITROSODI-n-PROPYLAMINE	BMDL	10.0
56-38-2	PARATHION	BMDL	1.00
82-68-3	PENTACHLORONITROBENZENE	BMDL	1.00
87-86-5	PENTACHLOROPHENOL	BMDL	5.00
85-01-8	PHENANTHRENE	BMDL	1.00
108-95-2	PHENOL	BMDL	1.00
298-02-2	PHORATE	BMDL	1.00
732-11-6	PHOSMET	BMDL	1.00
13171-21-6	PHOSPHAMIDON	BMDL	5.00
109-06-8	2-PICOLINE	BMDL	10.0
23950-58-5	PRONAMIDE	BMDL	1.00
129-00-0	PYRENE	500	1.00
110-86-1	PYRIDINE	BMDL	10.0
13071-79-9	TERBUFOS	BMDL	5.00
95-94-3	1,2,4,5-TETRACHLOROBENZENE	BMDL	1.00
961-11-5	TETRACHLORVINPHOS	BMDL	5.00
8001-35-2	TOXAPHENE	BMDL	5.00
120-82-1	1,2,4-TRICHLOROBENZENE	BMDL	2.50
95-95-4	2,4,5-TRICHLOROPHENOL	BMDL	1.00
88-06-2	2,4,6-TRICHLOROPHENOL	BMDL	1.00
1582-09-8	TRIFLURALIN	BMDL	1.50

MISCELLANEOUS ANALYTES

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
30560-19-1	ACEPHATE	BMDL	10.0
76-06-2	CHLORPICRIN	BMDL	5.00
2675-77-6	CHLORNEB	BMDL	1.00
5598-13-0	CHLORPYRIFOS "DURSBAN"	BMDL	1.00
99-30-9	DICHLORAN "BOTRAN"	BMDL	1.00
333-41-5	DIAZINON	BMDL	1.00
120-36-5	DICHLORPROP	BMDL	10.0
957-51-7	DIPHENAMID	BMDL	1.00
25311-71-1	ISOFENPHOS	BMDL	5.00
150-50-5	MERPHOS	BMDL	1.00
114-26-1	PROPUXUR	BMDL	5.00
206-44-0	FLUORANTHENE	590	1.00

BMDL = BELOW METHOD DETECTION LIMIT
ACTUAL METHOD DETECTION LIMIT = DILUTION FACTOR x MDL

LYLE A. JOHNSON - Chemist

4550 N. Dixie Hwy., Ft. Lauderdale, Fla. 33334 • Phone: (305) 491-4691 • 630 Indian Street, Savannah, Ga. 31401 • Phone (912) 238-5050

SPECTRUM
Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT	WESTINGHOUSE	DATE REPORTED:	04/18/91
SAMPLE LOCATION	TP-5/TRAIN. CNT.	EPA:	# FL095
SAMPLE NUMBER	003-041291	FL DRINKING WATER:	# 86144
DATE RECEIVED	04/12/91	FL ENVIRONMENTAL:	# E86006
DATE SAMPLED	04/11/91	GEORGIA:	# 828
SAMPLE TYPE	SOIL	SOUTH CAROLINA:	# 96015
SUBMITTER	DIRECT EXPRESS		

TEST		RESULTS	
LEAD,T	3050/7421	15.0	MG/KG D.W.
ARSENIC,T	3050/7060	.40	MG/KG D.W.
BARIUM,T	3050/7080	<5.0	MG/KG D.W.
CADMIUM,T	3050/7131	.20	MG/KG D.W.
CHROMIUM,T	3050/7191	3.5	MG/KG D.W.
SELENIUM,T	3050/7740	.30	MG/KG D.W.
MERCURY,T	7471	<0.1	MG/KG D.W.
SILVER,T	3050/7760	<0.1	MG/KG D.W.
EPA 8240		POSITIVE	
EPA 8270		POSITIVE	
pH OF SOLID	9045	7.1	

IF YOU HAVE ANY QUESTIONS PLEASE CONTACT ME.

DONALD S. MCCORQUODALE, JR. PH.D.
MICROBIOLOGIST

4550 N. Dixie Hwy. Ft. Lauderdale, Fla. 33334 • Phone: (305) 491-4591 • 620 Indian Street, Savannah, Ga. 31401 • Phone (912) 238-5050

SPECTRUM

Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE
SAMPLE: 003-041291/ TP-5 TRAIN. CNT. #219
DATA FILE: >41616::D4
DATE REPORTED: 4/17/91 3:25
DILUTION FACT: 5.00000

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING WATER: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

EPA METHOD 8240
PURGEABLE ORGANICS - SOILS -

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)	CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/k
67-64-1	ACETONE	0.0	5.00	95-50-1	o-DICHLOROBENZENE	0.0	1.00
75-05-8	ACETONITRILE	0.0	10.0	541-73-1	m-DICHLOROBENZENE	0.0	1.00
107-02-8	ACROLEIN	0.0	80.0	106-46-7	p-DICHLOROBENZENE	17.9	1.00
107-13-1	ACRYLONITRILE	0.0	20.0	156-60-5	trans,1,2-DICHLOROETHENE	0.0	1.00
71-43-2	BENZENE	0.0	1.00	78-87-5	1,2-DICHLOROPROPANE	0.0	1.00
100-44-7	BENZYL CHLORIDE	0.0	1.00	10061-01-5	cis,1,3-DICHLOROPROPENE	0.0	1.00
75-27-4	BROMODICHLOROMETHANE	0.0	1.00	10061-02-6	trans,1,3-DICHLOROPROPENE	0.0	1.00
75-25-2	BROMOFORM	0.0	1.00	100-41-4	ETHYLBENZENE	0.0	1.00
74-83-9	BROMOMETHANE	0.0	5.00	591-78-6	HEXANE	0.0	1.00
78-93-3	2-BUTANONE (MEK)	0.0	10.0	78-83-1	ISOBUTYL ALCOHOL	0.0	20.0
75-15-0	CARBON DISULFIDE	0.0	5.00	75-09-2	METHYLENE CHLORIDE	0.0	5.00
56-23-53	CARBON TETRACHLORIDE	0.0	1.00	108-10-1	4-METHYL-2-PENTANONE	0.0	10.0
108-90-7	CHLOROBENZENE	0.0	1.00	109-06-8	2-PICOLINE	0.0	[illegible]
124-48-1	CHLORODIBROMOMETHANE	0.0	1.00	110-86-1	PYRIDINE	0.0	
75-00-3	CHLOROETHANE	0.0	5.00	100-42-5	STYRENE	0.0	[illegible]
110-75-8	2-CHLOROETHYLVINYLETHER	0.0	5.00	630-20-6	1,1,1,2-TETRACHLOROETHANE	0.0	1.00
67-66-3	CHLOROFORM	0.0	1.00	79-34-5	1,1,2,2-TETRACHLOROETHANE	0.0	1.00
74-87-3	CHLOROMETHANE	0.0	1.00	127-18-4	TETRACHLOROETHENE	0.0	1.00
96-12-8	1,2-DIBROMO-3-CHLOROPRO	0.0	1.00	108-88-3	TOLUENE	0.0	1.00
106-93-4	1,2-DIBROMOETHANE	0.0	1.00	71-55-6	1,1,1-TRICHLOROETHANE	0.0	1.00
74-95-3	DIBROMOMETHANE	0.0	1.00	79-00-5	1,1,2-TRICHLOROETHANE	0.0	1.00
764-41-0	1,4-DICHLORO-2-BUTENE	0.0	5.00	79-01-6	TRICHLOROETHENE	0.0	1.00
75-71-8	DICHLORODIFLUOROMETHANE	0.0	5.00	75-69-4	TRICHLOROFLUOROMETHANE	0.0	5.00
75-34-3	1,1-DICHLOROETHANE	0.0	1.00	96-18-4	1,2,3-TRICHLOROPROPANE	0.0	1.00
107-06-2	1,2-DICHLOROETHANE	0.0	1.00	108-05-4	VINYL ACETATE	0.0	5.00
75-35-4	1,1-DICHLOROETHENE	0.0	1.00	75-01-4	VINYL CHLORIDE	0.0	1.00
				1330-20-7	TOTAL XYLENES	0.0	1.00

LYLE A. JOHNSON / Chemist

* ACTUAL DETECTION LIMIT = METHOD DETECTION LIMIT x DILUTION F
** BMDL - BELOW METHOD DETECTION LIMIT (A value of 0.0 = BMDL)

SPECTRUM Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE ENVIRO.
SAMPLE: 003-041291/ TP-5 TRAIN CNT #219
DATA FILE: >4B12A::D3
DATE REPORTED: 4/17/91 3:54
DILUTION FACT: 100.0000

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING WATER: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

EPA METHOD 8270
BASE/NEUTRALS AND ACIDS

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
83-32-9	ACENAPHTHENE	BMDL	0.50
208-96-8	ACENAPHTHYLENE	BMDL	0.50
98-86-2	ACETOPHENONE	BMDL	0.50
309-00-2	ALDRIN	BMDL	0.50
101-05-3	ANILAZINE	BMDL	10.0
62-53-3	ANILINE	BMDL	0.75
120-12-7	ANTHRACENE	BMDL	1.00
12674-11-2	AROCHLOR-1016	BMDL	5.00
11104-28-2	AROCHLOR-1221	BMDL	5.00
11141-16-5	AROCHLOR-1232	BMDL	5.00
53469-21-9	AROCHLOR-1242	BMDL	5.00
12672-29-6	AROCHLOR-1248	BMDL	5.00
11097-69-1	AROCHLOR-1254	BMDL	5.00
11096-82-5	AROCHLOR-1260	BMDL	5.00
86-50-0	AZINPHOS METHYL "GUTHION"	BMDL	5.00
101-27-9	BARBAN	BMDL	5.00
2-87-5	BENZIDINE	BMDL	20.0
5-85-0	BENZOIC ACID	BMDL	25.0
56-55-3	BENZO(a)ANTHRACENE	BMDL	0.75
205-99-2	BENZO(b)FLUORANTHENE	BMDL	0.75
207-08-9	BENZO(k)FLUORANTHENE	BMDL	1.00
191-24-2	BENZO(ghi)PERYLENE	BMDL	0.85
50-32-8	BENZO(a)PYRENE	BMDL	1.00
106-51-4	p-BENZOQUINONE	BMDL	1.00
100-51-6	BENZYL ALCOHOL	BMDL	1.00
319-84-6	BHC-alpha	BMDL	1.00
319-85-7	BHC-beta	BMDL	1.00
319-86-8	BHC-delta	BMDL	1.00
58-89-9	BHC-gamma "LINDANE"	BMDL	1.00
111-91-1	BIS(2-CHLOROETHOXY)METHANE	BMDL	1.00
111-44-4	BIS(2-CHLOROETHYL)ETHER	BMDL	1.00
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	BMDL	1.00
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	BMDL	1.00
101-55-3	4-BROMODIPHENYLETHER	BMDL	0.50
1689-84-5	BROMOXYNIL	BMDL	5.00
85-68-7	BUTYLBENZYLPHTHALATE	BMDL	1.00
2425-06-1	CAPTAFOL	BMDL	5.00
133-06-2	CAPTAN	BMDL	2.50
63-25-2	CARBARYL	BMDL	1.00
1563-66-2	CARBOFURAN	BMDL	1.00
786-19-6	CARBOPHENOTHION	BMDL	1.50
57-74-9	CHLORDANE	BMDL	5.00
470-90-6	CHLORFEVINPHOS	BMDL	1.00
106-47-8	4-CHLOROANILINE	BMDL	2.50
510-15-6	CHLOROBENZILATE	BMDL	1.00
59-50-7	4-CHLORO-3-METHYLPHENOL	BMDL	10.0
91-58-7	2-CHLORONAPHTHALENE	BMDL	1.00
95-57-8	2-CHLOROPHENOL	BMDL	1.00
005-72-3	4-CHLORODIPHENYLETHER	BMDL	1.00
8-01-9	CHRYSENE	BMDL	2.50
-72-4	COUMAPHOS	BMDL	2.50
7700-17-6	CROTOXYPHOS	BMDL	5.00
72-54-8	p'p'-DDD	BMDL	1.00
72-55-9	p'p'-DDE	BMDL	1.00
50-29-3	p'p'-DDT	BMDL	5.00

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
298-03-3	DEMETON-o	BMDL	1.00
126-75-0	DEMETON-s	BMDL	1.00
2303-16-4	cis-DIALLATE	BMDL	1.00
2303-16-4	trans-DIALLATE	BMDL	1.00
53-70-3	DIBENZO(ah)ANTHRACENE	BMDL	1.00
132-64-9	DIBENZOFURAN	BMDL	1.00
84-74-2	DI-n-BUTYLPHTHALATE	BMDL	1.00
117-80-6	DICHLONE	BMDL	5.00
95-50-1	1,2-DICHLOROBENZENE	BMDL	1.00
541-73-1	1,3-DICHLOROBENZENE	BMDL	1.00
106-46-7	1,4-DICHLOROBENZENE	BMDL	1.00
91-94-1	3,3-DICHLOROBENZIDINE	BMDL	20.0
120-83-2	2,4-DICHLOROPHENOL	BMDL	20.0
62-73-7	DICHLORVOS	BMDL	5.00
141-66-2	DICROTOPHOS	BMDL	5.00
60-57-1	DIELDRIN	BMDL	2.50
84-66	DIETHYLPHTHALATE	BMDL	1.00
60-51-5	DIMETHOATE	BMDL	2.50
105-67-9	2,4-DIMETHYLPHENOL	BMDL	2.00
131-11-3	DIMETHYLPHTHALATE	BMDL	1.00
528-29-0	m-DINITROBENZENE	BMDL	10.0
534-52-1	4,6-DINITRO-2-METHYLPHENOL	BMDL	40.0
51-28-5	2,4-DINITROPHENOL	BMDL	10.0
121-14-2	2,4-DINITROTOLUENE	BMDL	10.0
606-20-2	2,6-DINITROTOLUENE	BMDL	10.0
88-85-7	DINOSEB	BMDL	5.00
122-39-4	DIPHENYLAMINE	BMDL	2.50
122-66-7	1,2-DIPHENYLHYDRAZINE	BMDL	5.00
117-84-0	DI-n-OCTYLPHTHALATE	BMDL	5.00
298-04-4	DISULFOTON	BMDL	1.00
959-98-8	ENDOSULFAN I	BMDL	5.00
33212-65-9	ENDOSULFAN II	BMDL	5.00
1031-07-8	ENDOSULFAN SULFATE	BMDL	5.00
72-20-8	ENDRIN	BMDL	5.00
	ENDRIN KETONE	BMDL	1.00
2104-64-5	EPN	BMDL	1.00
563-12-2	ETHION	BMDL	1.00
52-85-7	FAMPHUR	BMDL	1.00
55-38-9	FENTHION	BMDL	1.00
33245-39-5	FLUCHLORALIN	BMDL	1.00
86-73-7	FLUORENE	BMDL	1.00
76-44-8	HEPATACHLOR	BMDL	1.00
1024-57-3	HEPTACHLOR EPOXIDE	BMDL	1.00
118-74-1	HEXACHLOROBENZENE	BMDL	1.00
87-68-3	HEXACHLOROBUTADIENE	BMDL	1.00
77-47-4	HEXACHLOROCYCLOPENTADIENE	BMDL	1.00
67-72-1	HEXACHLOROETHANE	BMDL	1.00
123-31-9	HYDROQUINONE	BMDL	1.00
193-39-5	INDENO(1,2,3-cd)PYRENE	BMDL	1.00
465-73-6	ISODRIN	BMDL	1.00
78-59-1	ISOPHORONE	BMDL	1.00
143-50-0	KEPONE	BMDL	1.00
21609-90-5	LEPTOPHOS	BMDL	1.00
121-75-5	MALATHION	BMDL	1.00

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SPECTRUM Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE ENVIRO.
SAMPLE: 003-041291/ TP-5 TRAIN CNT #219
DATA FILE: >4B12A::D3

EPA METHOD 8270
BASE/NEUTRALS AND ACIDS

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
72-43-5	METHOXYCHLOR-p'p'	BMDL	5.00
90-12-0	1-METHYLNAPHTHALENE	BMDL	1.00
91-57-6	2-METHYLNAPHTHALENE	BMDL	1.00
298-00-0	METHYL PARATHION	BMDL	1.00
95-48-7	2-METHYLPHENOL "o-CRESOL"	BMDL	5.00
108-39-4	3-METHYLPHENOL "m-CRESOL"	BMDL	5.00
106-44-5	4-METHYLPHENOL "p-CRESOL"	BMDL	5.00
7786-34-7	MEVINPHOS	BMDL	1.00
2385-85-5	MIREX	BMDL	5.00
6923-22-4	MONOCROTOPHOS	BMDL	5.00
300-76-5	NALED	BMDL	5.00
91-20-3	NAPHTHALENE	390	1.00
130-15-4	1,4-NAPHTHOQUINONE	BMDL	5.00
54-11-5	NICOTINE	BMDL	10.0
98-95-3	NITROBENZENE	BMDL	5.00
1836-75-5	NITROFEN	BMDL	5.00
88-75-5	2-NITROPHENOL	BMDL	5.00
100-02-7	4-NITROPHENOL	BMDL	5.00
62-75-9	n-NITROSODIMETHYLAMINE	BMDL	10.0
86-30-6	n-NITROSODIPHENYLAMINE	BMDL	10.0
621-64-7	n-NITROSODI-n-PROPYLAMINE	BMDL	10.0
56-38-2	PARATHION	BMDL	1.00
82-68-3	PENTACHLORONITROBENZENE	BMDL	1.00
87-86-5	PENTACHLOROPHENOL	BMDL	5.00
85-01-8	PHENANTHRENE	BMDL	1.00
108-95-2	PHENOL	BMDL	1.00
298-02-2	PHORATE	BMDL	1.00
732-11-6	PHOSMET	BMDL	1.00
13171-21-6	PHOSPHAMIDON	BMDL	5.00
109-06-8	2-PICOLINE	BMDL	10.0
23950-58-5	PRONAMIDE	BMDL	1.00
129-00-0	PYRENE	BMDL	1.00
110-86-1	PYRIDINE	BMDL	10.0
13071-79-9	TERBUFOS	BMDL	5.00
95-94-3	1,2,4,5-TETRACHLOROBENZENE	BMDL	1.00
961-11-5	TETRACHLORVINPHOS	BMDL	5.00
8001-35-2	TOXAPHENE	BMDL	5.00
120-82-1	1,2,4-TRICHLOROBENZENE	BMDL	2.50
95-95-4	2,4,5-TRICHLOROPHENOL	BMDL	1.00
88-06-2	2,4,6-TRICHLOROPHENOL	BMDL	1.00
1582-09-8	TRIFLURALIN	BMDL	1.50

MISCELLANEOUS ANALYTES

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg
30560-19-1	ACEPHATE	BMDL	10.0
76-06-2	CHLORPICRIN	BMDL	5.00
2675-77-6	CHLORNEB	BMDL	1.00
5598-13-0	CHLORPYRIFOS "DURSBAN"	BMDL	1.00
99-30-9	DICHLORAN "BOTRAN"	BMDL	1.00
333-41-5	DIAZINON	BMDL	1.00
120-36-5	DICHLORPROP	BMDL	10.0
957-51-7	DIPHENAMID	BMDL	1.00
25311-71-1	ISOFENPHOS	BMDL	5.00
150-50-5	MERPHOS	BMDL	1.00
114-26-1	PROPUXUR	BMDL	5.00
206-44-0	FLUORANTHENE	BMDL	1.00

BMDL = BELOW METHOD DETECTION LIMIT
ACTUAL METHOD DETECTION LIMIT = DILUTION FACTOR x MDL

LYLE A. JOHNSON - Chemist

4550 N. Dixie Hwy., Ft. Lauderdale, Fla. 33334 • Phone: (305) 491-4691 • 630 Indian Street, Savannah, Ga. 31401 • Phone (912) 238-5050

SPECTRUM
Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT	WESTINGHOUSE	DATE REPORTED:	04/18/91
SAMPLE LOCATION	TP-8/TRAIN. CNT.	EPA:	# FL095
SAMPLE NUMBER	004-041291	FL DRINKING WATER:	# 86144
DATE RECEIVED	04/12/91	FL ENVIRONMENTAL:	# E86006
DATE SAMPLED	04/11/91	GEORGIA:	# 828
SAMPLE TYPE	SOIL	SOUTH CAROLINA:	# 96015
SUBMITTER	DIRECT EXPRESS		

TEST		RESULTS	
LEAD,T	3050/7421	3210.0	MG/KG D.W.
ARSENIC,T	3050/7060	2.10	MG/KG D.W.
BARIUM,T	3050/7080	41.	MG/KG D.W.
CADMIUM,T	3050/7131	3.10	MG/KG D.W.
CHROMIUM,T	3050/7191	49.0	MG/KG D.W.
SELENIUM,T	3050/7740	.30	MG/KG D.W.
MERCURY,T	7471	<0.1	MG/KG D.W.
SILVER,T	3050/7760	.3	MG/KG D.W.
EPA 8240		POSITIVE	
EPA 8270		POSITIVE	
pH OF SOLID	9045	7.4	

IF YOU HAVE ANY QUESTIONS PLEASE CONTACT ME.

DONALD S. MCCORQUODALE, JR. PH.D.
MICROBIOLOGIST

SPECTRUM
Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE
SAMPLE: 004-041291/ TP-8 TRAIN. CNT. #219
DATA FILE: >41617::D4
DATE REPORTED: 4/17/91 4:25
DILUTION FACT: 5.00000

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING WATER: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

EPA METHOD 8240
PURGEABLE ORGANICS - SOILS -

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)	CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
67-64-1	ACETONE	0.0	5.00	95-50-1	o-DICHLOROBENZENE	23.3	1.00
75-05-8	ACETONITRILE	0.0	10.0	541-73-1	m-DICHLOROBENZENE	0.0	1.00
107-02-8	ACROLEIN	0.0	80.0	106-46-7	p-DICHLOROBENZENE	97.0	1.00
107-13-1	ACRYLONITRILE	0.0	20.0	156-60-5	trans,1,2-DICHLOROETHENE	0.0	1.00
71-43-2	BENZENE	0.0	1.00	78-87-5	1,2-DICHLOROPROPANE	0.0	1.00
100-44-7	BENZYL CHLORIDE	0.0	1.00	10061-01-5	cis,1,3-DICHLOROPROPENE	0.0	1.00
75-27-4	BROMODICHLOROMETHANE	0.0	1.00	10061-02-6	trans,1,3-DICHLOROPROPENE	0.0	1.00
75-25-2	BROMOFORM	0.0	1.00	100-41-4	ETHYLBENZENE	0.0	1.00
74-83-9	BROMOMETHANE	0.0	5.00	591-78-6	HEXANE	0.0	1.00
78-93-3	2-BUTANONE (MEK)	0.0	10.0	78-83-1	ISOBUTYL ALCOHOL	0.0	20.0
75-15-0	CARBON DISULFIDE	0.0	5.00	75-09-2	METHYLENE CHLORIDE	0.0	5.00
56-23-53	CARBON TETRACHLORIDE	0.0	1.00	108-10-1	4-METHYL-2-PENTANONE	0.0	10.0
108-90-7	CHLOROBENZENE	154.0	1.00	109-06-8	2-PICOLINE	0.0	
124-48-1	CHLORODIBROMOMETHANE	0.0	1.00	110-86-1	PYRIDINE	0.0	
75-00-3	CHLOROETHANE	0.0	5.00	100-42-5	STYRENE	0.0	1.00
110-75-8	2-CHLOROETHYLVINYLETHER	0.0	5.00	630-20-6	1,1,1,2-TETRACHLOROETHANE	0.0	1.00
67-66-3	CHLOROFORM	0.0	1.00	79-34-5	1,1,2,2-TETRACHLOROETHANE	0.0	1.00
74-87-3	CHLOROMETHANE	0.0	1.00	127-18-4	TETRACHLOROETHENE	0.0	1.00
96-12-8	1,2-DIBROMO-3-CHLOROPRO	0.0	1.00	108-88-3	TOLUENE	0.0	1.00
106-93-4	1,2-DIBROMOETHANE	0.0	1.00	71-55-6	1,1,1-TRICHLOROETHANE	0.0	1.00
74-95-3	DIBROMOMETHANE	0.0	1.00	79-00-5	1,1,2-TRICHLOROETHANE	0.0	1.00
764-41-0	1,4-DICHLORO-2-BUTENE	0.0	5.00	79-01-6	TRICHLOROETHENE	0.0	1.00
75-71-8	DICHLORODIFLUOROMETHANE	0.0	5.00	75-69-4	TRICHLOROFLUOROMETHANE	0.0	5.00
75-34-3	1,1-DICHLOROETHANE	0.0	1.00	96-18-4	1,2,3-TRICHLOROPROPANE	0.0	1.00
107-06-2	1,2-DICHLOROETHANE	0.0	1.00	108-05-4	VINYL ACETATE	0.0	5.00
75-35-4	1,1-DICHLOROETHENE	0.0	1.00	75-01-4	VINYL CHLORIDE	0.0	1.00
				1330-20-7	TOTAL XYLENES	0.0	1.00

KYLE A. JOHNSON - Chemist

* ACTUAL DETECTION LIMIT = METHOD DETECTION LIMIT x DILUTION FA
** BMDL - BELOW METHOD DETECTION LIMIT (A value of 0.0 = BMDL)

SPECTRUM

Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE ENVIRO.
SAMPLE: 004-041291/ TP-8 TRAIN CNT #219
DATA FILE: >4B13A::D3
DATE REPORTED: 4/17/91 5:12
DILUTION FACT: 100.0000

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING WATER: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

EPA METHOD 8270
BASE/NEUTRALS AND ACIDS

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
83-32-9	ACENAPHTHENE	160	0.50
208-96-8	ACENAPHTHYLENE	165	0.50
98-86-2	ACETOPHENONE	BMDL	0.50
309-00-2	ALDRIN	BMDL	0.50
101-05-3	ANILAZINE	BMDL	10.0
62-53-3	ANILINE	BMDL	0.75
120-12-7	ANTHRACENE	380	1.00
12674-11-2	AROCHLOR-1016	BMDL	5.00
11104-28-2	AROCHLOR-1221	BMDL	5.00
11141-16-5	AROCHLOR-1232	BMDL	5.00
53469-21-9	AROCHLOR-1242	BMDL	5.00
12672-29-6	AROCHLOR-1248	BMDL	5.00
11097-69-1	AROCHLOR-1254	BMDL	5.00
11096-82-5	AROCHLOR-1260	BMDL	5.00
86-50-0	AZINPHOS METHYL "GUTHION"	BMDL	5.00
01-27-9	BARBAN	BMDL	5.00
2-87-5	BENZIDINE	BMDL	20.0
65-85-0	BENZOIC ACID	BMDL	25.0
56-55-3	BENZO(a)ANTHRACENE	260	0.75
205-99-2	BENZO(b)FLUORANTHENE	470	0.75
207-08-9	BENZO(k)FLUORANTHENE	470	1.00
191-24-2	BENZO(ghi)PERYLENE	BMDL	0.85
50-32-8	BENZO(a)PYRENE	240	1.00
106-51-4	p-BENZOQUINONE	BMDL	1.00
100-51-6	BENZYL ALCOHOL	BMDL	1.00
319-84-6	BHC-alpha	BMDL	1.00
319-85-7	BHC-beta	BMDL	1.00
319-86-8	BHC-delta	BMDL	1.00
58-89-9	BHC-gamma "LINDANE"	BMDL	1.00
111-91-1	BIS(2-CHLOROETHOXY)METHANE	BMDL	1.00
111-44-4	BIS(2-CHLOROETHYL)ETHER	BMDL	1.00
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	BMDL	1.00
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	8690	1.00
101-55-3	4-BROMODIPHENYLETHER	BMDL	0.50
1689-84-5	BROMOXYNIL	BMDL	5.00
85-68-7	BUTYLBENZYLPHTHALATE	3330	1.00
2425-06-1	CAPTAFOL	BMDL	5.00
133-06-2	CAPTAN	BMDL	2.50
63-25-2	CARBARYL	BMDL	1.00
1563-66-2	CARBOFURAN	BMDL	1.00
786-19-6	CARBOPHENOTHION	BMDL	1.50
57-74-9	CHLORDANE	BMDL	5.00
470-90-6	CHLORFEVINPHOS	BMDL	1.00
106-47-8	4-CHLOROANILINE	BMDL	2.50
510-15-6	CHLOROBENZILATE	BMDL	1.00
59-50-7	4-CHLORO-3-METHYLPHENOL	BMDL	10.0
91-58-7	2-CHLORONAPHTHALENE	BMDL	1.00
95-57-8	2-CHLOROPHENOL	BMDL	1.00
005-72-3	4-CHLORODIPHENYLETHER	BMDL	1.00
18-01-9	CHRYSENE	420	2.50
56-72-4	COUMAPHOS	BMDL	2.50
7700-17-6	CROTOXYPHOS	BMDL	5.00
72-54-8	p'p'-DDD	BMDL	1.00
72-55-9	p'p'-DDE	BMDL	1.00
50-29-3	p'p'-DDT	BMDL	5.00

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
298-03-3	DEMETON-o	BMDL	1.00
126-75-0	DEMETON-s	BMDL	1.00
2303-16-4	cis-DIALLATE	BMDL	1.00
2303-16-4	trans-DIALLATE	BMDL	1.00
53-70-3	DIBENZO(ah)ANTHRACENE	BMDL	1.00
132-64-9	DIBENZOFURAN	BMDL	1.00
84-74-2	DI-n-BUTYLPHTHALATE	BMDL	1.00
117-80-6	DICHLONE	BMDL	5.00
95-50-1	1,2-DICHLOROBENZENE	BMDL	1.00
541-73-1	1,3-DICHLOROBENZENE	BMDL	1.00
106-46-7	1,4-DICHLOROBENZENE	100	1.00
91-94-1	3,3-DICHLOROBENZIDINE	BMDL	20.0
120-83-2	2,4-DICHLOROPHENOL	BMDL	20.0
62-73-7	DICHLORVOS	BMDL	5.00
141-66-2	DICROTOPHOS	BMDL	5.00
60-57-1	DIELDRIN	BMDL	2.50
84-66-2	DIETHYLPHTHALATE	BMDL	1.00
60-51-5	DIMETHOATE	BMDL	2.50
105-67-9	2,4-DIMETHYLPHENOL	BMDL	2.00
131-11-3	DIMETHYLPHTHALATE	BMDL	1.00
528-29-0	m-DINITROBENZENE	BMDL	10.0
534-52-1	4,6-DINITRO-2-METHYLPHENOL	BMDL	40.0
51-28-5	2,4-DINITROPHENOL	BMDL	10.0
121-14-2	2,4-DINITROTOLUENE	BMDL	10.0
606-20-2	2,6-DINITROTOLUENE	BMDL	10.0
88-85-7	DINOSEB	BMDL	5.00
122-39-4	DIPHENYLAMINE	BMDL	2.50
122-66-7	1,2-DIPHENYLHYDRAZINE	BMDL	5.00
117-84-0	DI-n-OCTYLPHTHALATE	BMDL	5.00
298-04-4	DISULFOTON	BMDL	1.00
959-98-8	ENDOSULFAN I	BMDL	5.00
33212-65-9	ENDOSULFAN II	BMDL	5.00
1031-07-8	ENDOSULFAN SULFATE	BMDL	5.00
72-20-8	ENDRIN	BMDL	5.00
	ENDRIN KETONE	BMDL	1.00
2104-64-5	EPN	BMDL	1.00
563-12-2	ETHION	BMDL	1.00
52-85-7	FAMPHUR	BMDL	1.00
55-38-9	FENTHION	BMDL	1.00
33245-39-5	FLUCHLORALIN	BMDL	1.00
86-73-7	FLUORENE	210	1.00
76-44-8	HEPATACHLOR	BMDL	1.00
1024-57-3	HEPTACHLOR EPOXIDE	BMDL	1.00
118-74-1	HEXACHLOROBENZENE	BMDL	1.00
87-68-3	HEXACHLOROBUTADIENE	BMDL	1.00
77-47-4	HEXACHLOROCYCLOPENTADIENE	BMDL	1.00
67-72-1	HEXACHLOROETHANE	BMDL	1.00
123-31-9	HYDROQUINONE	BMDL	1.00
193-39-5	INDENO(1,2,3-cd)PYRENE	BMDL	1.00
465-73-6	ISODRIN	BMDL	1.00
78-59-1	ISOPHORONE	BMDL	1.00
143-50-0	KEPONE	BMDL	1.00
21609-90-5	LEPTOPHOS	BMDL	1.00
121-75-5	MALATHION	BMDL	1.00

SPECTRUM Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE ENVIRO.
SAMPLE: 004-041291/ TP-8 TRAIN CNT #219
DATA FILE: >4B13A::D3

EPA METHOD 8270
BASE/NEUTRALS AND ACIDS

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
72-43-5	METHOXYCHLOR-p'p'	BMDL	5.00
90-12-0	1-METHYLNAPHTHALENE	330	1.00
91-57-6	2-METHYLNAPHTHALENE	630	1.00
298-00-0	METHYL PARATHION	BMDL	1.00
95-48-7	2-METHYLPHENOL "o-CRESOL"	BMDL	5.00
108-39-4	3-METHYLPHENOL "m-CRESOL"	BMDL	5.00
106-44-5	4-METHYLPHENOL "p-CRESOL"	BMDL	5.00
7786-34-7	MEVINPHOS	BMDL	1.00
2385-85-5	MIREX	BMDL	5.00
6923-22-4	MONOCROTOPHOS	BMDL	5.00
300-76-5	NALED	BMDL	5.00
91-20-3	NAPHTHALENE	580	1.00
130-15-4	1,4-NAPHTHOQUINONE	BMDL	5.00
54-11-5	NICOTINE	BMDL	10.0
98-95-3	NITROBENZENE	BMDL	5.00
1836-75-5	NITROFEN	BMDL	5.00
88-75-5	2-NITROPHENOL	BMDL	5.00
100-02-7	4-NITROPHENOL	BMDL	5.00
62-75-9	n-NITROSODIMETHYLAMINE	BMDL	10.0
86-30-6	n-NITROSODIPHENYLAMINE	BMDL	10.0
621-64-7	n-NITROSODI-n-PROPYLAMINE	BMDL	10.0
56-38-2	PARATHION	BMDL	1.00
82-68-3	PENTACHLORONITROBENZENE	BMDL	1.00
87-86-5	PENTACHLOROPHENOL	BMDL	5.00
85-01-8	PHENANTHRENE	1800	1.00
108-95-2	PHENOL	BMDL	1.00
298-02-2	PHORATE	BMDL	1.00
732-11-6	PHOSMET	BMDL	1.00
13171-21-6	PHOSPHAMIDON	BMDL	5.00
109-06-8	2-PICOLINE	BMDL	10.0
23950-58-5	PRONAMIDE	BMDL	1.00
129-00-0	PYRENE	1290	1.00
110-86-1	PYRIDINE	BMDL	10.0
13071-79-9	TERBUFOS	BMDL	5.00
95-94-3	1,2,4,5-TETRACHLOROBENZENE	BMDL	1.00
961-11-5	TETRACHLORVINPHOS	BMDL	5.00
8001-35-2	TOXAPHENE	BMDL	5.00
120-82-1	1,2,4-TRICHLOROBENZENE	BMDL	2.50
95-95-4	2,4,5-TRICHLOROPHENOL	BMDL	1.00
88-06-2	2,4,6-TRICHLOROPHENOL	BMDL	1.00
1582-09-8	TRIFLURALIN	BMDL	1.50

MISCELLANEOUS ANALYTES

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg
30560-19-1	ACEPHATE	BMDL	10.0
76-06-2	CHLORPICRIN	BMDL	5.00
2675-77-6	CHLORNEB	BMDL	1.00
5598-13-0	CHLORPYRIFOS "DURSBAN"	BMDL	1.00
99-30-9	DICHLORAN "BOTRAN"	BMDL	1.00
333-41-5	DIAZINON	BMDL	1.00
120-36-5	DICHLORPROP	BMDL	10.0
957-51-7	DIPHENAMID	BMDL	1.00
25311-71-1	ISOFENPHOS	BMDL	5.00
150-50-5	MERPHOS	BMDL	1.00
114-26-1	PROPUXUR	BMDL	5.00
206-44-0	FLUORANTHENE	1920	1.00

BMDL = BELOW METHOD DETECTION LIMIT
ACTUAL METHOD DETECTION LIMIT = DILUTION FACTOR x MDL

LYCE A. JOHNSON, Chemist

4550 N. Dixie Hwy., Ft. Lauderdale, Fla. 33334 • Phone: (305) 491-4691 • 630 Indian Street, Savannah, Ga. 31401 • Phone (912) 238-5050

SPECTRUM
Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT	WESTINGHOUSE	DATE REPORTED:	04/18/91
SAMPLE LOCATION	TP-2A//TRAIN CNTR	EPA:	# FL095
SAMPLE NUMBER	005-041291	FL DRINKING WATER:	# 86144
DATE RECEIVED	04/12/91	FL ENVIRONMENTAL:	# E86006
DATE SAMPLED	04/11/91	GEORGIA:	# 828
SAMPLE TYPE	SOIL	SOUTH CAROLINA:	# 96015
SUBMITTER	DIRECT EXPRESS		

TEST		RESULTS	
LEAD,T	3050/7421	22.0	MG/KG D.W.
ARSENIC,T	3050/7060	11.00	MG/KG D.W.
BARIUM,T	3050/7080	110.	MG/KG D.W.
CADMIUM,T	3050/7131	.30	MG/KG D.W.
CHROMIUM,T	3050/7191	15.0	MG/KG D.W.
SELENIUM,T	3050/7740	.40	MG/KG D.W.
MERCURY,T	7471	<0.1	MG/KG D.W.
SILVER,T	3050/7760	<0.1	MG/KG D.W.
EPA 8240		POSITIVE	
EPA 8270		POSITIVE	
pH OF SOLID	9045	7.5	

IF YOU HAVE ANY QUESTIONS PLEASE CONTACT ME.

DONALD S. MCCORQUODALE, JR. PH.D.
MICROBIOLOGIST

SPECTRUM Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE
SAMPLE: 005-041291/ TP-2A TRAIN. CNT. #21
DATA FILE: >41618::D4
DATE REPORTED: 4/17/91 5:27
DILUTION FACT: 5.00000

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING WATER: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

EPA METHOD 8240
PURGEABLE ORGANICS - SOILS -

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)	CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg
67-64-1	ACETONE	0.0	5.00	95-50-1	o-DICHLOROBENZENE	0.0	1.00
75-05-8	ACETONITRILE	0.0	10.0	541-73-1	m-DICHLOROBENZENE	0.0	1.00
107-02-8	ACROLEIN	0.0	80.0	106-46-7	p-DICHLOROBENZENE	0.0	1.00
107-13-1	ACRYLONITRILE	0.0	20.0	156-60-5	trans,1,2-DICHLOROETHENE	0.0	1.00
71-43-2	BENZENE	0.0	1.00	78-87-5	1,2-DICHLOROPROPANE	0.0	1.00
100-44-7	BENZYL CHLORIDE	0.0	1.00	10061-01-5	cis,1,3-DICHLOROPROPENE	0.0	1.00
75-27-4	BROMODICHLOROMETHANE	0.0	1.00	10061-02-6	trans,1,3-DICHLOROPROPENE	0.0	1.00
75-25-2	BROMOFORM	0.0	1.00	100-41-4	ETHYLBENZENE	0.0	1.00
74-83-9	BROMOMETHANE	0.0	5.00	591-78-6	HEXANE	0.0	1.00
78-93-3	2-BUTANONE (MEK)	0.0	10.0	78-83-1	ISOBUTYL ALCOHOL	0.0	20.0
75-15-0	CARBON DISULFIDE	0.0	5.00	75-09-2	METHYLENE CHLORIDE	0.0	5.00
56-23-53	CARBON TETRACHLORIDE	0.0	1.00	108-10-1	4-METHYL-2-PENTANONE	0.0	10.0
108-90-7	CHLOROBENZENE	0.0	1.00	109-06-8	2-PICOLINE	0.0	
124-48-1	CHLORODIBROMOMETHANE	0.0	1.00	110-86-1	PYRIDINE	0.0	
75-00-3	CHLOROETHANE	0.0	5.00	100-42-5	STYRENE	0.0	1.00
110-75-8	2-CHLOROETHYLVINYLETHER	0.0	5.00	630-20-6	1,1,1,2-TETRACHLOROETHANE	0.0	1.00
67-66-3	CHLOROFORM	0.0	1.00	79-34-5	1,1,2,2-TETRACHLOROETHANE	0.0	1.00
74-87-3	CHLOROMETHANE	0.0	1.00	127-18-4	TETRACHLOROETHENE	0.0	1.00
96-12-8	1,2-DIBROMO-3-CHLOROPRO	0.0	1.00	108-88-3	TOLUENE	0.0	1.00
106-93-4	1,2-DIBROMOETHANE	0.0	1.00	71-55-6	1,1,1-TRICHLOROETHANE	0.0	1.00
74-95-3	DIBROMOMETHANE	0.0	1.00	79-00-5	1,1,2-TRICHLOROETHANE	0.0	1.00
764-41-0	1,4-DICHLORO-2-BUTENE	0.0	5.00	79-01-6	TRICHLOROETHENE	0.0	1.00
75-71-8	DICHLORODIFLUOROMETHANE	0.0	5.00	75-69-4	TRICHLOROFLUOROMETHANE	0.0	5.00
75-34-3	1,1-DICHLOROETHANE	0.0	1.00	96-18-4	1,2,3-TRICHLOROPROPANE	0.0	1.00
107-06-2	1,2-DICHLOROETHANE	0.0	1.00	108-05-4	VINYL ACETATE	0.0	5.00
75-35-4	1,1-DICHLOROETHENE	0.0	1.00	75-01-4	VINYL CHLORIDE	0.0	1.00
				1330-20-7	TOTAL XYLENES	6.3	1.00

LYLE A. JOHNSON / Chemist

* ACTUAL DETECTION LIMIT = METHOD DETECTION LIMIT x DILUTION FA
** BMDL - BELOW METHOD DETECTION LIMIT (A value of 0.0 = BMDL)

SPECTRUM

Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE ENVIRO.
SAMPLE: 005-041291/ TP-2A TRAIN CNT #219
DATA FILE: >4B14A::D3
DATE REPORTED: 4/17/91 6:35
DILUTION FACT: 100.0000

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING WATER: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

EPA METHOD 8270
BASE/NEUTRALS AND ACIDS

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
83-32-9	ACENAPHTHENE	BMDL	0.50
208-96-8	ACENAPHTHYLENE	BMDL	0.50
98-86-2	ACETOPHENONE	BMDL	0.50
309-00-2	ALDRIN	BMDL	0.50
101-05-3	ANILAZINE	BMDL	10.0
62-53-3	ANILINE	BMDL	0.75
120-12-7	ANTHRACENE	100	1.00
12674-11-2	AROCHLOR-1016	BMDL	5.00
11104-28-2	AROCHLOR-1221	BMDL	5.00
11141-16-5	AROCHLOR-1232	BMDL	5.00
53469-21-9	AROCHLOR-1242	BMDL	5.00
12672-29-6	AROCHLOR-1248	BMDL	5.00
11097-69-1	AROCHLOR-1254	BMDL	5.00
11096-82-5	AROCHLOR-1260	BMDL	5.00
86-50-0	AZINPHOS METHYL "GUTHION"	BMDL	5.00
01-27-9	BARBAN	BMDL	5.00
2-87-5	BENZIDINE	BMDL	20.0
65-85-0	BENZOIC ACID	BMDL	25.0
56-55-3	BENZO(a)ANTHRACENE	230	0.75
205-99-2	BENZO(b)FLUORANTHENE	BMDL	0.75
207-08-9	BENZO(k)FLUORANTHENE	BMDL	1.00
191-24-2	BENZO(ghi)PERYLENE	BMDL	0.85
50-32-8	BENZO(a)PYRENE	BMDL	1.00
106-51-4	p-BENZOQUINONE	BMDL	1.00
100-51-6	BENZYL ALCOHOL	BMDL	1.00
319-84-6	BHC-alpha	BMDL	1.00
319-85-7	BHC-beta	BMDL	1.00
319-86-8	BHC-delta	BMDL	1.00
58-89-9	BHC-gamma "LINDANE"	BMDL	1.00
111-91-1	BIS(2-CHLOROETHOXY)METHANE	BMDL	1.00
111-44-4	BIS(2-CHLOROETHYL)ETHER	BMDL	1.00
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	BMDL	1.00
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	630	1.00
101-55-3	4-BROMODIPHENYLETHER	BMDL	0.50
1689-84-5	BROMOXYNIL	BMDL	5.00
85-68-7	BUTYLBENZYLPHTHALATE	5130	1.00
2425-06-1	CAPTAFOL	BMDL	5.00
133-06-2	CAPTAN	BMDL	2.50
63-25-2	CARBARYL	BMDL	1.00
1563-66-2	CARBOFURAN	BMDL	1.00
786-19-6	CARBOPHENOTHION	BMDL	1.50
57-74-9	CHLORDANE	BMDL	5.00
470-90-6	CHLORFEVINPHOS	BMDL	1.00
106-47-8	4-CHLOROANILINE	BMDL	2.50
510-15-6	CHLOROBENZILATE	BMDL	1.00
59-50-7	4-CHLORO-3-METHYLPHENOL	BMDL	10.0
91-58-7	2-CHLORONAPHTHALENE	BMDL	1.00
95-57-8	2-CHLOROPHENOL	BMDL	1.00
7005-72-3	4-CHLORODIPHENYLETHER	BMDL	1.00
218-01-9	CHRYSENE	120	2.50
56-72-4	COUMAPHOS	BMDL	2.50
7700-17-6	CROTOXYPHOS	BMDL	5.00
72-54-8	p'p'-DDD	BMDL	1.00
72-55-9	p'p'-DDE	BMDL	1.00
50-29-3	p'p'-DDT	BMDL	5.00

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
298-03-3	DEMETON-o	BMDL	1.00
126-75-0	DEMETON-s	BMDL	1.00
2303-16-4	cis-DIALLATE	BMDL	1.00
2303-16-4	trans-DIALLATE	BMDL	1.00
53-70-3	DIBENZO(ah)ANTHRACENE	BMDL	1.00
132-64-9	DIBENZOFURAN	BMDL	1.00
84-74-2	DI-n-BUTYLPHTHALATE	BMDL	1.00
117-80-6	DICHLONE	BMDL	5.00
95-50-1	1,2-DICHLOROBENZENE	BMDL	1.00
541-73-1	1,3-DICHLOROBENZENE	BMDL	1.00
106-46-7	1,4-DICHLOROBENZENE	BMDL	1.00
91-94-1	3,3-DICHLOROBENZIDINE	BMDL	20.0
120-83-2	2,4-DICHLOROPHENOL	BMDL	20.0
62-73-7	DICHLORVOS	BMDL	5.00
141-66-2	DICROTOPHOS	BMDL	5.00
60-57-1	DIELDRIN	BMDL	2.50
84-66-2	DIETHYLPHTHALATE	BMDL	1.00
60-51-5	DIMETHOATE	BMDL	2.50
105-67-9	2,4-DIMETHYLPHENOL	BMDL	2.00
131-11-3	DIMETHYLPHTHALATE	BMDL	1.00
528-29-0	m-DINITROBENZENE	BMDL	10.0
534-52-1	4,6-DINITRO-2-METHYLPHENOL	BMDL	40.0
51-28-5	2,4-DINITROPHENOL	BMDL	10.0
121-14-2	2,4-DINITROTOLUENE	BMDL	10.0
606-20-2	2,6-DINITROTOLUENE	BMDL	10.0
88-85-7	DINOSEB	BMDL	5.00
122-39-4	DIPHENYLAMINE	BMDL	2.50
122-66-7	1,2-DIPHENYLHYDRAZINE	BMDL	5.00
117-84-0	DI-n-OCTYLPHTHALATE	BMDL	5.00
298-04-4	DISULFOTON	BMDL	1.00
959-98-8	ENDOSULFAN I	BMDL	5.00
33212-65-9	ENDOSULFAN II	BMDL	5.00
1031-07-8	ENDOSULFAN SULFATE	BMDL	5.00
72-20-8	ENDRIN	BMDL	5.00
	ENDRIN KETONE	BMDL	1.00
2104-64-5	EPN	BMDL	1.00
563-12-2	ETHION	BMDL	1.00
52-85-7	FAMPHUR	BMDL	1.00
55-38-9	FENTHION	BMDL	1.00
33245-39-5	FLUCHLORALIN	BMDL	1.00
86-73-7	FLUORENE	BMDL	1.00
76-44-8	HEPATACHLOR	BMDL	1.00
1024-57-3	HEPTACHLOR EPOXIDE	BMDL	1.00
118-74-1	HEXACHLOROBENZENE	BMDL	1.00
87-68-3	HEXACHLOROBUTADIENE	BMDL	1.00
77-47-4	HEXACHLOROCYCLOPENTADIENE	BMDL	1.00
67-72-1	HEXACHLOROETHANE	BMDL	1.00
123-31-9	HYDROQUINONE	BMDL	1.00
193-39-5	INDENO(1,2,3-cd)PYRENE	BMDL	1.00
465-73-6	ISODRIN	BMDL	1.00
78-59-1	ISOPHORONE	BMDL	1.00
143-50-0	KEPONE	BMDL	1.00
21609-90-5	LEPTOPHOS	BMDL	1.00
121-75-5	MALATHION	BMDL	1.00

SPECTRUM Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE ENVIRO.
SAMPLE: 005-041291/ TP-2A TRAIN CNT #219
DATA FILE: >4B14A::D3

EPA METHOD 8270
BASE/NEUTRALS AND ACIDS

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
72-43-5	METHOXYCHLOR-p'p'	BMDL	5.00
90-12-0	1-METHYLNAPHTHALENE	BMDL	1.00
91-57-6	2-METHYLNAPHTHALENE	BMDL	1.00
298-00-0	METHYL PARATHION	BMDL	1.00
95-48-7	2-METHYLPHENOL "o-CRESOL"	BMDL	5.00
108-39-4	3-METHYLPHENOL "m-CRESOL"	BMDL	5.00
106-44-5	4-METHYLPHENOL "p-CRESOL"	BMDL	5.00
7786-34-7	MEVINPHOS	BMDL	1.00
2385-85-5	MIREX	BMDL	5.00
6923-22-4	MONOCROTOPHOS	BMDL	5.00
300-76-5	NALED	BMDL	5.00
91-20-3	NAPHTHALENE	560	1.00
130-15-4	1,4-NAPHTHOQUINONE	BMDL	5.00
54-11-5	NICOTINE	BMDL	10.0
98-95-3	NITROBENZENE	BMDL	5.00
1836-75-5	NITROFEN	BMDL	5.00
88-75-5	2-NITROPHENOL	BMDL	5.00
100-02-7	4-NITROPHENOL	BMDL	5.00
62-75-9	n-NITROSODIMETHYLAMINE	BMDL	10.0
86-30-6	n-NITROSODIPHENYLAMINE	BMDL	10.0
621-64-7	n-NITROSODI-n-PROPYLAMINE	BMDL	10.0
56-38-2	PARATHION	BMDL	1.00
82-68-3	PENTACHLORONITROBENZENE	BMDL	1.00
87-86-5	PENTACHLOROPHENOL	BMDL	5.00
85-01-8	PHENANTHRENE	180	1.00
108-95-2	PHENOL	BMDL	1.00
298-02-2	PHORATE	BMDL	1.00
732-11-6	PHOSMET	BMDL	1.00
13171-21-6	PHOSPHAMIDON	BMDL	5.00
109-06-8	2-PICOLINE	BMDL	10.0
23950-58-5	PRONAMIDE	BMDL	1.00
129-00-0	PYRENE	430	1.00
110-86-1	PYRIDINE	BMDL	10.0
13071-79-9	TERBUFOS	BMDL	5.00
95-94-3	1,2,4,5-TETRACHLOROBENZENE	BMDL	1.00
961-11-5	TETRACHLORVINPHOS	BMDL	5.00
8001-35-2	TOXAPHENE	BMDL	5.00
120-82-1	1,2,4-TRICHLOROBENZENE	BMDL	2.50
95-95-4	2,4,5-TRICHLOROPHENOL	BMDL	1.00
88-06-2	2,4,6-TRICHLOROPHENOL	BMDL	1.00
1582-09-8	TRIFLURALIN	BMDL	1.50

MISCELLANEOUS ANALYTES

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
30560-19-1	ACEPHATE	BMDL	10.0
76-06-2	CHLORPICRIN	BMDL	5.00
2675-77-6	CHLORNEB	BMDL	1.00
5598-13-0	CHLORPYRIFOS "DURSBAN"	BMDL	1.00
99-30-9	DICHLORAN "BOTRAN"	BMDL	1.00
333-41-5	DIAZINON	BMDL	1.00
120-36-5	DICHLORPROP	BMDL	10.0
957-51-7	DIPHENAMID	BMDL	1.00
25311-71-1	ISOFENPHOS	BMDL	5.00
150-50-5	MERPHOS	BMDL	1.00
114-26-1	PROPUXUR	BMDL	5.00
206-44-0	FLUORANTHENE	550	1.00

BMDL = BELOW METHOD DETECTION LIMIT
ACTUAL METHOD DETECTION LIMIT = DILUTION FACTOR x MDL

LYLE A. JOHNSON - Chemist

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SPECTRUM
Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT	WESTINGHOUSE	DATE REPORTED:	04/18/91
SAMPLE LOCATION	TP-5A//TRAIN CNTR	EPA:	# FL095
SAMPLE NUMBER	006-041291	FL DRINKING WATER:	# 86144
DATE RECEIVED	04/12/91	FL ENVIRONMENTAL:	# E86006
DATE SAMPLED	04/11/91	GEORGIA:	# 828
SAMPLE TYPE	SOIL	SOUTH CAROLINA:	# 96015
SUBMITTER	DIRECT EXPRESS		

TEST		RESULTS	
LEAD,T	3050/7421	10.0	MG/KG D.W.
ARSENIC,T	3050/7060	.60	MG/KG D.W.
BARIUM,T	3050/7080	37.	MG/KG D.W.
CADMIUM,T	3050/7131	<0.1	MG/KG D.W.
CHROMIUM,T	3050/7191	4.8	MG/KG D.W.
SELENIUM,T	3050/7740	.20	MG/KG D.W.
MERCURY,T	7471	<0.1	MG/KG D.W.
SILVER,T	3050/7760	<0.1	MG/KG D.W.
EPA 8240		NEGATIVE	
EPA 8270		POSITIVE	
pH OF SOLID	9045	7.6	

IF YOU HAVE ANY QUESTIONS PLEASE CONTACT ME.

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SPECTRUM
Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE
SAMPLE: 006-041291/ TP-5A TRAIN. CNT. #21
DATA FILE: >41619::D4
DATE REPORTED: 4/17/91 6:22
DILUTION FACT: 5.00000

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING WATER: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

EPA METHOD 8240
PURGEABLE ORGANICS - SOILS -

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)	CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
67-64-1	ACETONE	0.0	5.00	95-50-1	o-DICHLOROBENZENE	0.0	1.00
75-05-8	ACETONITRILE	0.0	10.0	541-73-1	m-DICHLOROBENZENE	0.0	1.00
107-02-8	ACROLEIN	0.0	80.0	106-46-7	p-DICHLOROBENZENE	0.0	1.00
107-13-1	ACRYLONITRILE	0.0	20.0	156-60-5	trans,1,2-DICHLOROETHENE	0.0	1.00
71-43-2	BENZENE	0.0	1.00	78-87-5	1,2-DICHLOROPROPANE	0.0	1.00
100-44-7	BENZYL CHLORIDE	0.0	1.00	10061-01-5	cis,1,3-DICHLOROPROPENE	0.0	1.00
75-27-4	BROMODICHLOROMETHANE	0.0	1.00	10061-02-6	trans,1,3-DICHLOROPROPENE	0.0	1.00
75-25-2	BROMOFORM	0.0	1.00	100-41-4	ETHYLBENZENE	0.0	1.00
74-83-9	BROMOMETHANE	0.0	5.00	591-78-6	HEXANE	0.0	1.00
78-93-3	2-BUTANONE (MEK)	0.0	10.0	78-83-1	ISOBUTYL ALCOHOL	0.0	20.0
75-15-0	CARBON DISULFIDE	0.0	5.00	75-09-2	METHYLENE CHLORIDE	0.0	5.00
56-23-53	CARBON TETRACHLORIDE	0.0	1.00	108-10-1	4-METHYL-2-PENTANONE	0.0	
108-90-7	CHLOROBENZENE	0.0	1.00	109-06-8	2-PICOLINE	0.0	
124-48-1	CHLORODIBROMOMETHANE	0.0	1.00	110-86-1	PYRIDINE	0.0	1
75-00-3	CHLOROETHANE	0.0	5.00	100-42-5	STYRENE	0.0	1.00
110-75-8	2-CHLOROETHYLVINYLETHER	0.0	5.00	630-20-6	1,1,1,2-TETRACHLOROETHANE	0.0	1.00
67-66-3	CHLOROFORM	0.0	1.00	79-34-5	1,1,2,2-TETRACHLOROETHANE	0.0	1.00
74-87-3	CHLOROMETHANE	0.0	1.00	127-18-4	TETRACHLOROETHENE	0.0	1.00
96-12-8	1,2-DIBROMO-3-CHLOROPRO	0.0	1.00	108-88-3	TOLUENE	0.0	1.00
106-93-4	1,2-DIBROMOETHANE	0.0	1.00	71-55-6	1,1,1-TRICHLOROETHANE	0.0	1.00
74-95-3	DIBROMOMETHANE	0.0	1.00	79-00-5	1,1,2-TRICHLOROETHANE	0.0	1.00
764-41-0	1,4-DICHLORO-2-BUTENE	0.0	5.00	79-01-6	TRICHLOROETHENE	0.0	1.00
75-71-8	DICHLORODIFLUOROMETHANE	0.0	5.00	75-69-4	TRICHLOROFLUOROMETHANE	0.0	5.00
75-34-3	1,1-DICHLOROETHANE	0.0	1.00	96-18-4	1,2,3-TRICHLOROPROPANE	0.0	1.00
107-06-2	1,2-DICHLOROETHANE	0.0	1.00	108-05-4	VINYL ACETATE	0.0	5.00
75-35-4	1,1-DICHLOROETHENE	0.0	1.00	75-01-4	VINYL CHLORIDE	0.0	1.00
				1330-20-7	TOTAL XYLENES	0.0	1.00

LYLE A. JOHNSON - Chemist

* ACTUAL DETECTION LIMIT = METHOD DETECTION LIMIT x DILUTION FACT.
** BMDL - BELOW METHOD DETECTION LIMIT (A value of 0.0 = BMDL)

SPECTRUM Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE ENVIRO.
SAMPLE: 006-041291/ TP-5A TRAIN CNT #219
DATA FILE: >4B15A::D3
DATE REPORTED: 4/17/91 7:52
DILUTION FACT: 100.0000

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING WATER: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

EPA METHOD 8270
BASE/NEUTRALS AND ACIDS

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
83-32-9	ACENAPHTHENE	BMDL	0.50
208-96-8	ACENAPHTHYLENE	BMDL	0.50
98-86-2	ACETOPHENONE	BMDL	0.50
309-00-2	ALDRIN	BMDL	0.50
101-05-3	ANILAZINE	BMDL	10.0
62-53-3	ANILINE	BMDL	0.75
120-12-7	ANTHRACENE	BMDL	1.00
12674-11-2	AROCHLOR-1016	BMDL	5.00
11104-28-2	AROCHLOR-1221	BMDL	5.00
11141-16-5	AROCHLOR-1232	BMDL	5.00
53469-21-9	AROCHLOR-1242	BMDL	5.00
12672-29-6	AROCHLOR-1248	BMDL	5.00
11097-69-1	AROCHLOR-1254	BMDL	5.00
11096-82-5	AROCHLOR-1260	BMDL	5.00
86-50-0	AZINPHOS METHYL "GUTHION"	BMDL	5.00
'01-27-9	BARBAN	BMDL	5.00
2-87-5	BENZIDINE	BMDL	20.0
65-85-0	BENZOIC ACID	BMDL	25.0
56-55-3	BENZO(a)ANTHRACENE	BMDL	0.75
205-99-2	BENZO(b)FLUORANTHENE	BMDL	0.75
207-08-9	BENZO(k)FLUORANTHENE	BMDL	1.00
191-24-2	BENZO(ghi)PERYLENE	BMDL	0.85
50-32-8	BENZO(a)PYRENE	BMDL	1.00
106-51-4	p-BENZOQUINONE	BMDL	1.00
100-51-6	BENZYL ALCOHOL	BMDL	1.00
319-84-6	BHC-alpha	BMDL	1.00
319-85-7	BHC-beta	BMDL	1.00
319-86-8	BHC-delta	BMDL	1.00
58-89-9	BHC-gamma "LINDANE"	BMDL	1.00
111-91-1	BIS(2-CHLOROETHOXY)METHANE	BMDL	1.00
111-44-4	BIS(2-CHLOROETHYL)ETHER	BMDL	1.00
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	BMDL	1.00
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	BMDL	1.00
101-55-3	4-BROMODIPHENYLETHER	BMDL	0.50
1689-84-5	BROMOXYNIL	BMDL	5.00
85-68-7	BUTYLBENZYLPHTHALATE	2130	1.00
2425-06-1	CAPTAFOL	BMDL	5.00
133-06-2	CAPTAN	BMDL	2.50
63-25-2	CARBARYL	BMDL	1.00
1563-66-2	CARBOFURAN	BMDL	1.00
786-19-6	CARBOPHENOTHION	BMDL	1.50
57-74-9	CHLORDANE	BMDL	5.00
470-90-6	CHLORFEVINPHOS	BMDL	1.00
106-47-8	4-CHLOROANILINE	BMDL	2.50
510-15-6	CHLOROBENZILATE	BMDL	1.00
59-50-7	4-CHLORO-3-METHYLPHENOL	BMDL	10.0
91-58-7	2-CHLORONAPHTHALENE	BMDL	1.00
95-57-8	2-CHLOROPHENOL	BMDL	1.00
7005-72-3	4-CHLORODIPHENYLETHER	BMDL	1.00
18-01-9	CHRYSENE	BMDL	2.50
56-72-4	COUMAPHOS	BMDL	2.50
7700-17-6	CROTOXYPHOS	BMDL	5.00
72-54-8	p'p'-DDD	BMDL	1.00
72-55-9	p'p'-DDE	BMDL	1.00
50-29-3	p'p'-DDT	BMDL	5.00

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg
298-03-3	DEMETON-o	BMDL	1.00
126-75-0	DEMETON-s	BMDL	1.00
2303-16-4	cis-DIALLATE	BMDL	1.00
2303-16-4	trans-DIALLATE	BMDL	1.00
53-70-3	DIBENZO(ah)ANTHRACENE	BMDL	1.00
132-64-9	DIBENZOFURAN	BMDL	1.00
84-74-2	DI-n-BUTYLPHTHALATE	BMDL	1.00
117-80-6	DICHLONE	BMDL	5.00
95-50-1	1,2-DICHLOROBENZENE	BMDL	1.00
541-73-1	1,3-DICHLOROBENZENE	BMDL	1.00
106-46-7	1,4-DICHLOROBENZENE	BMDL	1.00
91-94-1	3,3-DICHLOROBENZIDINE	BMDL	20.0
120-83-2	2,4-DICHLOROPHENOL	BMDL	20.0
62-73-7	DICHLORVOS	BMDL	5.00
141-66-2	DICROTOPHOS	BMDL	5.00
60-57-1	DIELDRIN	BMDL	2.50
84-66-2	DIETHYLPHTHALATE	BMDL	1.00
60-51-5	DIMETHOATE	BMDL	2.50
105-67-9	2,4-DIMETHYLPHENOL	BMDL	2.00
131-11-3	DIMETHYLPHTHALATE	BMDL	1.00
528-29-0	m-DINITROBENZENE	BMDL	10.0
534-52-1	4,6-DINITRO-2-METHYLPHENOL	BMDL	40.0
51-28-5	2,4-DINITROPHENOL	BMDL	10.0
121-14-2	2,4-DINITROTOLUENE	BMDL	10.0
606-20-2	2,6-DINITROTOLUENE	BMDL	10.0
88-85-7	DINOSEB	BMDL	5.00
122-39-4	DIPHENYLAMINE	BMDL	2.50
122-66-7	1,2-DIPHENYLHYDRAZINE	BMDL	5.00
117-84-0	DI-n-OCTYLPHTHALATE	BMDL	5.00
298-04-4	DISULFOTON	BMDL	1.00
959-98-8	ENDOSULFAN I	BMDL	5.00
33212-65-9	ENDOSULFAN II	BMDL	5.00
1031-07-8	ENDOSULFAN SULFATE	BMDL	5.00
72-20-8	ENDRIN	BMDL	5.00
	ENDRIN KETONE	BMDL	1.00
2104-64-5	EPN	BMDL	1.00
563-12-2	ETHION	BMDL	1.00
52-85-7	FAMPHUR	BMDL	1.00
55-38-9	FENTHION	BMDL	1.00
33245-39-5	FLUCHLORALIN	BMDL	1.00
86-73-7	FLUORENE	BMDL	1.00
76-44-8	HEPATACHLOR	BMDL	1.00
1024-57-3	HEPTACHLOR EPOXIDE	BMDL	1.00
118-74-1	HEXACHLOROBENZENE	BMDL	1.00
87-68-3	HEXACHLOROBUTADIENE	BMDL	1.00
77-47-4	HEXACHLOROCYCLOPENTADIENE	BMDL	1.00
67-72-1	HEXACHLOROETHANE	BMDL	1.00
123-31-9	HYDROQUINONE	BMDL	1.00
193-39-5	INDENO(1,2,3-cd)PYRENE	BMDL	1.00
465-73-6	ISODRIN	BMDL	1.00
78-59-1	ISOPHORONE	BMDL	1.00
143-50-0	KEPONE	BMDL	1.00
21609-90-5	LEPTOPHOS	BMDL	1.00
121-75-5	MALATHION	BMDL	1.00

SPECTRUM Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE ENVIRO.
SAMPLE: 006-041291/ TP-5A TRAIN CNT #219
DATA FILE: >4B15A::D3

EPA METHOD 8270
BASE/NEUTRALS AND ACIDS

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg)
72-43-5	METHOXYCHLOR-p'p'	BMDL	5.00
90-12-0	1-METHYLNAPHTHALENE	380	1.00
91-57-6	2-METHYLNAPHTHALENE	560	1.00
298-00-0	METHYL PARATHION	BMDL	1.00
95-48-7	2-METHYLPHENOL "o-CRESOL"	BMDL	5.00
108-39-4	3-METHYLPHENOL "m-CRESOL"	BMDL	5.00
106-44-5	4-METHYLPHENOL "p-CRESOL"	BMDL	5.00
7786-34-7	MEVINPHOS	BMDL	1.00
2385-85-5	MIREX	BMDL	5.00
6923-22-4	MONOCROTOPHOS	BMDL	5.00
300-76-5	NALED	BMDL	5.00
91-20-3	NAPHTHALENE	720	1.00
130-15-4	1,4-NAPHTHOQUINONE	BMDL	5.00
54-11-5	NICOTINE	BMDL	10.0
98-95-3	NITROBENZENE	BMDL	5.00
1836-75-5	NITROFEN	BMDL	5.00
88-75-5	2-NITROPHENOL	BMDL	5.00
100-02-7	4-NITROPHENOL	BMDL	5.00
62-75-9	n-NITROSODIMETHYLAMINE	BMDL	10.0
86-30-6	n-NITROSODIPHENYLAMINE	BMDL	10.0
621-64-7	n-NITROSODI-n-PROPYLAMINE	BMDL	10.0
56-38-2	PARATHION	BMDL	1.00
82-68-3	PENTACHLORONITROBENZENE	BMDL	1.00
87-86-5	PENTACHLOROPHENOL	BMDL	5.00
85-01-8	PHENANTHRENE	BMDL	1.00
108-95-2	PHENOL	BMDL	1.00
298-02-2	PHORATE	BMDL	1.00
732-11-6	PHOSMET	BMDL	1.00
13171-21-6	PHOSPHAMIDON	BMDL	5.00
109-06-8	2-PICOLINE	BMDL	10.0
23950-58-5	PRONAMIDE	BMDL	1.00
129-00-0	PYRENE	BMDL	1.00
110-86-1	PYRIDINE	BMDL	10.0
13071-79-9	TERBUFOS	BMDL	5.00
95-94-3	1,2,4,5-TETRACHLOROBENZENE	BMDL	1.00
961-11-5	TETRACHLORVINPHOS	BMDL	5.00
8001-35-2	TOXAPHENE	BMDL	5.00
120-82-1	1,2,4-TRICHLOROBENZENE	BMDL	2.50
95-95-4	2,4,5-TRICHLOROPHENOL	BMDL	1.00
88-06-2	2,4,6-TRICHLOROPHENOL	BMDL	1.00
1582-09-8	TRIFLURALIN	BMDL	1.50

MISCELLANEOUS ANALYTES

CAS No.	PARAMETER	CONCENTRATION (ug/kg)	*MDL (ug/kg
30560-19-1	ACEPHATE	BMDL	10.0
76-06-2	CHLORPICRIN	BMDL	5.00
2675-77-6	CHLORNEB	BMDL	1.00
5598-13-0	CHLORPYRIFOS "DURSBAN"	BMDL	1.00
99-30-9	DICHLORAN "BOTRAN"	BMDL	1.00
333-41-5	DIAZINON	BMDL	1.00
120-36-5	DICHLORPROP	BMDL	10.0
957-51-7	DIPHENAMID	BMDL	1.00
25311-71-1	ISOFENPHOS	BMDL	5.00
150-50-5	MERPHOS	BMDL	1.00
114-26-1	PROPUXUR	BMDL	5.00
206-44-0	FLUORANTHENE	BMDL	1.00

BMDL = BELOW METHOD DETECTION LIMIT
ACTUAL METHOD DETECTION LIMIT = DILUTION FACTOR x MDL

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SPECTRUM
Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT	WESTINGHOUSE	DATE REPORTED:	04/18/91
SAMPLE LOCATION	CSY-FMW #2/NAVAL	EPA:	# FL095
SAMPLE NUMBER	001-041591	FL DRINKING WATER:	# 86144
DATE RECEIVED	04/15/91	FL ENVIRONMENTAL:	# E86006
DATE SAMPLED	04/12/91	GEORGIA:	# 828
SAMPLE TYPE	WATER	SOUTH CAROLINA:	# 96015
SUBMITTER	FEDEX		

TEST		RESULTS	
EPA 624		POSITIVE	
EPA 625		POSITIVE	
ARSENIC	SM 304	<0.002	MG/L
CADMIUM	SM 300 SERIES	<0.001	MG/L
CHROMIUM,T	SM 300 SERIES	<0.002	MG/L
COPPER	SM 300 SERIES	.030	MG/L
LEAD, T	SM 300 SERIES	.002	MG/L
MERCURY	SM 300 SERIES	<0.0002	MG/L
SELENIUM	SM 300 SERIES	.002	MG/L
SILVER	SM 300 SERIES	<0.002	MG/L
ZINC	SM 300 SERIES	.07	MG/L
ANTIMONY	SM 300 SERIES	.004	MG/L
BERYLLIUM	SM 300 SERIES	<0.002	MG/L
NICKEL	SM 300 SERIES	.06	MG/L
THALLIUM	SM 304	<0.002	MG/L

IF YOU HAVE ANY QUESTIONS PLEASE CONTACT ME.

DONALD S. MCCORQUODALE, JR. PH.D.
MICROBIOLOGIST

SPECTRUM Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING WATER: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

CLIENT: WESTINGHOUSE-ENVIRO.
SAMPLE: 001-041591/ CSY-FMW #2 NAVAL BASE
DATA FILE: >41505::D4
DATE ANALYZED: 4/15/91 20:08
DILUTION FACTOR: .20000

EPA METHOD 624 - PURGEABLE ORGANICS

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
71-43-2	BENZENE	20.0	(0.20)
75-27-4	BROMODICHLOROMETHANE	0.0	(0.20)
75-25-2	BROMOFORM	0.0	(0.20)
74-83-9	BROMOMETHANE	0.0	(0.50)
56-23-5	CARBON TETRACHLORIDE	0.0	(0.50)
108-90-7	CHLOROBENZENE	13.6	(0.20)
75-00-3	CHLOROETHANE	0.0	(0.50)
67-66-3	CHLOROFORM	0.0	(0.20)
74-87-3	CHLOROMETHANE	0.0	(0.50)
124-48-1	DIBROMOCHLOROMETHANE	0.0	(0.20)
95-50-1	o-DICHLOROBENZENE	.3	(0.20)
541-73-1	m-DICHLOROBENZENE	0.0	(0.20)
106-46-7	p-DICHLOROBENZENE	7.5	(0.20)
75-34-3	1,1-DICHLOROETHANE	0.0	(0.25)
107-06-2	1,2-DICHLOROETHANE	0.0	(0.20)
75-35-4	1,1-DICHLOROETHENE	0.0	(0.40)
156-60-5	trans,1,2-DICHLOROETHENE	0.0	(0.25)
78-87-5	1,2-DICHLOROPROPANE	0.0	(0.40)
10061-01-5	cis,1,3-DICHLOROPROPENE	0.0	(0.50)
10061-02-6	trans,1,3-DICHLOROPROPENE	0.0	(0.50)
100-41-1	ETHYLBENZENE	2.7	(0.20)
75-09-2	DICHLOROMETHANE	0.0	(0.50)
79-34-5	1,1,2,2-TETRACHLOROETHANE	0.0	(0.24)
127-18-4	TETRACHLOROETHENE	0.0	(0.14)
108-88-3	TOLUENE	4.6	(0.20)
71-55-6	1,1,1-TRICHLOROETHANE	.8	(0.30)
79-00-5	1,1,2-TRICHLOROETHANE	0.0	(0.30)
79-01-6	TRICHLOROETHENE	.4	(0.20)
75-01-4	VINYL CHLORIDE	0.0	(0.17)

* ACTUAL DETECTION LIMIT = METHOD DETECTION LIMIT x DILUTION FACTOR
A value of 0.0 = BMDL (BELOW METHOD DETECTION LIMIT)

LYLE A. JOHNSON - Chemist

SPECTRUM

Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE ENVIRO.
SAMPLE: 001-041591/ CSY-FMW #2 N NAVAL BASE
DATA FILE: >4B01A::D3
DATE REPORTED: 4/16/91 12:27
DILUTION FACT: 1.00000

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

EPA METHOD 625
BASE/NEUTRALS AND ACIDS

BASE AND NEUTRALS EXTRACTABLES

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
83-32-9	ACENAPHTHENE	1.3	0.50
208-96-8	ACENAPHTHYLENE	0.0	0.50
120-12-7	ANTHRACENE	0.0	1.00
309-00-2	ALDRIN	0.0	0.75
56-55-3	BENZO(a)ANTHRACENE	0.0	1.00
205-99-2	BENZO(b)FLUORANTHENE	0.0	1.25
207-08-9	BENZO(k)FLUORANTHENE	0.0	1.25
50-32-8	BENZO(a)PYRENE	0.0	2.00
191-24-2	BENZO(ghi)PERYLENE	0.0	2.50
85-68-7	BUTYLBENZYLPHTHALATE	0.0	0.86
319-85-7	BHC-beta	0.0	0.50
319-86-8	HCH-delta	0.0	3.6
111-44-4	BIS(2-CHLOROETHYL)ETHER	0.0	0.75
11-91-1	BIS(2-CHLOROETHOXY)METHANE	0.0	0.75
117-81-7	DI(2-ETHYLHEXYL)PHTHALATE	0.0	1.00
108-60-1	BIS(2-CHLOROISOPROPYL)ETHE	0.0	0.85
101-55-3	4-BROMODIPHENYLETHER	0.0	1.00
57-74-9	CHLORDANE	0.0	1.00
91-58-7	2-CHLORONAPHTHALENE	0.0	0.55
7005-72-3	4-CHLORODIPHENYLETHER	0.0	1.00
218-01-9	CHRYSENE	0.0	1.50
72-54-8	p'p'-DDD	0.0	1.00
72-55-9	p'p'-DDE	0.0	1.00
50-29-3	p'p'-DDT	0.0	1.00
53-70-3	DIBENZO(ah)ANTHRACENE	0.0	5.7
84-74-2	DI-n-BUTYLPHTHALATE	0.0	1.00
541-73-1	1,3-DICHLOROBENZENE	0.0	0.50
95-50-1	1,2-DICHLOROBENZENE	0.0	0.50
106-46-7	1,4-DICHLOROBENZENE	7.2	0.75
60-57-1	DIELDRIN	0.0	1.25
84-66-2	DIETHYLPHTHALATE	0.0	0.75
131-11-3	DIMETHYLPHTHALATE	0.0	0.75
121-14-2	2,4 DINITROTOLUENE	0.0	2.50
606-20-6	2,6-DINITROTOLUENE	0.0	2.75
117-84-0	DI-n-OCTYLPHTHALATE	0.0	1.00
1031-07-8	ENDOSULFAN SULFATE	0.0	5.00
206-44-0	FLUORANTHENE	0.0	1.00
86-73-7	FLUORENE	0.0	0.50
76-44-8	HEPTACHLOR	0.0	0.80
1024-57-3	HEPTACHLOR EPOXIDE	0.0	1.00
118-74-1	HEXACHLOROBENZENE	0.0	1.00
87-68-3	HEXACHLOROBUTADIENE	0.0	1.00
67-72-1	HEXACHLOROETHANE	0.0	1.40
193-39-5	INDENO(1,2,3-cd)PYRENE	0.0	2.50
78-59-1	ISOPHORONE	0.0	0.85
91-20-3	NAPHTHALENE	2.2	0.50
98-95-3	NITROBENZENE	0.0	2.00
85-01-8	PHENANTHRENE	0.0	1.00
129-00-0	PYRENE	0.0	1.00
120-82-1	1,2,4-TRICHLOROBENZENE	0.0	1.00

POLYCHLORINATED BIPHENYLS

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
12674-11-2	PCB-1016	BMDL**	30.0
11104-28-2	PCB-1221	BMDL**	30.0
11141-16-5	PCB-1232	BMDL**	30.0
53469-21-9	PCB-1242	BMDL**	30.0
12672-29-6	PCB-1248	BMDL**	30.0
11097-69-1	PCB-1254	BMDL**	30.0
11096-82-5	PCB-1260	BMDL**	30.0

ACID EXTRACTABLES

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
59-50-7	4-CHLORO-3-METHYLPHENOL	0.0	3.00
95-57-8	2-CHLOROPHENOL	0.0	1.00
120-83-2	2,4-DICHLOROPHENOL	0.0	1.50
105-67-9	2,4-DIMETHYLPHENOL	0.0	2.50
51-28-5	2,4-DINITROPHENOL	0.0	40.0
534-52-1	2-METHYL-4,6-DINITROPHENOL	0.0	20.0
88-75-5	2-NITROPHENOL	0.0	3.00
100-02-7	4-NITROPHENOL	0.0	2.50
87-86-5	PENTACHLOROPHENOL	0.0	2.75
109-95-2	PHENOL	0.0	0.50
88-06-2	2,4,6-TRICHLOROPHENOL	0.0	1.00

ADDITIONAL EXTRACTABLES

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
92-87-5	BENZIDINE	0.0	40.0
319-84-6	BHC-alpha	0.0	1.00
959-98-8	ENDOSULFAN I	0.0	10.0
33213-65-9	ENDOSULFAN II	0.0	10.0
72-20-8	ENDRIN	0.0	1.25
77-47-4	HEXACHLOROCYCLOPENTADIENE	0.0	2.50
86-30-6	n-NITROSODIPHENYLAMINE	0.0	1.50
62-75-6	n-NITROSODIMETHYLAMINE	0.0	10.0
91-94-1	3,3-DICHLOROBENZIDINE	0.0	20.0
	2-METHYLNAPHTHALENE	5.5	0.5

LYLE A. JOHNSON - Chemist

* ACTUAL DETECTION LIMIT = METHOD DETECTION LIMIT x DILUTION FACTOR
** BMDL - BELOW METHOD DETECTION LIMIT (A value of 0.0 = BMDL)

SPECTRUM
Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT	WESTINGHOUSE	DATE REPORTED:	04/18/91
SAMPLE LOCATION	CSY-FMW #4/NAVAL	EPA:	# FL095
SAMPLE NUMBER	002-041591	FL DRINKING WATER:	# 86144
DATE RECEIVED	04/15/91	FL ENVIRONMENTAL:	# E86006
DATE SAMPLED	04/12/91	GEORGIA:	# 828
SAMPLE TYPE	WATER	SOUTH CAROLINA:	# 96015
SUBMITTER	FEDEX		

TEST		RESULTS	
EPA 624		POSITIVE	
EPA 625		POSITIVE	
ARSENIC	SM 304	<0.002	MG/L
CADMIUM	SM 300 SERIES	<0.001	MG/L
CHROMIUM,T	SM 300 SERIES	<0.002	MG/L
COPPER	SM 300 SERIES	.020	MG/L
LEAD, T	SM 300 SERIES	<0.002	MG/L
MERCURY	SM 300 SERIES	<0.0002	MG/L
SELENIUM	SM 300 SERIES	.003	MG/L
SILVER	SM 300 SERIES	<0.002	MG/L
ZINC	SM 300 SERIES	.05	MG/L
ANTIMONY	SM 300 SERIES	.003	MG/L
BERYLLIUM	SM 300 SERIES	<0.002	MG/L
NICKEL	SM 300 SERIES	.05	MG/L
THALLIUM	SM 304	<0.002	MG/L

IF YOU HAVE ANY QUESTIONS PLEASE CONTACT ME.

DONALD S. MCCORQUODALE, JR. PH.D.
MICROBIOLOGIST

SPECTRUM Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING WATER: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

CLIENT: WESTINGHOUSE-ENVIRO.
SAMPLE: 002-041591/ CSY-FMW #4 NAVAL BASE
DATA FILE: >41506::D4
DATE ANALYZED: 4/15/91 20:08
DILUTION FACTOR: .20000

EPA METHOD 624 - PURGEABLE ORGANICS

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
71-43-2	BENZENE	6.9	(0.20)
75-27-4	BROMODICHLOROMETHANE	0.0	(0.20)
75-25-2	BROMOFORM	0.0	(0.20)
74-83-9	BROMOMETHANE	0.0	(0.50)
56-23-5	CARBON TETRACHLORIDE	0.0	(0.50)
108-90-7	CHLOROBENZENE	9.6	(0.20)
75-00-3	CHLOROETHANE	0.0	(0.50)
67-66-3	CHLOROFORM	0.0	(0.20)
74-87-3	CHLOROMETHANE	0.0	(0.50)
124-48-1	DIBROMOCHLOROMETHANE	0.0	(0.20)
95-50-1	o-DICHLOROBENZENE	.4	(0.20)
541-73-1	m-DICHLOROBENZENE	0.0	(0.20)
106-46-7	p-DICHLOROBENZENE	4.8	(0.20)
75-34-3	1,1-DICHLOROETHANE	0.0	(0.25)
107-06-2	1,2-DICHLOROETHANE	0.0	(0.20)
75-35-4	1,1-DICHLOROETHENE	0.0	(0.40)
156-60-5	trans,1,2-DICHLOROETHENE	0.0	(0.25)
78-87-5	1,2-DICHLOROPROPANE	0.0	(0.40)
10061-01-5	cis,1,3-DICHLOROPROPENE	0.0	(0.50)
10061-02-6	trans,1,3-DICHLOROPROPENE	0.0	(0.50)
100-41-1	ETHYLBENZENE	0.0	(0.20)
75-09-2	DICHLOROMETHANE	0.0	(0.50)
79-34-5	1,1,2,2-TETRACHLOROETHANE	0.0	(0.24)
127-18-4	TETRACHLOROETHENE	0.0	(0.14)
108-88-3	TOLUENE	.9	(0.20)
71-55-6	1,1,1-TRICHLOROETHANE	.6	(0.30)
79-00-5	1,1,2-TRICHLOROETHANE	0.0	(0.30)
79-01-6	TRICHLOROETHENE	0.0	(0.20)
75-01-4	VINYL CHLORIDE	0.0	(0.17)

* ACTUAL DETECTION LIMIT = METHOD DETECTION LIMIT x DILUTION FACTOR
A value of 0.0 = BMDL (BELOW METHOD DETECTION LIMIT)

LYLE A. JOHNSON - Chemist

SPECTRUM Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE ENVIRO.
SAMPLE: 002-041591/ CSY-FMW #4 NAVAL BASE
DATA FILE: >4B02A::D3
DATE REPORTED: 4/16/91 13:55
DILUTION FACT: 1.00000

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

EPA METHOD 625
BASE/NEUTRALS AND ACIDS

BASE AND NEUTRALS EXTRACTABLES

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
83-32-9	ACENAPHTHENE	4.3	0.50
208-96-8	ACENAPHTHYLENE	0.0	0.50
120-12-7	ANTHRACENE	3.0	1.00
309-00-2	ALDRIN	0.0	0.75
56-55-3	BENZO(a)ANTHRACENE	0.0	1.00
205-99-2	BENZO(b)FLUORANTHENE	0.0	1.25
207-08-9	BENZO(k)FLUORANTHENE	0.0	1.25
50-32-8	BENZO(a)PYRENE	0.0	2.00
191-24-2	BENZO(ghi)PERYLENE	0.0	2.50
85-68-7	BUTYLBENZYLPHTHALATE	0.0	0.86
319-85-7	BHC-beta	0.0	0.50
319-86-8	HCH-delta	0.0	3.6
111-44-4	BIS(2-CHLOROETHYL)ETHER	0.0	0.75
111-91-1	BIS(2-CHLOROETHOXY)METHANE	0.0	0.75
117-81-7	DI(2-ETHYLHEXYL)PHTHALATE	0.0	1.00
108-60-1	BIS(2-CHLOROISOPROPYL)ETHE	0.0	0.85
101-55-3	4-BROMODIPHENYLETHER	0.0	1.00
57-74-9	CHLORDANE	0.0	1.00
91-58-7	2-CHLORONAPHTHALENE	0.0	0.55
7005-72-3	4-CHLORODIPHENYLETHER	0.0	1.00
218-01-9	CHRYSENE	0.0	1.50
72-54-8	p'p'-DDD	0.0	1.00
72-55-9	p'p'-DDE	0.0	1.00
50-29-3	p'p'-DDT	0.0	1.00
53-70-3	DIBENZO(ah)ANTHRACENE	0.0	5.7
84-74-2	DI-n-BUTYLPHTHALATE	0.0	1.00
541-73-1	1,3-DICHLOROBENZENE	0.0	0.50
95-50-1	1,2-DICHLOROBENZENE	0.0	0.50
106-46-7	1,4-DICHLOROBENZENE	4.5	0.75
60-57-1	DIELDRIN	0.0	1.25
84-66-2	DIETHYLPHTHALATE	0.0	0.75
131-11-3	DIMETHYLPHTHALATE	0.0	0.75
121-14-2	2,4 DINITROTOLUENE	0.0	2.50
606-20-6	2,6-DINITROTOLUENE	0.0	2.75
117-84-0	DI-n-OCTYLPHTHALATE	0.0	1.00
1031-07-8	ENDOSULFAN SULFATE	0.0	5.00
206-44-0	FLUORANTHENE	0.0	1.00
86-73-7	FLUORENE	2.2	0.50
76-44-8	HEPTACHLOR	0.0	0.80
1024-57-3	HEPTACHLOR EPOXIDE	0.0	1.00
118-74-1	HEXACHLOROBENZENE	0.0	1.00
87-68-3	HEXACHLOROBUTADIENE	0.0	1.00
67-72-1	HEXACHLOROETHANE	0.0	1.40
193-39-5	INDENO(1,2,3-cd)PYRENE	0.0	2.50
78-59-1	ISOPHORONE	0.0	0.85
91-20-3	NAPHTHALENE	1.2	0.50
98-95-3	NITROBENZENE	0.0	2.00
85-01-8	PHENANTHRENE	3.0	1.00
129-00-0	PYRENE	0.0	1.00
120-82-1	1,2,4-TRICHLOROBENZENE	0.0	1.00

POLYCHLORINATED BIPHENYLS

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l
12674-11-2	PCB-1016	BMDL**	30.0
11104-28-2	PCB-1221	BMDL**	30.0
11141-16-5	PCB-1232	BMDL**	30.0
53469-21-9	PCB-1242	BMDL**	30.0
12672-29-6	PCB-1248	BMDL**	30.0
11097-69-1	PCB-1254	BMDL**	30.0
11096-82-5	PCB-1260	BMDL**	30.0

ACID EXTRACTABLES

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l
59-50-7	4-CHLORO-3-METHYLPHENOL	0.0	
95-57-8	2-CHLOROPHENOL	0.0	
120-83-2	2,4-DICHLOROPHENOL	0.0	1.50
105-67-9	2,4-DIMETHYLPHENOL	0.0	2.50
51-28-5	2,4-DINITROPHENOL	0.0	40.0
534-52-1	2-METHYL-4,6-DINITROPHENOL	0.0	20.0
88-75-5	2-NITROPHENOL	0.0	3.00
100-02-7	4-NITROPHENOL	0.0	2.50
87-86-5	PENTACHLOROPHENOL	0.0	2.75
109-95-2	PHENOL	0.0	0.50
88-06-2	2,4,6-TRICHLOROPHENOL	0.0	1.00

ADDITIONAL EXTRACTABLES

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
92-87-5	BENZIDINE	0.0	40.0
319-84-6	BHC-alpha	0.0	1.00
959-98-8	ENDOSULFAN I	0.0	10.0
33213-65-9	ENDOSULFAN II	0.0	10.0
72-20-8	ENDRIN	0.0	1.25
77-47-4	HEXACHLOROCYCLOPENTADIENE	0.0	2.50
86-30-6	n-NITROSODIPHENYLAMINE	0.0	1.50
62-75-6	n-NITROSODIMETHYLAMINE	0.0	10.0
91-94-1	3,3-DICHLOROBENZIDINE	0.0	20.0
	2-METHYLNAPHTHALENE	3.9	0.5

LYLE A. JOHNSON - Chemist

* ACTUAL DETECTION LIMIT = METHOD DETECTION LIMIT x DILUTION F
** BMDL - BELOW METHOD DETECTION LIMIT (A value of 0.0 = BMDL)

SPECTRUM
Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT	WESTINGHOUSE	DATE REPORTED:	04/18/91
SAMPLE LOCATION	CSY-FMW #3/NAVAL	EPA:	# FL095
SAMPLE NUMBER	003-041591	FL DRINKING WATER:	# 86144
DATE RECEIVED	04/15/91	FL ENVIRONMENTAL:	# E86006
DATE SAMPLED	04/12/91	GEORGIA:	# 828
SAMPLE TYPE	WATER	SOUTH CAROLINA:	# 96015
SUBMITTER	FEDEX		

TEST		RESULTS	
EPA 624		POSITIVE	
EPA 625		NEGATIVE	
ARSENIC	SM 304	<0.002	MG/L
CADMIUM	SM 300 SERIES	<0.001	MG/L
CHROMIUM,T	SM 300 SERIES	<0.002	MG/L
COPPER	SM 300 SERIES	.020	MG/L
LEAD, T	SM 300 SERIES	<0.002	MG/L
MERCURY	SM 300 SERIES	<0.0002	MG/L
SELENIUM	SM 300 SERIES	<0.002	MG/L
SILVER	SM 300 SERIES	<0.002	MG/L
ZINC	SM 300 SERIES	.06	MG/L
ANTIMONY	SM 300 SERIES	<0.002	MG/L
BERYLLIUM	SM 300 SERIES	<0.002	MG/L
NICKEL	SM 300 SERIES	.04	MG/L
THALLIUM	SM 304	<0.002	MG/L

IF YOU HAVE ANY QUESTIONS PLEASE CONTACT ME.

DONALD S. MCCORQUODALE, JR. PH.D.
MICROBIOLOGIST

SPECTRUM
Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING WATER: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

CLIENT: WESTINGHOUSE-ENVIRO.
SAMPLE: 003-041591/ CSY-FMW #3 NAVAL BASE
DATA FILE: >41507::D4
DATE ANALYZED: 4/15/91 20:08
DILUTION FACTOR: .20000

EPA METHOD 624 - PURGEABLE ORGANICS

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
71-43-2	BENZENE	1.5	(0.20)
75-27-4	BROMODICHLOROMETHANE	0.0	(0.20)
75-25-2	BROMOFORM	0.0	(0.20)
74-83-9	BROMOMETHANE	0.0	(0.50)
56-23-5	CARBON TETRACHLORIDE	0.0	(0.50)
108-90-7	CHLOROBENZENE	7.5	(0.20)
75-00-3	CHLOROETHANE	0.0	(0.50)
67-66-3	CHLOROFORM	0.0	(0.20)
74-87-3	CHLOROMETHANE	0.0	(0.50)
124-48-1	DIBROMOCHLOROMETHANE	0.0	(0.20)
95-50-1	o-DICHLOROBENZENE	0.0	(0.20)
541-73-1	m-DICHLOROBENZENE	0.0	(0.20)
106-46-7	p-DICHLOROBENZENE	1.1	(0.20)
75-34-3	1,1-DICHLOROETHANE	0.0	(0.25)
107-06-2	1,2-DICHLOROETHANE	0.0	(0.20)
75-35-4	1,1-DICHLOROETHENE	0.0	(0.40)
156-60-5	trans,1,2-DICHLOROETHENE	0.0	(0.25)
78-87-5	1,2-DICHLOROPROPANE	0.0	(0.40)
10061-01-5	cis,1,3-DICHLOROPROPENE	0.0	(0.50)
10061-02-6	trans,1,3-DICHLOROPROPENE	0.0	(0.50)
100-41-1	ETHYLBENZENE	0.0	(0.20)
75-09-2	DICHLOROMETHANE	0.0	(0.50)
79-34-5	1,1,2,2-TETRACHLOROETHANE	0.0	(0.24)
127-18-4	TETRACHLOROETHENE	0.0	(0.14)
108-88-3	TOLUENE	1.7	(0.20)
71-55-6	1,1,1-TRICHLOROETHANE	.6	(0.30)
79-00-5	1,1,2-TRICHLOROETHANE	0.0	(0.30)
79-01-6	TRICHLOROETHENE	0.0	(0.20)
75-01-4	VINYL CHLORIDE	0.0	(0.17)

* ACTUAL DETECTION LIMIT = METHOD DETECTION LIMIT x DILUTION FACTOR
A value of 0.0 = BMDL (BELOW METHOD DETECTION LIMIT)

LYLE A. JOHNSON - Chemist

SPECTRUM

Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE ENVIRO.
SAMPLE: 003-041591/ CSY-FMW #3 NAVAL BASE
DATA FILE: >4B03A::D3
DATE REPORTED: 4/16/91 15:32
DILUTION FACT: 1.00000

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

EPA METHOD 625
BASE/NEUTRALS AND ACIDS

BASE AND NEUTRALS EXTRACTABLES

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
83-32-9	ACENAPHTHENE	0.0	0.50
208-96-8	ACENAPHTHYLENE	0.0	0.50
120-12-7	ANTHRACENE	0.0	1.00
309-00-2	ALDRIN	0.0	0.75
56-55-3	BENZO(a)ANTHRACENE	0.0	1.00
205-99-2	BENZO(b)FLUORANTHENE	0.0	1.25
207-08-9	BENZO(k)FLUORANTHENE	0.0	1.25
50-32-8	BENZO(a)PYRENE	0.0	2.00
191-24-2	BENZO(ghi)PERYLENE	0.0	2.50
85-68-7	BUTYLBENZYLPHTHALATE	0.0	0.86
319-85-7	BHC-beta	0.0	0.50
319-86-8	HCH-delta	0.0	3.6
11-44-4	BIS(2-CHLOROETHYL)ETHER	0.0	0.75
1-91-1	BIS(2-CHLOROETHOXY)METHANE	0.0	0.75
117-81-7	DI(2-ETHYLHEXYL)PHTHALATE	0.0	1.00
108-60-1	BIS(2-CHLOROISOPROPYL)ETHE	0.0	0.85
101-55-3	4-BROMODIPHENYLETHER	0.0	1.00
57-74-9	CHLORDANE	0.0	1.00
91-58-7	2-CHLORONAPHTHALENE	0.0	0.55
7005-72-3	4-CHLORODIPHENYLETHER	0.0	1.00
218-01-9	CHRYSENE	0.0	1.50
72-54-8	p'p'-DDD	0.0	1.00
72-55-9	p'p'-DDE	0.0	1.00
50-29-3	p'p'-DDT	0.0	1.00
53-70-3	DIBENZO(ah)ANTHRACENE	0.0	5.7
84-74-2	DI-n-BUTYLPHTHALATE	0.0	1.00
541-73-1	1,3-DICHLOROBENZENE	0.0	0.50
95-50-1	1,2-DICHLOROBENZENE	0.0	0.50
106-46-7	1,4-DICHLOROBENZENE	0.0	0.75
60-57-1	DIELDRIN	0.0	1.25
84-66-2	DIETHYLPHTHALATE	0.0	0.75
131-11-3	DIMETHYLPHTHALATE	0.0	0.75
121-14-2	2,4 DINITROTOLUENE	0.0	2.50
606-20-6	2,6-DINITROTOLUENE	0.0	2.75
117-84-0	DI-n-OCTYLPHTHALATE	0.0	1.00
1031-07-8	ENDOSULFAN SULFATE	0.0	5.00
206-44-0	FLUORANTHENE	0.0	1.00
86-73-7	FLUORENE	0.0	0.50
76-44-8	HEPTACHLOR	0.0	0.80
1024-57-3	HEPTACHLOR EPOXIDE	0.0	1.00
118-74-1	HEXACHLOROBENZENE	0.0	1.00
87-68-3	HEXACHLOROBUTADIENE	0.0	1.00
67-72-1	HEXACHLOROETHANE	0.0	1.40
193-39-5	INDENO(1,2,3-cd)PYRENE	0.0	2.50
78-59-1	ISOPHORONE	0.0	0.85
1-20-3	NAPHTHALENE	0.0	0.50
-95-3	NITROBENZENE	0.0	2.00
85-01-8	PHENANTHRENE	0.0	1.00
129-00-0	PYRENE	0.0	1.00
120-82-1	1,2,4-TRICHLOROBENZENE	0.0	1.00

POLYCHLORINATED BIPHENYLS

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
12674-11-2	PCB-1016	BMDL**	30.0
11104-28-2	PCB-1221	BMDL**	30.0
11141-16-5	PCB-1232	BMDL**	30.0
53469-21-9	PCB-1242	BMDL**	30.0
12672-29-6	PCB-1248	BMDL**	30.0
11097-69-1	PCB-1254	BMDL**	30.0
11096-82-5	PCB-1260	BMDL**	30.0

ACID EXTRACTABLES

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
59-50-7	4-CHLORO-3-METHYLPHENOL	0.0	3.00
95-57-8	2-CHLOROPHENOL	0.0	1.00
120-83-2	2,4-DICHLOROPHENOL	0.0	1.50
105-67-9	2,4-DIMETHYLPHENOL	0.0	2.50
51-28-5	2,4-DINITROPHENOL	0.0	40.0
534-52-1	2-METHYL-4,6-DINITROPHENOL	0.0	20.0
88-75-5	2-NITROPHENOL	0.0	3.00
100-02-7	4-NITROPHENOL	0.0	2.50
87-86-5	PENTACHLOROPHENOL	0.0	2.75
109-95-2	PHENOL	0.0	0.50
88-06-2	2,4,6-TRICHLOROPHENOL	0.0	1.00

ADDITIONAL EXTRACTABLES

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
92-87-5	BENZIDINE	0.0	40.0
319-84-6	BHC-alpha	0.0	1.00
959-98-8	ENDOSULFAN I	0.0	10.0
33213-65-9	ENDOSULFAN II	0.0	10.0
72-20-8	ENDRIN	0.0	1.25
77-47-4	HEXACHLOROCYCLOPENTADIENE	0.0	2.50
86-30-6	n-NITROSODIPHENYLAMINE	0.0	1.50
62-75-6	n-NITROSODIMETHYLAMINE	0.0	10.0
91-94-1	3,3-DICHLOROBENZIDINE	0.0	20.0
	2-METHYLNAPHTHALENE	0.0	0.5

LYLE A. JOHNSON - Chemist

* ACTUAL DETECTION LIMIT = METHOD DETECTION LIMIT x DILUTION FACTOR
** BMDL - BELOW METHOD DETECTION LIMIT (A value of 0.0 = BMDL)

SPECTRUM
Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT	WESTINGHOUSE	DATE REPORTED:	04/18/91
SAMPLE LOCATION	CSY-FMW #1/NAVAL	EPA:	# FL095
SAMPLE NUMBER	004-041591	FL DRINKING WATER:	# 86144
DATE RECEIVED	04/15/91	FL ENVIRONMENTAL:	# E86006
DATE SAMPLED	04/12/91	GEORGIA:	# 828
SAMPLE TYPE	WATER	SOUTH CAROLINA:	# 96015
SUBMITTER	FEDEX		

TEST		RESULTS	
EPA 624		POSITIVE	
EPA 625		POSITIVE	
ARSENIC	SM 304	<0.002	MG/L
CADMIUM	SM 300 SERIES	<0.001	MG/L
CHROMIUM,T	SM 300 SERIES	<0.002	MG/L
COPPER	SM 300 SERIES	.040	MG/L
LEAD, T	SM 300 SERIES	<0.002	MG/L
MERCURY	SM 300 SERIES	<0.0002	MG/L
SELENIUM	SM 300 SERIES	<0.002	MG/L
SILVER	SM 300 SERIES	<0.002	MG/L
ZINC	SM 300 SERIES	.06	MG/L
ANTIMONY	SM 300 SERIES	.003	MG/L
BERYLLIUM	SM 300 SERIES	<0.002	MG/L
NICKEL	SM 300 SERIES	.04	MG/L
THALLIUM	SM 304	<0.002	MG/L

IF YOU HAVE ANY QUESTIONS PLEASE CONTACT ME.

DONALD S. MCCORQUODALE, JR. PH.D.
MICROBIOLOGIST

SPECTRUM
Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING WATER: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

CLIENT: WESTINGHOUSE-ENVIRO.
SAMPLE: 004-041591/ CSY-FMW #1 NAVAL BASE
DATA FILE: >41508::D4
DATE ANALYZED: 4/15/91 20:08
DILUTION FACTOR: .20000

EPA METHOD 624 - PURGEABLE ORGANICS

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
71-43-2	BENZENE	1.9	(0.20)
75-27-4	BROMODICHLOROMETHANE	0.0	(0.20)
75-25-2	BROMOFORM	0.0	(0.20)
74-83-9	BROMOMETHANE	0.0	(0.50)
56-23-5	CARBON TETRACHLORIDE	0.0	(0.50)
108-90-7	CHLOROBENZENE	1.7	(0.20)
75-00-3	CHLOROETHANE	0.0	(0.50)
7-66-3	CHLOROFORM	0.0	(0.20)
1-87-3	CHLOROMETHANE	0.0	(0.50)
4-48-1	DIBROMOCHLOROMETHANE	0.0	(0.20)
-50-1	o-DICHLOROBENZENE	0.0	(0.20)
541-73-1	m-DICHLOROBENZENE	0.0	(0.20)
106-46-7	p-DICHLOROBENZENE	.3	(0.20)
75-34-3	1,1-DICHLOROETHANE	0.0	(0.25)
107-06-2	1,2-DICHLOROETHANE	0.0	(0.20)
75-35-4	1,1-DICHLOROETHENE	0.0	(0.40)
156-60-5	trans,1,2-DICHLOROETHENE	0.0	(0.25)
78-87-5	1,2-DICHLOROPROPANE	0.0	(0.40)
10061-01-5	cis,1,3-DICHLOROPROPENE	0.0	(0.50)
10061-02-6	trans,1,3-DICHLOROPROPENE	0.0	(0.50)
100-41-1	ETHYLBENZENE	0.0	(0.20)
75-09-2	DICHLOROMETHANE	0.0	(0.50)
79-34-5	1,1,2,2-TETRACHLOROETHANE	0.0	(0.24)
127-18-4	TETRACHLOROETHENE	0.0	(0.14)
108-88-3	TOLUENE	2.2	(0.20)
71-55-6	1,1,1-TRICHLOROETHANE	0.0	(0.30)
79-00-5	1,1,2-TRICHLOROETHANE	0.0	(0.30)
79-01-6	TRICHLOROETHENE	0.0	(0.20)
75-01-4	VINYL CHLORIDE	0.0	(0.17)

* ACTUAL DETECTION LIMIT = METHOD DETECTION LIMIT x DILUTION FACTOR
A value of 0.0 = BMDL (BELOW METHOD DETECTION LIMIT)

LYLE A. JOHNSON - Chemist

SPECTRUM Laboratories, Inc. FORT LAUDERDALE • SAVANNAH

CLIENT: WESTINGHOUSE ENVIRO.
SAMPLE: 004-041591/ CSY-FMW #1 NAVAL BASE
DATA FILE: >4B04A::D3
DATE REPORTED: 4/16/91 17:07
DILUTION FACT: 1.00000

-CERTIFICATIONS-
EPA: #FL095
FL DRINKING: #86144
FL ENVIRONMENTAL: #E86006
GA # 828
SC # 96015

EPA METHOD 625
BASE/NEUTRALS AND ACIDS

BASE AND NEUTRALS EXTRACTABLES

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
83-32-9	ACENAPHTHENE	0.0	0.50
208-96-8	ACENAPHTHYLENE	0.0	0.50
120-12-7	ANTHRACENE	1.1	1.00
309-00-2	ALDRIN	0.0	0.75
56-55-3	BENZO(a)ANTHRACENE	0.0	1.00
205-99-2	BENZO(b)FLUORANTHENE	0.0	1.25
207-08-9	BENZO(k)FLUORANTHENE	0.0	1.25
50-32-8	BENZO(a)PYRENE	0.0	2.00
191-24-2	BENZO(ghi)PERYLENE	0.0	2.50
85-68-7	BUTYLBENZYLPHTHALATE	0.0	0.86
319-85-7	BHC-beta	0.0	0.50
319-86-8	HCH-delta	0.0	3.6
111-44-4	BIS(2-CHLOROETHYL)ETHER	0.0	0.75
111-91-1	BIS(2-CHLOROETHOXY)METHANE	0.0	0.75
117-81-7	DI(2-ETHYLHEXYL)PHTHALATE	0.0	1.00
108-60-1	BIS(2-CHLOROISOPROPYL)ETHE	0.0	0.85
101-55-3	4-BROMODIPHENYLETHER	0.0	1.00
57-74-9	CHLORDANE	0.0	1.00
91-58-7	2-CHLORONAPHTHALENE	0.0	0.55
7005-72-3	4-CHLORODIPHENYLETHER	0.0	1.00
218-01-9	CHRYSENE	0.0	1.50
72-54-8	p'p'-DDD	0.0	1.00
72-55-9	p'p'-DDE	0.0	1.00
50-29-3	p'p'-DDT	0.0	1.00
53-70-3	DIBENZO(ah)ANTHRACENE	0.0	5.7
84-74-2	DI-n-BUTYLPHTHALATE	0.0	1.00
541-73-1	1,3-DICHLOROBENZENE	0.0	0.50
95-50-1	1,2-DICHLOROBENZENE	0.0	0.50
106-46-7	1,4-DICHLOROBENZENE	0.0	0.75
60-57-1	DIELDRIN	0.0	1.25
84-66-2	DIETHYLPHTHALATE	0.0	0.75
131-11-3	DIMETHYLPHTHALATE	0.0	0.75
121-14-2	2,4 DINITROTOLUENE	0.0	2.50
606-20-6	2,6-DINITROTOLUENE	0.0	2.75
117-84-0	DI-n-OCTYLPHTHALATE	0.0	1.00
1031-07-8	ENDOSULFAN SULFATE	0.0	5.00
206-44-0	FLUORANTHENE	0.0	1.00
86-73-7	FLUORENE	0.0	0.50
76-44-8	HEPTACHLOR	0.0	0.80
1024-57-3	HEPTACHLOR EPOXIDE	0.0	1.00
118-74-1	HEXACHLOROBENZENE	0.0	1.00
87-68-3	HEXACHLOROBUTADIENE	0.0	1.00
67-72-1	HEXACHLOROETHANE	0.0	1.40
193-39-5	INDENO(1,2,3-cd)PYRENE	0.0	2.50
78-59-1	ISOPHORONE	0.0	0.85
91-20-3	NAPHTHALENE	0.0	0.50
98-95-3	NITROBENZENE	0.0	2.00
85-01-8	PHENANTHRENE	1.1	1.00
129-00-0	PYRENE	0.0	1.00
120-82-1	1,2,4-TRICHLOROBENZENE	0.0	1.00

POLYCHLORINATED BIPHENYLS

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
12674-11-2	PCB-1016	BMDL**	30.0
11104-28-2	PCB-1221	BMDL**	30.0
11141-16-5	PCB-1232	BMDL**	30.0
53469-21-9	PCB-1242	BMDL**	30.0
12672-29-6	PCB-1248	BMDL**	30.0
11097-69-1	PCB-1254	BMDL**	30.0
11096-82-5	PCB-1260	BMDL**	30.0

ACID EXTRACTABLES

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
59-50-7	4-CHLORO-3-METHYLPHENOL	0.0	
95-57-8	2-CHLOROPHENOL	0.0	1.[illegible]
120-83-2	2,4-DICHLOROPHENOL	0.0	1.50
105-67-9	2,4-DIMETHYLPHENOL	0.0	2.50
51-28-5	2,4-DINITROPHENOL	0.0	40.0
534-52-1	2-METHYL-4,6-DINITROPHENOL	0.0	20.0
88-75-5	2-NITROPHENOL	0.0	3.00
100-02-7	4-NITROPHENOL	0.0	2.50
87-86-5	PENTACHLOROPHENOL	0.0	2.75
109-95-2	PHENOL	0.0	0.50
88-06-2	2,4,6-TRICHLOROPHENOL	0.0	1.00

ADDITIONAL EXTRACTABLES

CAS No.	PARAMETER	CONCENTRATION (ug/l)	*MDL (ug/l)
92-87-5	BENZIDINE	0.0	40.0
319-84-6	BHC-alpha	0.0	1.00
959-98-8	ENDOSULFAN I	0.0	10.0
33213-65-9	ENDOSULFAN II	0.0	10.0
72-20-8	ENDRIN	0.0	1.25
77-47-4	HEXACHLOROCYCLOPENTADIENE	0.0	2.50
86-30-6	n-NITROSODIPHENYLAMINE	0.0	1.50
62-75-6	n-NITROSODIMETHYLAMINE	0.0	10.0
91-94-1	3,3-DICHLOROBENZIDINE	0.0	20.0
	2-METHYLNAPHTHALENE	0.0	0.5

LYLE A. JOHNSON - Chemist

* ACTUAL DETECTION LIMIT = METHOD DETECTION LIMIT x DILUTION FAC
** BMDL - BELOW METHOD DETECTION LIMIT (A value of 0.0 = BMDL)

APPENDIX J

Caustic Pond - Analytical Data

(Source: Reference 12)

GENERAL ENGINEERING LABORATORIES

Full Service Chemical Testing and Analysis

Office & Lab.
1313 Ashley River Road
Charleston, S.C.
Phone (803) 556-8171

Mailing Address
P.O. Box 30712
Charleston, S.C. 29407

Analysis Sheet

Client Geraghty & Miller, Inc.
P.O. Box 271173
Tampa, Florida 33688

Date August 4, 1981
P.O. No.
Requested by Mr. Phil Ciaravella

Sample Identification — Results

Analysis of Monitoring Wells
(July 28, 9181)

	CP-1	GP-2	CP-3	CP-4
ph	6.5	6.3	6.75	7.3
Conductivity, MMHOS/CM	3100	7400	1970	2700
Calcium, mg/L	250	490	192	101
Chloride, mg/L	670	1340	423	823
Sulfate, mg/L	279	552	116	124

By George C. Greene
George C. Greene, PhD

APPENDIX K

Chemical Disposal Area - Analytical Data

(Source: Reference 12)

ENERGY RESOURCES CO. INC

TRACE METAL ANALYSIS

- Report Sheet -

Analyzed for: Geraghty & Miller
Charleston, S.C.

mg/l unless otherwise stated

ERCO ID	CLIENT ID	F	NO^3	SO_4	TOC	COND umhos/cm
51-915a	CD-1	0.46	<0.01	26	110	27,000
51-916	CD-2	0.57	0.02	<1	110	32,000
51-917	CD-3	0.13	0.23	4	63	1,900
51-918	CD-4	0.71	<0.01	400	190	11,000
51-919	CD-5	0.69	<0.01	61	170	14,000

If customer has any questions regarding analysis, refer to sample in question by its ERCO ID #.

Sample Rcvd. 7/30/81 Reported by Nat

Date Analysis Completed 8/25/81 Checked by Kah

ENERGY RESOURCES CO. INC

TRACE METAL ANALYSIS

- Report Sheet -

Analyzed for: Geraghty & Miller
Charleston, S.C.

ug/l unless otherwise stated

ERCO ID	CLIENT ID	Cd	Fe	Pb	Mg mg/l	Hg	Na mg/l
51-915a	CD-1	<1	200	<5	800	<0.1	5500
51-916	CD-2	<1	400	<5	820	<0.1	6300
51-917	CD-3	<1	46	<5	260	<0.1	2200
51-918	CD-4	<1	130	<5	280	<0.1	2500
51-919	CD-5	<1	1200	<5	280	<0.1	2800

If customer has any questions regarding analysis, refer to sample in question by its ERCO ID #.

Sample Rcvd. 7/30/81 Reported by NaL

Date Analysis Completed 8/25/81 Checked by Pah

ENERGY RESOURCES CO. INC.

INORGANIC CHEMISTRY LABORATORY

- Report of Chemical Analyses -

Client: Geraghty & Miller
Charleston, S.C.

ERCO ID	Client ID	Cl Concentration (gm/l)
51-915[a]	CD-1	7.3
51-916	CD-2	6.6
51-917	CD-3	0.2
51-918	CD-4	1.9
51-919	CD-5	2.7

Sample Rcvd. 7/30/81
Date Completed 8/25/81
Date of this rpt. 5/4/82
Reported by Kah
Checked by

Sample Rcvd: 7/30/81

Date Analysis Completed: 8/7/81

All Results In: mg/l

Reported By:

Checked By:

ENERGY RESOURCES CO. INC.

VOLATILE ORGANICS ANALYSIS

- Report Sheet -

Analyzed for: Geraghty & Miller

Compounds (in order of elution)	CD-1	CD-2	CD-3	CD-4	CD-5
Vinyl chloride					
Methylene chloride	0.58	0.32			
1,1-dichloroethylene					
1,1-dichloroethane					
trans-1,2-dichloroethylene					
1,2-dichloroethane					
1,1,1-trichloroethane					
1,2-Dichloropropane					
Trichloroethylene					
1,1,2-Trichloroethane					
Tetrachloroethylene					
Chlorobenzene			0.14		10.68
Unknown	0.20				

Comments: All blank spaces are ND's (none detected) (<0.05 mg/l, or 50 ppb)

Sample Rcvd: 2/12/82

Date Analysis Completed: 2/23/82

All Results In: µg/l (ppb)

Reported By:

Checked By:

ENERGY RESOURCES CO. INC.

VOLATILE ORGANICS ANALYSIS

- Report Sheet -

Analyzed for: G & M SC Navy

Compounds (in order of elution)	CD-1 13-1239	CD-2 13-1240	CD-3 13-1241	CD-4 13-1242	CD-5 13-1246
Vinyl chloride					
Methylene chloride	28	2000	7.5	1800	1500
1,1-dichloroethylene					
1,1-dichloroethane					
1,2-dichloroethylene					
Chloroform			1.5		
1,2-dichloroethane					
1,1,1-trichloroethane					
Carbon tetrachloride					
Bromodichloromethane					
Trichloroethylene					
Dibromochloromethane					
Bromoform					
Tetrachloroethylene					

Comments: All blank spaces are ND's (none detected).

ENERGY RESOURCES CO.,INC.
SUMMARY OF BASE/NEUTRAL PRIORITY POLLUTANTS

CLIENT: Geraghty & Miller

CLIENT I.D.: CD 1 DATE SAMPLE RECEIVED: 2/12/82

ERCO I.D.: 13-1239 DATE SAMPLE COMPLETED: 2/28/82

	BASE/NEUTRAL	ug/l
3	acenaphthene	ND
2B	benzidine	ND
3B	1,2,4-trichlorobenzene	ND
3	hexachlorobenzene	ND
12B	hexachloroethane	ND
3B	bis(2-chloroethyl)ether	ND
20B	2-chloronaphthalene	ND
5B	1,2-dichlorobenzene	ND
26B	1,3-dichlorobenzene	ND
	1,4-dichlorobenzene	ND
28B	3,3-dichlorobenzidine	ND
5B	2,4-dinitrotoluene	ND
36B	2,6-dinitrotoluene	ND
7B	1,2-diphenylhydrazine	ND
9B	fluoranthene	ND
0B	4-chlorophenyl phenyl ether	ND
1B	4-bromophenyl phenyl ether	ND
2B	bis(2-chloroisopropyl)ether	ND
3B	bis(2-chloroethoxy)methane	ND
52B	hexachlorobutadiene	ND
3B	hexachlorocyclopentadiene	ND
54B	isophorone	ND
5B	naphthalene	ND
56B	nitrobenzene	ND
1B	N-nitrosodimethylamine	ND
5	N-nitrosodiphenylamine	ND
3B	N-nitrosodi-n-propylamine	ND
6B	bis(2-ethylhexyl)phthalate	*
7B	butyl benzyl phthalate	ND

	BASE/NEUTRAL	ug/l
68B	di-n-butyl phthalate	ND
69B	di-n-octyl phthalate	ND
70B	diethyl phthalate	*
71B	dimethyl phthalate	ND
72B	benzo(a)anthracene	ND
73B	benzo(a)pyrene	ND
74B	3,4-benzofluoranthene	ND
75B	benzo(k)fluoranthene	ND
76B	chrysene	ND
77B	acenaphthylene	ND
78B	anthracene	ND
79B	benzo(ghi)perylene	ND
80B	fluorene	ND
81B	phenanthrene	ND
82B	dibenzo(a,h)anthracene	ND
83B	indeno(1,2,3-cd)pyrene	ND
84B	pyrene	ND
129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

ND = Not Detected
NA = Not Applicable
* = 1-9 ug/l

Reported by: [signature]
Checked by: C Rodgers

ENERGY RESOURCES CO.,INC.
SUMMARY OF BASE/NEUTRAL PRIORITY POLLUTANTS

CLIENT: Geraghty & Miller

CLIENT I.D.: CD 2 DATE SAMPLE RECEIVED: 2/12/82

ERCO I.D.: 13-1240 DATE SAMPLE COMPLETED: 2/28/82

	BASE/NEUTRAL	ug/l		BASE/NEUTRAL	ug/l
3	acenaphthene	ND	68B	di-n-butyl phthalate	ND
2B	benzidine	ND	69B	di-n-octyl phthalate	ND
3	1,2,4-trichlorobenzene	ND	70B	diethyl phthalate	*
3	hexachlorobenzene	ND	71B	dimethyl phthalate	ND
2B	hexachloroethane	ND	72B	benzo(a)anthracene	ND
3B	bis(2-chloroethyl)ether	ND	73B	benzo(a)pyrene	ND
20B	2-chloronaphthalene	ND	74B	3,4-benzofluoranthene	ND
5B	1,2-dichlorobenzene	ND	75B	benzo(k)fluoranthene	ND
26B	1,3-dichlorobenzene	ND	76B	chrysene	ND
7B	1,4-dichlorobenzene	ND	77B	acenaphthylene	ND
28B	3,3-dichlorobenzidine	ND	78B	anthracene	ND
5B	2,4-dinitrotoluene	ND	79B	benzo(ghi)perylene	ND
36B	2,6-dinitrotoluene	ND	80B	fluorene	ND
7B	1,2-diphenylhydrazine	ND	81B	phenanthrene	ND
9B	fluoranthene	ND	82B	dibenzo(a,h)anthracene	ND
0B	4-chlorophenyl phenyl ether	ND	83B	indeno(1,2,3-cd)pyrene	ND
1B	4-bromophenyl phenyl ether	ND	84B	pyrene	ND
2B	bis(2-chloroisopropyl)ether	ND	129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND
3B	bis(2-chloroethoxy)methane	ND			
52B	hexachlorobutadiene	ND			
3B	hexachlorocyclopentadiene	ND			
54B	isophorone	ND			
5B	naphthalene	ND			
56B	nitrobenzene	ND			
1B	N-nitrosodimethylamine	ND			
52B	N-nitrosodiphenylamine	ND			
3B	N-nitrosodi-n-propylamine	ND			
6B	bis(2-ethylhexyl)phthalate	34			
7B	butyl benzyl phthalate	ND			

ND = Not Detected

NA = Not Applicable

* = 1-9 ug/l

Reported by: NKM

Checked by: C. Lodger

ENERGY RESOURCES CO.,INC.
SUMMARY OF BASE/NEUTRAL PRIORITY POLLUTANTS

CLIENT: Geraghty & Miller

CLIENT I.D.: CD 3 DATE SAMPLE RECEIVED: 2/12/82

ERCO I.D.: 13-1241 DATE SAMPLE COMPLETED: 2/28/82

	BASE/NEUTRAL	ug/l
3	acenaphthene	ND
B	benzidine	ND
B	1,2,4-trichlorobenzene	ND
3	hexachlorobenzene	ND
12B	hexachloroethane	ND
3B	bis(2-chloroethyl)ether	ND
20B	2-chloronaphthalene	ND
5B	1,2-dichlorobenzene	ND
26B	1,3-dichlorobenzene	ND
	1,4-dichlorobenzene	ND
28B	3,3-dichlorobenzidine	ND
5B	2,4-dinitrotoluene	ND
36B	2,6-dinitrotoluene	ND
B	1,2-diphenylhydrazine	ND
9B	fluoranthene	ND
0B	4-chlorophenyl phenyl ether	ND
B	4-bromophenyl phenyl ether	ND
2B	bis(2-chloroisopropyl)ether	ND
B	bis(2-chloroethoxy)methane	ND
2B	hexachlorobutadiene	ND
B	hexachlorocyclopentadiene	ND
4B	isophorone	ND
B	naphthalene	*
6B	nitrobenzene	ND
B	N-nitrosodimethylamine	ND
2	N-nitrosodiphenylamine	ND
B	N-nitrosodi-n-propylamine	ND
6B	bis(2-ethylhexyl)phthalate	*
B	butyl benzyl phthalate	ND

	BASE/NEUTRAL	ug/l
68B	di-n-butyl phthalate	*
69B	di-n-octyl phthalate	ND
70B	diethyl phthalate	*
71B	dimethyl phthalate	*
72B	benzo(a)anthracene	ND
73B	benzo(a)pyrene	ND
74B	3,4-benzofluoranthene	ND
75B	benzo(k)fluoranthene	ND
76B	chrysene	ND
77B	acenaphthylene	ND
78B	anthracene	ND
79B	benzo(ghi)perylene	ND
80B	fluorene	ND
81B	phenanthrene	ND
82B	dibenzo(a,h)anthracene	ND
83B	indeno(1,2,3-cd)pyrene	ND
84B	pyrene	ND
129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

ND = Not Detected
NA = Not Applicable
* = 1-9 ug/l

Reported by: [signature]
Checked by: C. [signature]

ENERGY RESOURCES CO.,INC.
SUMMARY OF BASE/NEUTRAL PRIORITY POLLUTANTS

CLIENT: Geraghty & Miller

CLIENT I.D.: CD 4 DATE SAMPLE RECEIVED: 2/12/82

ERCO I.D.: 13-1242 DATE SAMPLE COMPLETED: 2/28/82

	BASE/NEUTRAL	ug/l
1B	acenaphthene	ND
B	benzidine	ND
3B	1,2,4-trichlorobenzene	ND
B	hexachlorobenzene	ND
12B	hexachloroethane	ND
8B	bis(2-chloroethyl)ether	ND
20B	2-chloronaphthalene	ND
5B	1,2-dichlorobenzene	ND
26B	1,3-dichlorobenzene	ND
7B	1,4-dichlorobenzene	ND
8B	3,3-dichlorobenzidine	ND
5B	2,4-dinitrotoluene	ND
6B	2,6-dinitrotoluene	ND
37B	1,2-diphenylhydrazine	ND
9B	fluoranthene	ND
40B	4-chlorophenyl phenyl ether	ND
1B	4-bromophenyl phenyl ether	ND
42B	bis(2-chloroisopropyl)ether	ND
3B	bis(2-chloroethoxy)methane	ND
52B	hexachlorobutadiene	ND
3B	hexachlorocyclopentadiene	ND
54B	isophorone	ND
5B	naphthalene	ND
6B	nitrobenzene	ND
1B	N-nitrosodimethylamine	ND
2B	N-nitrosodiphenylamine	ND
53B	N-nitrosodi-n-propylamine	ND
6B	bis(2-ethylhexyl)phthalate	15
57B	butyl benzyl phthalate	ND

	BASE/NEUTRAL	ug/l
68B	di-n-butyl phthalate	*
69B	di-n-octyl phthalate	ND
70B	diethyl phthalate	*
71B	dimethyl phthalate	ND
72B	benzo(a)anthracene	ND
73B	benzo(a)pyrene	ND
74B	3,4-benzofluoranthene	ND
75B	benzo(k)fluoranthene	ND
76B	chrysene	ND
77B	acenaphthylene	ND
78B	anthracene	ND
79B	benzo(ghi)perylene	ND
80B	fluorene	ND
81B	phenanthrene	ND
82B	dibenzo(a,h)anthracene	ND
83B	indeno(1,2,3-cd)pyrene	ND
84B	pyrene	ND
129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

ND = Not Detected

NA = Not Applicable

* = 1-9 ug/l

Reported by: MKM

Checked by: C. Rodger

ENERGY RESOURCES CO.,INC.
SUMMARY OF BASE/NEUTRAL PRIORITY POLLUTANTS

CLIENT: Geraghty & Miller

CLIENT I.D.: CD 5 DATE SAMPLE RECEIVED: 2/12/82

ERCO I.D.: 13-1246 DATE SAMPLE COMPLETED: 2/28/82

	BASE/NEUTRAL	ug/l
B	acenaphthene	ND
2B	benzidine	ND
7B	1,2,4-trichlorobenzene	ND
B	hexachlorobenzene	ND
12B	hexachloroethane	ND
8B	bis(2-chloroethyl)ether	ND
20B	2-chloronaphthalene	ND
5B	1,2-dichlorobenzene	ND
26B	1,3-dichlorobenzene	ND
	1,4-dichlorobenzene	ND
28B	3,3-dichlorobenzidine	ND
5B	2,4-dinitrotoluene	ND
36B	2,6-dinitrotoluene	ND
7B	1,2-diphenylhydrazine	ND
39B	fluoranthene	ND
0B	4-chlorophenyl phenyl ether	ND
1B	4-bromophenyl phenyl ether	ND
2B	bis(2-chloroisopropyl)ether	ND
3B	bis(2-chloroethoxy)methane	ND
52B	hexachlorobutadiene	ND
3B	hexachlorocyclopentadiene	ND
54B	isophorone	ND
5B	naphthalene	ND
56B	nitrobenzene	ND
1B	N-nitrosodimethylamine	ND
52	N-nitrosodiphenylamine	ND
3B	N-nitrosodi-n-propylamine	ND
56B	bis(2-ethylhexyl)phthalate	*
7B	butyl benzyl phthalate	ND

	BASE/NEUTRAL	ug/l
68B	di-n-butyl phthalate	*
69B	di-n-octyl phthalate	ND
70B	diethyl phthalate	*
71B	dimethyl phthalate	ND
72B	benzo(a)anthracene	ND
73B	benzo(a)pyrene	ND
74B	3,4-benzofluoranthene	ND
75B	benzo(k)fluoranthene	ND
76B	chrysene	ND
77B	acenaphthylene	ND
78B	anthracene	ND
79B	benzo(ghi)perylene	ND
80B	fluorene	ND
81B	phenanthrene	ND
82B	dibenzo(a,h)anthracene	ND
83B	indeno(1,2,3-cd)pyrene	ND
84B	pyrene	ND
129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND

ND = Not Detected

NA = Not Applicable

* = 1-9 ug/l

Reported by: NHH

Checked by: C. Ridgeway

pH MEASUREMENTS OF WATER SAMPLES
COLLECTED FROM MONITOR WELLS
AT THE CHEMICAL-DISPOSAL AREA[1]

Well Number	pH 7/27/81	pH 2/11/82
CD-1	6.85	7.22
CD-2	6.85	7.10
CD-3	7.45	8.63
CD-4	7.30	7.15
CD-5	7.30	6.68

[1] Measured at the time of sample collection.

APPENDIX L

Old Plating Shop Waste Treatment Area - Analytical Data

SOUTHERN DIVISION NAVAL FACILITIES

DELIVERY ORDER # 0096

PLATING WASTE TREATMENT UNIT SOIL SAMPLES

CHARLESTON, SC NAVAL SHIPYARD

ETC #	Sample I.D.	Date	Results (as received ppm) pH	Cadmium	Chromium	Cyanide Total
122	PW12-1	3/24	7.5	9.92	10.9	<0.05
123	PW12-2	3/24	9.2	<0.1	15.2	<0.05
124	PW12-3	3/24	7.2	1.09	13.8	0.97
125	PW13-1	3/24	8.1	1.30	17.1	<0.05
126	PW13-2	3/24	7.5	47.7	143	6.28
127	PW13-3	3/24	5.6	7.73	136	0.984
128	PW11-1	3/24	7.2	<0.1	16.2	<0.05
129	PW11-2	3/24	6.7	<0.1	12.9	<0.05
130	PW11-3	3/24	7.3	<0.1	15.4	<0.05
131	PW10-1	3/24	7.9	<0.1	13.0	<0.05
132	PW10-2	3/24	8.4	<0.1	108	<0.05
133	PW10-3	3/24	7.7	<0.1	26.5	<0.05
134	PW9-1	3/24	8.3	<0.1	32.5	<0.05
135	PW9-2	3/24	7.9	<0.1	15.8	<0.05
136	PW9-3	3/24	7.7	<0.1	7.54	<0.05
137	PW8-1	3/24	8.3	2.93	36.7	<0.05
138	PW8-2	3/24	8.2	<0.1	27.7	<0.05
139	PW8-3	3/24	8.1	<0.1	10.3	<0.05
140	PW7-1	3/24	8.5	4.06	-	<0.05
141	PW7-2	3/24	8.0	<0.1	-	<0.05
142	PW7-3	3/24	8.1	<0.1	-	<0.05
143	PW6-1	3/24	8.6	<0.1	29.3	<0.05
144	PW6-2	3/24	8.2	<0.1	36.6	<0.05
145	PW6-3	3/24	8.4	<0.1	27.8	<0.05
146	PW5-1	3/24	8.3	0.44	-	<0.05
147	PW5-2	3/24	8.0	<0.1	-	<0.05
148	PW5-3	3/24	8.5	<0.1	-	<0.05
149	PW4-1	3/24	8.9	12.9	29.8	<0.05
150	PW4-2	3/24	8.1	0.58	12.6	<0.05
151	PW4-3	3/24	8.1	<0.1	6.40	<0.05
152	PW3-1	3/25	8.7	<0.1	30.8	<0.05
153	PW3-2	3/25	8.9	<0.1	23.4	<0.05
154	PW3-3	3/25	8.7	<0.1	29.3	<0.05
155	PW2-1	3/25	8.3	3.39	38.5	<0.05
156	PW2-2	3/25	8.4	<0.1	28.7	<0.05
157	PW2-3	3/25	8.4	<0.1	26.0	<0.05
158	PW1-1	3/25	8.6	12.0	66.6	<0.05
159	PW1-2	3/25	9.0	3.61	31.0	<0.05
160	PW1-3	3/25	8.6	<0.1	31.8	<0.05
161	PW16-1	3/25	8.6	<0.1	16.9	<0.05
162	PW16-2	3/25	8.4	<0.1	6.50	<0.05
163	PW16-3	3/25	8.0	4.34	8.42	<0.05
164	PW14-1	3/25	7.9	<0.1	6.57	<0.05
165	PW14-2	3/25	7.9	<0.1	5.37	<0.05
166	PW14-3	3/25	7.5	1.79	6.81	<0.05
67	PW15-1	3/25	7.9	-	-	<0.05
168	PW15-2	3/25	7.8	-	-	<0.05
169	PW15-3	3/25	7.6	-	-	<0.05

GENERAL ENGINEERING LABORATORIES

Environmental Engineering and Analytical Services

Molly E. Greene
President

George C. Greene, P.E., Ph.D.
Vice President
SC Registration No. 9103

Laboratory Certifications:

FL	E87156/87294
NC	233
SC	10120
VA	00151
NACIP	Approved

CERTIFICATE OF ANALYSIS

Client: ENVIRONMENTAL & SAFETY DESIGNS, INC
P.O. BOX 341315
MEMPHIS , TN 38184

Date: 02/16/89

Contact: MR. J. SPEAKMAN, PhD, PE

Released by: ALLAN M. CRANE

cc/fc: ENSA/CR2

Page No.: 1

Parameter	Sample ID :	PW-1 (4') 02/06/89	PW-1 (5') 02/06/89	PW-1 (6') 02/06/89	PW-3 (4') 02/06/89
	Lab ID :	89020441	89020442	89020443	89020444
	Sample Type :	15	15	15	15
	Date Received:	02/06/89	02/06/89	02/06/89	02/06/89
	Collected by :	GEL	GEL	GEL	GEL
CHROMIUM		21.2 ppm	27.6 ppm	26.6 ppm	25.8 ppm
ACID DIGESTION		YES	YES	YES	YES

2040 Savage Road • Charleston, SC 29414 / P. O. Box 30712 • Charleston, SC 29417
Phone (803) 556-8171 • FAX (803) 766-1178

GENERAL ENGINEERING LABORATORIES

Environmental Engineering and Analytical Services

Molly E. Greene
President

George C. Greene, P.E., Ph.D.
Vice President
SC Registration No. 9103

Laboratory Certifications:
FL E87156/87
NC
SC 10120
VA 00151
NACIP Approved

CERTIFICATE OF ANALYSIS

Client: ENVIRONMENTAL & SAFETY DESIGNS, INC
P.O. BOX 341315
MEMPHIS , TN 38184

Date: 02/16/89

Contact: MR. J. SPEAKMAN, PhD, PE

Released by: ALLAN M. CRANE

cc/fc: ENSA/CR2

Page No.: 1

Parameter			
	Sample ID :	PW-3 (5') 02/06/89	PW-3 (6') 02/06/89
	Lab ID :	89020445	89020446
	Sample Type :	15	15
	Date Received:	02/06/89	02/06/89
	Collected by :	GEL	GEL
CHROMIUM		3.83 ppm	8.38 ppm
ACID DIGESTION		YES	YES

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Environmental Engineering and Analytical Services

Molly L. Greene
President

George C. Greene, P.E., Ph.D.
Vice President
SC Registration No. 9103

Laboratory Certifications:

FL	E87156/87294
NC	233
SC	10120
VA	00151
NACIP	Approved

CERTIFICATE OF ANALYSIS

Client: ENVIRONMENTAL & SAFETY DESIGNS, INC
P.O. BOX 341315
MEMPHIS , TN 38184

Date: 02/16/89

Contact: MR. J. SPEAKMAN, PhD, PE

Released by: A. M. Crane
ALLAN M. CRANE

cc/fc: ENSA/ENSAM

Page No.: 1

Parameter	Sample ID	PW-6 (4') 02/07/89	PW-6 (5') 02/07/89	PW-6 (6') 02/07/89	PW-13 (4') 02/07/89
	Lab ID	89020534	89020535	89020536	89020537
	Sample Type	15	15	15	15
	Date Received	02/08/89	02/08/89	02/08/89	02/08/89
	Collected by	GEL	GEL	GEL	GEL
CADMIUM					15.5 ppm
CHROMIUM		9.79 ppm	7.10 ppm	17.9 ppm	128 ppm
ACID DIGESTION		YES	YES	YES	YES

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GENERAL ENGINEERING LABORATORIES

Environmental Engineering and Analytical Services

Molly L. Greene
President

George C. Greene, P.E., Ph.D.
Vice President
SC Registration No. 9103

Laboratory Certifications:
FL E87156/87204
NC
SC
VA 00151
NACIP Approved

CERTIFICATE OF ANALYSIS

Client: ENVIRONMENTAL & SAFETY DESIGNS, INC
P.O. BOX 341315
MEMPHIS , TN 38184

Date: 02/16/89

Contact: MR. J. SPEAKMAN, PhD, PE

Released by: A. M. Crane
ALLAN M. CRANE

cc/fc: ENSA/ENSAM

Page No.: 1

	Sample ID :	PW-13 (5') 02/07/89	PW-13 (6') 02/07/89	PW-14 (4') 02/07/89	PW-14 (5') 02/07/89
	Lab ID :	89020538	89020539	89020540	89020541
	Sample Type :	15	15	15	15
	Date Received:	02/08/89	02/08/89	02/08/89	02/08/89
Parameter	Collected by :	GEL	GEL	GEL	GEL
CADMIUM		3.88 ppm	0.716 ppm	1.02 ppm	1.69 ppm
CHROMIUM		46.6 ppm	9.57 ppm		
ACID DIGESTION		YES	YES	YES	YES

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GENERAL ENGINEERING LABORATORIES

Environmental Engineering and Analytical Services

Molly E. Greene
President

George C. Greene, P.E., Ph.D.
Vice President
SC Registration No. 9103

Laboratory Certifications:

LI	E871/6/87294
NC	233
SC	10120
VA	00151
NACIP	Approved

CERTIFICATE OF ANALYSIS

Client: ENVIRONMENTAL & SAFETY DESIGNS, INC
P.O. BOX 341315
MEMPHIS , TN 38184

Date: 02/16/89

Contact: MR. J. SPEAKMAN, PhD, PE

Released by: ALLAN M. CRANE

cc/fc: ENSA/ENSAM

Page No.: 1

Parameter					
	Sample ID :	PW-14 (6') 02/07/89	PW-16 (4') 02/07/89	PW-16 (5') 02/07/89	PW-16 (6') 02/07/89
	Lab ID :	89020542	89020543	89020544	89020545
	Sample Type :	15	15	15	15
	Date Received:	02/08/89	02/08/89	02/08/89	02/08/89
	Collected by :	GEL	GEL	GEL	GEL
CADMIUM		0.596 ppm	3.36 ppm	2.31 ppm	1.32 ppm
ACID DIGESTION		YES	YES	YES	YES

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APPENDIX M

Building 44 - Analytical Data

(Source: Reference 15)

Appendix B

ANALYTICAL RESULTS
1-, 2- AND 3-FOOT SAMPLES

PLATING WASTE TREATMENT FACILITY
HAZARDOUS WASTE FACILITY CLOSURES
NAVAL SHIPYARD CHARLESTON, SC

APPENDICES

APPENDIX 1

Laboratory Analyses - Metals

Davis & Floyd, Inc.

Laboratory Analysis Report

Page 1
Received: 01/28/91

Work Order # 91-01-161

02/20/91 09:21:39

REPORT CHARLESTON NAVAL BASE
TO RUDY POWELL
DAVIS & FLOYD, INC.

ATTEN RUDY POWELL

WORK ID JOB # 5548.00
P.O. #
TAKEN DAVIS & FLOYD, INC.
TYPE SOLID & WASTE WATER
NUMBER OF SAMPLES 30

PREPARED Davis & Floyd, Inc.
BY P.O. Drawer 428
Greenwood, S.C. 29648

PHONE (803)-229_5211

CERTIFIED BY

JOHN_MCCORD

Comments:
WE ARE PLEASED TO PROVIDE THIS CERTIFIED REPORT OF ANALYSES. FEEL FREE TO TELEPHONE IF FURTHER EXPLANATION IS REQUIRED. UNLESS OTHER ARRANGEMENTS HAVE BEEN MADE, SAMPLES WILL BE DISPOSED OF OR RETURNED 28 DAYS FROM THE DATE OF THIS REPORT.

	SAMPLE IDENTIFICATION	DATE COLLECTED
01	SP1 PEELING PAINT OFF WALL	01/24/91 15:06:00
02	SP2 TANK 41	01/24/91 15:20:00
03	SP3 TANK 42	01/24/91 15:30:00
04	SP4 TANK 49	01/24/91 15:50:00
05	SP5 TANK 47	01/24/91 16:00:00
06	SP6 TANK 45	01/24/91 15:34:00
07	SP7 TANK 29	01/24/91 16:10:00
08	SP8 TANK 22	01/24/91 16:17:00
09	SP9 MATERIAL UNDER FLOOR G	01/25/91 08:30:00
10	SP10 WAXER TANK	01/25/91 09:04:00
11	SP11 TANK 11	01/25/91 09:18:00
12	SP12 FLOOR AREA BEHIND TAN	01/25/91 10:08:00
13	SP13 TANK F	01/25/91 10:18:00
14	SP14 GRATE INFLOOR	01/25/91 10:38:00
15	SP15 TANK 1	01/25/91 10:30:00
16	SP16 TANK 3	01/25/91 10:35:00
17	SP17 TANK 5	01/25/91 10:40:00
18	SP18 ANODE CLEANER TANK	01/25/91 10:45:00
19	SP19 TANK 6	01/25/91 10:52:00
20	SP20 TANK 21	01/25/91 10:56:00
21	SP21 TANK 28A	01/25/91 13:45:00
22	SP22 TANK 33	01/25/91 13:50:00
23	SP23 TANK 36	01/25/91 13:55:00
24	SP24 TANK 56	01/25/91 14:00:00
25	SP25 DUCTS FR. TANKS 54,56	01/25/91 14:05:00
26	SP26 TANK 8	01/25/91 13:30:00
27	SP27 TANKS 57 & 58	01/25/91 14:10:00
28	SP28 TANK 54	01/25/91 14:15:00
29	SP29 DUST FROM ROOF AREA	01/25/91 14:25:00
30	TRIP BLANK	

Davis & Floyd, Inc.

Laboratory Analysis Report

Received: 01/28/91

02/20/91 09:21:39

Work Order # 91-01-161

Test Description	Units	01 SP1 PEELING PAI OFF WALL	02 SP2 TANK 41	03 SP3 TANK 42	04 SP4 TANK 49
SILVER	mg/kg	<1.0	60.0	<1.0	17.5
CADMIUM	mg/kg	90.2	167	224	214
CHROMIUM	mg/kg	598	579	5110	83
NICKEL	mg/kg	118	2130	887	555
MERCURY	mg/kg	2.7	1.3	0.63	0.97
LEAD	mg/kg	5836	10017	7330	4363
CYANIDE (TOTAL)	mg/kg	43.5	2.2	2.3	2.8

Test Description	Units	05 SP5 TANK 47	14 SP14 GRATE IN-FLOOR	15 SP15 TANK 1	16 SP16 TANK 3
SILVER	mg/kg	38.7	<1.0	4.5	16.7
CADMIUM	mg/kg	270	56.9	2.02	7.9
CHROMIUM	mg/kg	1095	3624	129100	85350
NICKEL	mg/kg	8030	285	93.7	46
MERCURY	mg/kg	0.07	0.19	0.10	<0.07
LEAD	mg/kg	6420	6297	446000	133800
CYANIDE (TOTAL)	mg/kg	<0.08	1.8	<50 X	<5.0 X

Received: 01/28/91

Work Order # 91-01-161

02/20/91 09:21:39

Test Description	Unit	17 SP17 TANK 5	18 SP18 ANODE CLEA TANK	19 SP19 TANK 6	20 SP20 TANK 21
SILVER	mg/kg	<1.0	4.5	<1.0	11.9
CADMIUM	mg/kg	6.6	20.8	50.5	23.2
CHROMIUM	mg/kg	145100	2958	123100	627
NICKEL	mg/kg	123	18	88	103
MERCURY	mg/kg	0.12	0.13	0.13	0.13
LEAD	mg/kg	231600	10903	43610	436
CYANIDE (TOTAL)	mg/kg	<5.0 X	3.33	<2.5 X	268

Test Description	Units	21 SP21 TANK 28A	22 SP22 TANK 33	23 SP23 TANK 36	24 SP24 TANK 56
SILVER	mg/kg	145.3	28.6	54.2	2.4
CADMIUM	mg/kg	84340	397	92.8	19.7
CHROMIUM	mg/kg	392	77	280	75480
NICKEL	mg/kg	73	736	1244	11940
MERCURY	mg/kg	<0.07	<0.06	0.10	<0.06
LEAD	mg/kg	62.6	342	55	6.7
CYANIDE (TOTAL)	mg/kg	5400	6920	13.0	2.81

Davis & Floyd, Inc.

Laboratory Analysis Report

Received: 01/28/91

Work Order # 91-01-161

02/20/91 09:21:39

Test Description	Units	25 SP25 DUCTS FR. TANKS 54,56	26 SP26 TANK 8	27 SP27 TANKS 57 & 58	28 SP28 TANK 54
SILVER (TOTAL)	mg/l		<0.01		
SILVER	mg/kg	65.3		9.8	1.5
CADMIUM (TOTAL)	mg/l		0.497		
CADMIUM	mg/kg	64.3		72.2	19.9
CHROMIUM (TOTAL)	mg/l		182		
CHROMIUM	mg/kg	472		76	32.8
NICKEL (TOTAL)	mg/l		2.30		
NICKEL	mg/kg	1226		92420	1609
MERCURY (TOTAL)	mg/l		0.017		
MERCURY	mg/kg	0.10		<0.07	<0.07
LEAD (TOTAL)	mg/l		0.55		
LEAD	mg/kg	193	.	27	14.8
CYANIDE (TOTAL)	mg/l		0.684		
CYANIDE (TOTAL)	mg/kg	15.8		0.9	0.17

Received: 01/28/91 02/20/91 09:21:39

Test Description	Units	29 SP29 DUST FROM ROOF AREA
SILVER	mg/kg	1.5
CADMIUM	mg/kg	9.80
CHROMIUM	mg/kg	222
NICKEL	mg/kg	43
MERCURY	mg/kg	<0.07
LEAD	mg/kg	180
CYANIDE (TOTAL)	mg/kg	0.84

Work Order # 91-01-161

Received: 01/28/91

Results by Sample

SAMPLE ID SP6 TANK 45

FRACTION 06A TEST CODE TCLPHB NAME TCLP HERBICIDES
Date & Time Collected 01/24/91 15:34:00 Category

ANALYST DMM ANALYZED 02/14/91 FACTOR 5 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
2,4-D	BDL	0.5
2,4,5-TP (Silvex)	BDL	0.05

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 91-01-161

Received: 01/28/91

Results by Sample

SAMPLE ID SP6 TANK 45

FRACTION 06A TEST CODE TCLPPS NAME TCLP PESTICIDES
Date & Time Collected 01/24/91 15:34:00 Category

ANALYST DMM ANALYZED 02/12/91 FACTOR 10 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Chlordane	BDL	5
Endrin	BDL	1
Heptachlor	BDL	0.5
Lindane	BDL	0.5
Methoxychlor	BDL	0.5
Toxaphene	BDL	10

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Davis & Floyd, Inc.

Laboratory Analysis Report

Received: 01/28/91

Work Order # 91-01-161

Results by Sample

SAMPLE ID SP6 TANK 45

FRACTION 06A TEST CODE TCLPSV NAME TCLP SEMIVOLATILES
Date & Time Collected 01/24/91 15:34:00 Category

ANALYST MPT ANALYZED 02/13/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
1,4-Dichlorobenzene	BDL	100
o-Cresol	BDL	100
m-Cresol	BDL	100
p-Cresol	BDL	100
Hexachloroethane	BDL	100
Nitrobenzene	BDL	100
Hexachlorobutadiene	BDL	100
2,4,6-Trichlorophenol	BDL	100
2,4,5-Trichlorophenol	BDL	500
2,4-Dinitrotoluene	BDL	500
Hexachlorobenzene	BDL	100
Pentachlorophenol	BDL	500
Pyridine	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 91-01-161

Received: 01/28/91

Results by Sample

SAMPLE ID SP6 TANK 45

FRACTION 06B TEST CODE TCLPTM NAME TCLP TRACE METALS
Date & Time Collected 01/24/91 15:34:00 Category

ANALYST BDL EXTRACTED _____ ANALYZED 02/12/91 VERIFIED JHM

COMPOUND	RESULT mg/l	REG LEVEL mg/l
Arsenic	<0.32 X	5.0
Barium	0.40	100.0
Cadmium	6.83	1.0
Chromium	0.11	5.0
Lead	0.10	5.0
Mercury	0.0005	0.2
Selenium	<0.05	1.0
Silver	<0.02	5.0

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 91-01-161

Received: 01/28/91

Results by Sample

SAMPLE ID SP6 TANK 45

FRACTION 06C TEST CODE TCLPVO NAME TCLP VOLATILES

Date & Time Collected 01/24/91 15:34:00 Category

ANALYST KLS ANALYZED 02/05/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Vinyl chloride	BDL	200
1,1-Dichloroethylene	BDL	100
Chloroform	BDL	100
1,2-Dichloroethane	BDL	100
Methyl ethly ketone	BDL	200
Carbon tetrachloride	BDL	100
Trichloroethylene	BDL	100
Benzene	BDL	100
Tetrachloroethylene	BDL	100
Chlorobenzene	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT

NA = not analyzed
BDL = below the required detection limit.
B = compound detected in extraction blank.
J = estimate below required detection limit.
D = secondary dilution required.
X = interference - dilution required.

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 91-01-161

Received: 01/28/91

Results by Sample

SAMPLE ID SP7 TANK 29

FRACTION 07A TEST CODE TCLPHB NAME TCLP HERBICIDES
Date & Time Collected 01/24/91 16:10:00 Category

ANALYST DMM ANALYZED 02/14/91 FACTOR 5 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
2,4-D	BDL	0.5
2,4,5-TP (Silvex)	BDL	0.05

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Received: 01/28/91

Results by Sample

SAMPLE ID SP7 TANK 29

FRACTION 07A TEST CODE TCLPPS NAME TCLP PESTICIDES
Date & Time Collected 01/24/91 16:10:00 Category

ANALYST DMM ANALYZED 02/12/91 FACTOR 10 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Chlordane	BDL	5
Endrin	BDL	1
Heptachlor	BDL	0.5
Lindane	BDL	0.5
Methoxychlor	BDL	0.5
Toxaphene	BDL	10

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Davis & Floyd, Inc.

Laboratory Analysis Report

Received: 01/28/91

Work Order # 91-01-161

Results by Sample

SAMPLE ID SP7 TANK 29

FRACTION 07A TEST CODE TCLPSV NAME TCLP SEMIVOLATILES
Date & Time Collected 01/24/91 16:10:00 Category

ANALYST MPT ANALYZED 02/13/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
1,4-Dichlorobenzene	BDL	100
o-Cresol	BDL	100
m-Cresol	BDL	100
p-Cresol	BDL	100
Hexachloroethane	BDL	100
Nitrobenzene	BDL	100
Hexachlorobutadiene	BDL	100
2,4,6-Trichlorophenol	BDL	100
2,4,5-Trichlorophenol	BDL	500
2,4-Dinitrotoluene	BDL	500
Hexachlorobenzene	BDL	100
Pentachlorophenol	BDL	500
Pyridine	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Davis & Floyd, Inc.

Laboratory Analysis Report

Received: 01/28/91

Work Order # 91-01-161

Results by Sample

SAMPLE ID SP7 TANK 29

FRACTION 07B TEST CODE TCLPTM NAME TCLP TRACE METALS
Date & Time Collected 01/24/91 16:10:00 Category

ANALYST BDL EXTRACTED _____ ANALYZED 02/14/91 VERIFIED JHM

COMPOUND	RESULT mg/l	REG LEVEL mg/l
Arsenic	0.013	5.0
Barium	160	100.0
Cadmium	26.0	1.0
Chromium	1612	5.0
Lead	<0.005	5.0
Mercury	0.010	0.2
Selenium	0.15	1.0
Silver	<0.02	5.0

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed

Davis & Floyd, Inc.

Laboratory Analysis Report

Received: 01/28/91

Work Order # 91-01-161

Results by Sample

SAMPLE ID SP7 TANK 29

FRACTION 07C TEST CODE TCLPVO NAME TCLP VOLATILES
Date & Time Collected 01/24/91 16:10:00 Category

ANALYST KLS ANALYZED 02/06/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Vinyl chloride	BDL	200
1,1-Dichloroethylene	BDL	100
Chloroform	BDL	100
1,2-Dichloroethane	BDL	100
Methyl ethly ketone	BDL	200
Carbon tetrachloride	BDL	100
Trichloroethylene	BDL	100
Benzene	BDL	100
Tetrachloroethylene	BDL	100
Chlorobenzene	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT

NA = not analyzed
BDL = below the required detection limit.
B = compound detected in extraction blank.
J = estimate below required detection limit.
D = secondary dilution required.
X = interference - dilution required.

Received: 01/28/91

Results by Sample

SAMPLE ID SP8 TANK 22

FRACTION 08A TEST CODE TCLPHB NAME TCLP HERBICIDES
Date & Time Collected 01/24/91 16:17:00 Category

ANALYST DMM ANALYZED 02/14/91 FACTOR 5 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
2,4-D	BDL	0.5
2,4,5-TP (Silvex)	BDL	0.05

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 91-01-161

Received: 01/28/91

Results by Sample

SAMPLE ID SP8 TANK 22

FRACTION 08A TEST CODE TCLPPS NAME TCLP PESTICIDES
Date & Time Collected 01/24/91 16:17:00 Category

ANALYST DMM ANALYZED 02/12/91 FACTOR 10 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Chlordane	BDL	5
Endrin	BDL	1
Heptachlor	BDL	0.5
Lindane	BDL	0.5
Methoxychlor	BDL	0.5
Toxaphene	BDL	10

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Davis & Floyd, Inc.

Laboratory Analysis Report

Received: 01/28/91

Work Order # 91-01-161

Results by Sample

SAMPLE ID SP8 TANK 22

FRACTION 08A TEST CODE TCLPSV NAME TCLP SEMIVOLATILES
Date & Time Collected 01/24/91 16:17:00 Category

ANALYST MPT ANALYZED 02/13/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
1,4-Dichlorobenzene	BDL	100
o-Cresol	BDL	100
m-Cresol	BDL	100
p-Cresol	BDL	100
Hexachloroethane	BDL	100
Nitrobenzene	BDL	100
Hexachlorobutadiene	BDL	100
2,4,6-Trichlorophenol	BDL	100
2,4,5-Trichlorophenol	BDL	500
2,4-Dinitrotoluene	BDL	500
Hexachlorobenzene	BDL	100
Pentachlorophenol	BDL	500
Pyridine	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT

NA = not analyzed

BDL = below the required detection limit.

Davis & Floyd, Inc.

Laboratory Analysis Report

Received: 01/28/91

Work Order # 91-01-161

Results by Sample

SAMPLE ID SP8 TANK 22

FRACTION 08B TEST CODE TCLPTM NAME TCLP TRACE METALS
Date & Time Collected 01/24/91 16:17:00 Category

ANALYST BDL EXTRACTED _____ ANALYZED 02/14/91 VERIFIED JHM

COMPOUND	RESULT mg/l	REG LEVEL mg/l
Arsenic	<0.05	5.0
Barium	0.08	100.0
Cadmium	0.050	1.0
Chromium	0.47	5.0
Lead	<0.05	5.0
Mercury	0.0042	0.2
Selenium	<0.05	1.0
Silver	0.06	5.0

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed

Received: 01/28/91

Results by Sample

SAMPLE ID SP8 TANK 22

FRACTION 08C TEST CODE TCLPVO NAME TCLP VOLATILES
Date & Time Collected 01/24/91 16:17:00 Category

ANALYST KLS ANALYZED 02/05/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Vinyl chloride	BDL	200
1,1-Dichloroethylene	BDL	100
Chloroform	BDL	100
1,2-Dichloroethane	BDL	100
Methyl ethly ketone	BDL	200
Carbon tetrachloride	BDL	100
Trichloroethylene	BDL	100
Benzene	BDL	100
Tetrachloroethylene	BDL	100
Chlorobenzene	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT

NA = not analyzed
BDL = below the required detection limit.
B = compound detected in extraction blank.
J = estimate below required detection limit.
D = secondary dilution required.
X = interference - dilution required.

Received: 01/28/91

Results by Sample

SAMPLE ID SP9 MATERIAL UNDER FLOOR G FRACTION 09A TEST CODE TCLPHB NAME TCLP HERBICIDES
Date & Time Collected 01/25/91 08:30:00 Category

ANALYST DMM ANALYZED 02/14/91 FACTOR 5 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
2,4-D	BDL	0.5
2,4,5-TP (Silvex)	BDL	0.05

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Received: 01/28/91

Results by Sample

SAMPLE ID SP9 MATERIAL UNDER FLOOR G FRACTION 09A TEST CODE TCLPPS NAME TCLP PESTICIDES
Date & Time Collected 01/25/91 08:30:00 Category

ANALYST DMM ANALYZED 02/12/91 FACTOR 10 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Chlordane	BDL	5
Endrin	BDL	1
Heptachlor	BDL	0.5
Lindane	BDL	0.5
Methoxychlor	BDL	0.5
Toxaphene	BDL	10

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

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Laboratory Analysis Report

Received: 01/28/91

Work Order # 91-01-161

Results by Sample

SAMPLE ID SP9 MATERIAL UNDER FLOOR G FRACTION 09A TEST CODE TCLPSV NAME TCLP SEMIVOLATILES
Date & Time Collected 01/25/91 08:30:00 Category

ANALYST MPT ANALYZED 02/13/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
1,4-Dichlorobenzene	BDL	100
o-Cresol	BDL	100
m-Cresol	BDL	100
p-Cresol	BDL	100
Hexachloroethane	BDL	100
Nitrobenzene	BDL	100
Hexachlorobutadiene	BDL	100
2,4,6-Trichlorophenol	BDL	100
2,4,5-Trichlorophenol	BDL	500
2,4-Dinitrotoluene	BDL	500
Hexachlorobenzene	BDL	100
Pentachlorophenol	BDL	500
Pyridine	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 91-01-161

Received: 01/28/91

Results by Sample

SAMPLE ID SP9 MATERIAL UNDER FLOOR G FRACTION 09B TEST CODE TCLPTM NAME TCLP TRACE METALS
Date & Time Collected 01/25/91 08:30:00 Category

ANALYST BDL EXTRACTED _____ ANALYZED 02/12/91 VERIFIED JHM

COMPOUND	RESULT mg/l	REG LEVEL mg/l
Arsenic	<0.05	5.0
Barium	5.35	100.0
Cadmium	30.4	1.0
Chromium	0.13	5.0
Lead	0.12	5.0
Mercury	0.0009	0.2
Selenium	<0.05	1.0
Silver	0.18	5.0

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed

Received: 01/28/91

Results by Sample

SAMPLE ID SP9 MATERIAL UNDER FLOOR G FRACTION 09C TEST CODE TCLPVO NAME TCLP VOLATILES
Date & Time Collected 01/25/91 08:30:00 Category

ANALYST KLS ANALYZED 02/05/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Vinyl chloride	BDL	200
1,1-Dichloroethylene	BDL	100
Chloroform	BDL	100
1,2-Dichloroethane	BDL	100
Methyl ethly ketone	BDL	200
Carbon tetrachloride	BDL	100
Trichloroethylene	BDL	100
Benzene	BDL	100
Tetrachloroethylene	BDL	100
Chlorobenzene	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT

NA = not analyzed
BDL = below the required detection limit.
B = compound detected in extraction blank.
J = estimate below required detection limit.
D = secondary dilution required.
X = interference - dilution required.

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 91-01-161

Received: 01/28/91

Results by Sample

SAMPLE ID SP10 WAXER TANK

FRACTION 10A TEST CODE TCLPHB NAME TCLP HERBICIDES
Date & Time Collected 01/25/91 09:04:00 Category

ANALYST DMM ANALYZED 02/14/91 FACTOR 5 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
2,4-D	BDL	0.5
2,4,5-TP (Silvex)	BDL	0.05

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Work Order # 91-01-161

Received: 01/28/91

Results by Sample

SAMPLE ID SP10 WAXER TANK

FRACTION 10A TEST CODE TCLPPS NAME TCLP PESTICIDES
Date & Time Collected 01/25/91 09:04:00 Category

ANALYST DMM ANALYZED 02/12/91 FACTOR 10 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Chlordane	BDL	5
Endrin	BDL	1
Heptachlor	BDL	0.5
Lindane	BDL	0.5
Methoxychlor	BDL	0.5
Toxaphene	BDL	10

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Received: 01/28/91

Work Order # 91-01-161

Results by Sample

SAMPLE ID SP10 WAXER TANK

FRACTION 10A TEST CODE TCLPSV NAME TCLP SEMIVOLATILES
Date & Time Collected 01/25/91 09:04:00 Category

ANALYST MPT ANALYZED 02/13/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
1,4-Dichlorobenzene	BDL	100
o-Cresol	BDL	100
m-Cresol	BDL	100
p-Cresol	BDL	100
Hexachloroethane	BDL	100
Nitrobenzene	BDL	100
Hexachlorobutadiene	BDL	100
2,4,6-Trichlorophenol	BDL	100
2,4,5-Trichlorophenol	BDL	500
2,4-Dinitrotoluene	BDL	500
Hexachlorobenzene	BDL	100
Pentachlorophenol	BDL	500
Pyridine	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Received: 01/28/91

Results by Sample

SAMPLE ID SP10 WAXER TANK

FRACTION 10B TEST CODE TCLPTM NAME TCLP TRACE METALS
Date & Time Collected 01/25/91 09:04:00 Category

ANALYST BDL EXTRACTED _____ ANALYZED 02/08/91 VERIFIED JHM

COMPOUND	RESULT mg/l	REG LEVEL mg/l
Arsenic	<0.05	5.0
Barium	0.17	100.0
Cadmium	0.020	1.0
Chromium	0.16	5.0
Lead	<0.05	5.0
Mercury	0.0011	0.2
Selenium	<0.05	1.0
Silver	<0.02	5.0

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed

Davis & Floyd, Inc.

Laboratory Analysis Report

Received: 01/28/91

Work Order # 91-01-161

Results by Sample

SAMPLE ID SP10 WAXER TANK

FRACTION 10C TEST CODE TCLPVO NAME TCLP VOLATILES
Date & Time Collected 01/25/91 09:04:00 Category

ANALYST KLS ANALYZED 02/06/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Vinyl chloride	BDL	200
1,1-Dichloroethylene	BDL	100
Chloroform	BDL	100
1,2-Dichloroethane	BDL	100
Methyl ethly ketone	BDL	200
Carbon tetrachloride	BDL	100
Trichloroethylene	BDL	100
Benzene	BDL	100
Tetrachloroethylene	BDL	100
Chlorobenzene	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT

NA = not analyzed
BDL = below the required detection limit.
B = compound detected in extraction blank.
J = estimate below required detection limit.
D = secondary dilution required.
X = interference - dilution required.

Received: 01/28/91

Results by Sample

SAMPLE ID SP11 TANK 11

FRACTION 11A TEST CODE TCLPHB NAME TCLP HERBICIDES
Date & Time Collected 01/25/91 09:18:00 Category

ANALYST DMM ANALYZED 02/14/91 FACTOR 5 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
2,4-D	BDL	0.5
2,4,5-TP (Silvex)	BDL	0.05

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 91-01-161

Received: 01/28/91

Results by Sample

SAMPLE ID SP11 TANK 11

FRACTION 11A TEST CODE TCLPPS NAME TCLP PESTICIDES
Date & Time Collected 01/25/91 09:18:00 Category

ANALYST DMM ANALYZED 02/12/91 FACTOR 10 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Chlordane	BDL	5
Endrin	BDL	1
Heptachlor	BDL	0.5
Lindane	BDL	0.5
Methoxychlor	BDL	0.5
Toxaphene	BDL	10

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Received: 01/28/91

Results by Sample

SAMPLE ID SP11 TANK 11

FRACTION 11A TEST CODE TCLPSV NAME TCLP SEMIVOLATILES
Date & Time Collected 01/25/91 09:18:00 Category

ANALYST MPT ANALYZED 02/13/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
1,4-Dichlorobenzene	BDL	100
o-Cresol	BDL	100
m-Cresol	BDL	100
p-Cresol	BDL	100
Hexachloroethane	BDL	100
Nitrobenzene	BDL	100
Hexachlorobutadiene	BDL	100
2,4,6-Trichlorophenol	BDL	100
2,4,5-Trichlorophenol	BDL	500
2,4-Dinitrotoluene	BDL	500
Hexachlorobenzene	BDL	100
Pentachlorophenol	BDL	500
Pyridine	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 91-01-161

Received: 01/28/91

Results by Sample

SAMPLE ID SP11 TANK 11

FRACTION 11B TEST CODE TCLPTM NAME TCLP TRACE METALS
Date & Time Collected 01/25/91 09:18:00 Category

ANALYST BDL EXTRACTED _____ ANALYZED 02/12/91 VERIFIED JHM

COMPOUND	RESULT mg/l	REG LEVEL mg/l
Arsenic	10.1	5.0
Barium	0.51	100.0
Cadmium	1.938	1.0
Chromium	12170	5.0
Lead	0.105	5.0
Mercury	0.0021	0.2
Selenium	<0.025 X	1.0
Silver	0.03	5.0

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed

Received: 01/28/91

Work Order # 91-01-161

Results by Sample

SAMPLE ID SP11 TANK 11

FRACTION 11C TEST CODE TCLPVO NAME TCLP VOLATILES
Date & Time Collected 01/25/91 09:18:00 Category

ANALYST KLS ANALYZED 02/06/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Vinyl chloride	BDL	200
1,1-Dichloroethylene	BDL	100
Chloroform	BDL	100
1,2-Dichloroethane	BDL	100
Methyl ethly ketone	BDL	200
Carbon tetrachloride	BDL	100
Trichloroethylene	BDL	100
Benzene	BDL	100
Tetrachloroethylene	BDL	100
Chlorobenzene	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT

NA = not analyzed
BDL = below the required detection limit.
B = compound detected in extraction blank.
J = estimate below required detection limit.
D = secondary dilution required.
X = interference - dilution required.

Received: 01/28/91

Results by Sample

SAMPLE ID SP12 FLOOR AREA BEHIND TAN FRACTION 12A TEST CODE TCLPHB NAME TCLP HERBICIDES
Date & Time Collected 01/25/91 10:08:00 Category

ANALYST DMM ANALYZED 02/14/91 FACTOR 5 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
2,4-D	BDL	0.5
2,4,5-TP (Silvex)	BDL	0.05

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 91-01-161

Received: 01/28/91

Results by Sample

SAMPLE ID SP12 FLOOR AREA BEHIND TAN FRACTION 12A TEST CODE TCLPPS NAME TCLP PESTICIDES
Date & Time Collected 01/25/91 10:08:00 Category

ANALYST DMM ANALYZED 02/12/91 FACTOR 10 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Chlordane	BDL	5
Endrin	BDL	1
Heptachlor	BDL	0.5
Lindane	BDL	0.5
Methoxychlor	BDL	0.5
Toxaphene	BDL	10

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Received: 01/28/91

Results by Sample

SAMPLE ID SP12 FLOOR AREA BEHIND TAN FRACTION 12A TEST CODE TCLPSV NAME TCLP SEMIVOLATILES
Date & Time Collected 01/25/91 10:08:00 Category

ANALYST MPT ANALYZED 02/14/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
1,4-Dichlorobenzene	BDL	100
o-Cresol	BDL	100
m-Cresol	BDL	100
p-Cresol	BDL	100
Hexachloroethane	BDL	100
Nitrobenzene	BDL	100
Hexachlorobutadiene	BDL	100
2,4,6-Trichlorophenol	BDL	100
2,4,5-Trichlorophenol	BDL	500
2,4-Dinitrotoluene	BDL	500
Hexachlorobenzene	BDL	100
Pentachlorophenol	BDL	500
Pyridine	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT

NA = not analyzed

BDL = below the required detection limit.

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 91-01-161

Received: 01/28/91

Results by Sample

SAMPLE ID SP12 FLOOR AREA BEHIND TAN FRACTION 12B TEST CODE TCLPTM NAME TCLP TRACE METALS
Date & Time Collected 01/25/91 10:08:00 Category

ANALYST BDL EXTRACTED _____ ANALYZED 02/12/91 VERIFIED JHM

COMPOUND	RESULT mg/l	REG LEVEL mg/l
Arsenic	<0.05	5.0
Barium	<0.2 X	100.0
Cadmium	0.411	1.0
Chromium	218	5.0
Lead	<0.08 X	5.0
Mercury	0.0005	0.2
Selenium	<0.05	1.0
Silver	<0.02	5.0

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed

Received: 01/28/91

Results by Sample

SAMPLE ID SP12 FLOOR AREA BEHIND TAN FRACTION 12C TEST CODE TCLPVO NAME TCLP VOLATILES
Date & Time Collected 01/25/91 10:08:00 Category

ANALYST KLS ANALYZED 02/06/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Vinyl chloride	BDL	200
1,1-Dichloroethylene	BDL	100
Chloroform	BDL	100
1,2-Dichloroethane	BDL	100
Methyl ethly ketone	BDL	200
Carbon tetrachloride	BDL	100
Trichloroethylene	BDL	100
Benzene	BDL	100
Tetrachloroethylene	BDL	100
Chlorobenzene	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT

NA = not analyzed
BDL = below the required detection limit.
B = compound detected in extraction blank.
J = estimate below required detection limit.
D = secondary dilution required.
X = interference - dilution required.

Davis & Floyd, Inc.

Laboratory Analysis Report

Received: 01/28/91

Work Order # 91-01-161

Results by Sample

SAMPLE ID SP13 TANK F

FRACTION 13A TEST CODE TCLPHB NAME TCLP HERBICIDES
Date & Time Collected 01/25/91 10:18:00 Category

ANALYST DMM ANALYZED 02/14/91 FACTOR 5 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
2,4-D	BDL	0.5
2,4,5-TP (Silvex)	BDL	0.05

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Work Order # 91-01-161

Received: 01/28/91

Results by Sample

SAMPLE ID SP13 TANK F

FRACTION 13A TEST CODE TCLPPS NAME TCLP PESTICIDES
Date & Time Collected 01/25/91 10:18:00 Category

ANALYST DMM ANALYZED 02/12/91 FACTOR 10 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Chlordane	BDL	5
Endrin	BDL	1
Heptachlor	BDL	0.5
Lindane	BDL	0.5
Methoxychlor	BDL	0.5
Toxaphene	BDL	10

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Received: 01/28/91

Results by Sample

SAMPLE ID SP13 TANK F

FRACTION 13A TEST CODE TCLPSV NAME TCLP SEMIVOLATILES
Date & Time Collected 01/25/91 10:18:00 Category

ANALYST MPT ANALYZED 02/19/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
1,4-Dichlorobenzene	BDL	100
o-Cresol	BDL	100
m-Cresol	BDL	100
p-Cresol	BDL	100
Hexachloroethane	BDL	100
Nitrobenzene	BDL	100
Hexachlorobutadiene	BDL	100
2,4,6-Trichlorophenol	BDL	100
2,4,5-Trichlorophenol	BDL	500
2,4-Dinitrotoluene	BDL	500
Hexachlorobenzene	BDL	100
Pentachlorophenol	BDL	500
Pyridine	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed
BDL = below the required detection limit.

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 91-01-161

Received: 01/28/91

Results by Sample

SAMPLE ID SP13 TANK F

FRACTION 13B TEST CODE TCLPTM NAME TCLP TRACE METALS
Date & Time Collected 01/25/91 10:18:00 Category

ANALYST BDL EXTRACTED _____ ANALYZED 02/08/91 VERIFIED JHM

COMPOUND	RESULT mg/l	REG LEVEL mg/l
Arsenic	<0.05	5.0
Barium	0.10	100.0
Cadmium	0.003	1.0
Chromium	<0.01	5.0
Lead	0.12	5.0
Mercury	0.0004	0.2
Selenium	<0.05	1.0
Silver	<0.02	5.0

NOTES AND DEFINITIONS FOR THIS REPORT
NA = not analyzed

Davis & Floyd, Inc.

Laboratory Analysis Report

Received: 01/28/91

Work Order # 91-01-161

Results by Sample

SAMPLE ID SP13 TANK F

FRACTION 13C TEST CODE TCLPVO NAME TCLP VOLATILES
Date & Time Collected 01/25/91 10:18:00 Category

ANALYST KLS ANALYZED 01/31/91 FACTOR 20 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Vinyl chloride	BDL	200
1,1-Dichloroethylene	BDL	100
Chloroform	BDL	100
1,2-Dichloroethane	BDL	100
Methyl ethly ketone	BDL	200
Carbon tetrachloride	BDL	100
Trichloroethylene	BDL	100
Benzene	BDL	100
Tetrachloroethylene	BDL	100
Chlorobenzene	BDL	100

NOTES AND DEFINITIONS FOR THIS REPORT

NA = not analyzed
BDL = below the required detection limit.
B = compound detected in extraction blank.
J = estimate below required detection limit.
D = secondary dilution required.
X = interference - dilution required.

Received: 01/28/91

Results by Sample

SAMPLE ID TRIP BLANK

FRACTION 30A TEST CODE TCLPVO NAME TCLP VOLATILES
Date & Time Collected not specified Category

ANALYST KLS ANALYZED 02/05/91 FACTOR 1 UNITS ug/l VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Vinyl chloride	BDL	10
1,1-Dichloroethylene	BDL	5.0
Chloroform	BDL	5.0
1,2-Dichloroethane	BDL	5.0
Methyl ethly ketone	BDL	10
Carbon tetrachloride	BDL	5.0
Trichloroethylene	BDL	5.0
Benzene	BDL	5.0
Tetrachloroethylene	BDL	5.0
Chlorobenzene	BDL	5.0

NOTES AND DEFINITIONS FOR THIS REPORT

NA = not analyzed
BDL = below the required detection limit.
B = compound detected in extraction blank.
J = estimate below required detection limit.
D = secondary dilution required.
X = interference - dilution required.

Received: 01/28/91 02/20/91 09:21:39

CHARLESTON NAVAL BASE

DEFINITIONS AND EXPLANATIONS:

1. THE " X " INDICATES A MATRIX INTERFERENCE WHICH MAY REQUIRE A DILUTION OR WHICH PREVENTS THE REPORTING OF A RESULT. DETECTION LIMITS HAVE BEEN ADJUSTED WHERE APPLICABLE.

DAVIS & FLOYD

Page __ of __

Chain of Custody Form

816 East Durst Street, Greenwood, S.C. 29646 Phone (803)229-5211 Fax (803)229-7844

PROJ. NO.: 5548.00

PROJECT NAME: Charleston Naval Base

SAMPLERS NAME/AFFILIATION: (PRINTED) John L McMahan

SAMPLE NO.	DATE	TIME	COMP.	GRAB	SAMPLE DESCRIPTION	NO. OF CONTAINERS	Metals/Cn Tot. 500ml	TCLP VOA 40ml	TCLP Organics 500ml	TCLP Metals 500ml	TCLP VOA 250ml	TCLP Organics 1 liter	TCLP Metals liter	Metals liter	Cn-Tot liter	REMARKS	SAMPLE TYPE	POTENTIAL HAZARD
	1-24-91	1506		✓	Sp01 (Parking Plant off Wall)	1	1										*Metals: Ag, Cd,	SD	✓
		1520		✓	Sp02 (Tank #41)	1	1										Cr, Hg, Ni, Pb	SD	✓
		1530		✓	Sp03 (Tank #42)	1	1											SD	✓
		1550		✓	Sp04 (Tank #49)	1	1											SD	*
		1600		✓	Sp05 (Tank #47)	1	1											SD	✓
		1534		✓	Sp06 (Tank #45)	4			2	1	1							SD	✓
		1610		✓	Sp07 (Tank #39)	4			2	1	1							SD	✓
		1617		✓	Sp08 (Tank #33)	4			2	1	1							SD	✓
	1-25-91	0830		✓	Sp09 (Material Under Floor Grates)	4			2	1	1							SD	✓
		0904		✓	Sp10 (Waxer Tank)	4			2	1	1							SD	✓
		0918		✓	Sp11 (Tank 11) ~~(Floor Area Behind Tank #1)~~ JLM 1-25-91	4			2	1	1							SD	*
		1008		✓	Sp12 (Floor Area Behind Tank #1)	4			2	1	1							SD	✓
		1018		✓	Sp13 (Tank F)	4						2	1	1				WW	✓
		1028		✓	Sp14 (Grate in floor)	1	1		JLM 1-25-91	JLM 1-25-91								SD	✓
		1035		✓	Sp15 (Tank #1)	1	1											SD	✓
		1035		✓	Sp16 (Tank #3)	1	1											SD	✓
		1040		✓	Sp17 (Tank #5)	1	1											SD	✓

RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED BY: (SIGNATURE)
John L McMahan	1-25-91 1914				

RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED FOR LAB BY: (SIGNATURE)	DATE / TIME	REMARKS
		Melissa Coffey	1/28/91 06:30	

DW-DRINKING WATER
GW-GROUND WATER
WW-WASTE WATER
RC-RCRA
HW-HAZARDOUS WASTE
SW-SURFACE WATER
SD-SOLID
IM-IMPINGER SOLUTION
AB-ABSORBENT TUBE

DAVIS & FLOYD

Page __ of __

Chain of Custody Form

816 East Durst Street, Greenwood, S.C. 29646 Phone (803)229-5211 Fax (803)229-7844

PROJ. NO. 5548.00

PROJECT NAME: Charleston Naval Base

SAMPLERS NAME/AFFILIATION:(PRINTED): John R. McMahon II

SAMPLE NO.	DATE	TIME	COMP.	GRAB	SAMPLE DESCRIPTION	NO. OF CONTAINERS	*Metals/Cn-Tot 500ml		*Metals liter	Cn-Tot liter									REMARKS	SAMPLE TYPE	POTENTIAL HAZARD
	1-25-91	1045		✓	Sp18 (Anode Cleaner Tank)	1	1												* Metals: Ag, Cd,	SD	✓
	↓	1052		✓	Sp19 (Tank #6)	1	1												Cr, Hg, Ni, Pb,	SD	✓
		1056		✓	Sp20 (Tank #21)	1	1													SD	✓
		1345		✓	Sp21 [Tank #28A (Cd)]	1	1													SD	✓
		1350		✓	Sp22 [Tank #33 (CuCn)]	1	1													SD	*
		1355		✓	Sp23 (Tank #36)	1	1													SD	✓
		1400		✓	Sp24 (Tank 56)	1	1													SD	*
		1405		✓	Sp25 (~~Tank #54~~ Ducts form Tanks 54+56)	1	1													SD	✓
		1330		✓	Sp26 (Tank #8)	2			1	1										WW	*
		1410	✓		Sp27 (Tanks #57+58)	1	1													SD	*
		1415		✓	Sp28 (Tank #54)	1	1													SD	*
	↓	1425		✓	Sp29 (Dust from Roof Area)	1	1													SD	✓

RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED BY: (SIGNATURE)
John R. McMahon II	1-25-91 1914				

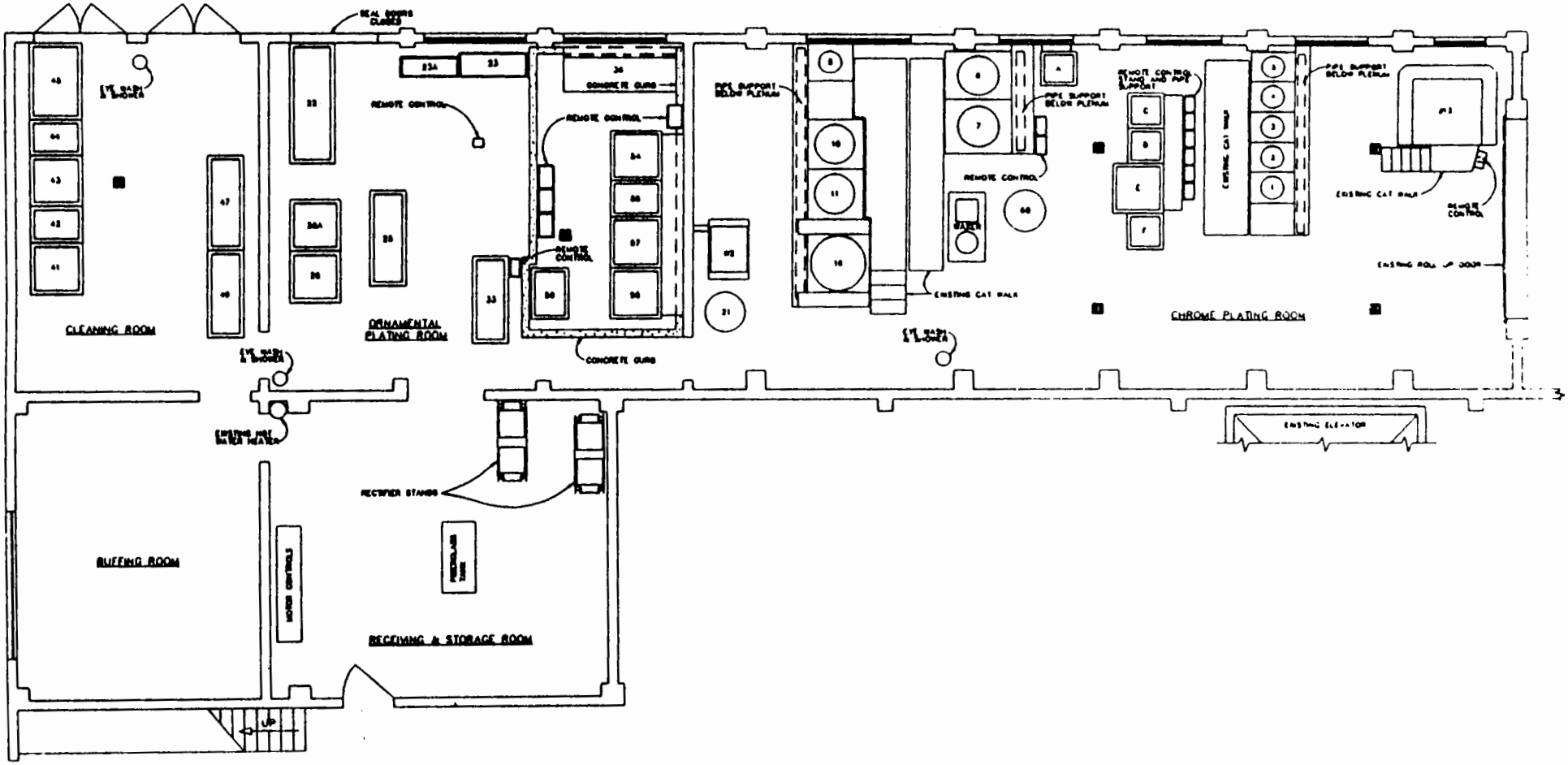
RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED FOR LAB BY: (SIGNATURE)	DATE / TIME	REMARKS
		Melissa Colley	1/28/91 06:30	

DW-DRINKING WATER WW-WASTE WATER HW-HAZARDOUS WASTE SD-SOLID AB-ABSORBENT TUBE
GW-GROUND WATER RC-RCRA SW-SURFACE WATER IM-IMPINGER SOLUTION

APPENDIX 2

Floor Plan Showing Tank Locations

BUILDING NO. 44 ELECTRO-PLATING FACILITY
TANK LOCATIONS



Davis & Floyd, Inc.

CONSULTING ENGINEERS
POST OFFICE DRAWER 428
GREENWOOD, SOUTH CAROLINA 29648
803-229-5211

ASBESTOS BULK SAMPLE ANALYSIS REPORT

Job # : 5548.00
Client : CHARLESTON NAVAL BASE
Location : CHROME PLATING SHOP
: CHARLESTON NAVAL SHIPYARD
: CHARLESTON, S.C.

Clients sample #: 44-02 Laboratory sample #: 9100108
Sample Date: 01/25/91
Description: HARD JOINT-TAN,PINK,GRAY,GLASSY,GRAINY,NONFIBROUS,WAXY, NONHOMOGENEOUS
Asbestos Type(s) Present:

Asbestos Materials	Estimated Percentage
1. Chrysotile :	00
2. Amosite :	00
3. Crocidolite :	00
4. Anthophyllite :	00
5. Tremolite :	00
6. Actinolite :	00
Asbestos Total:	0

Other Components	Estimated Percentage
1. Cellulose Fibers :	10
2. Glass Fibers :	15
3. Mineral Wool Fibers:	00
4. Perlite :	00
5. Mica :	00
6. Binder :	65
7. Other :	10
Other Total:	100

Comments -- The Method used was PLM/DS.
:

Sampled by: BOB HYLER
Affiliation: DAVIS & FLOYD, INC.
Analyzed by: Elizabeth I. Culbertson

Signature - Elizabeth I. Culbertson
Date: 01/30/91
Laboratory EPA No.: 4788
Laboratory NVLAP No.: 1410

NOTICE: This test must not be used to claim product endorsement by NVLAP or agency of the U.S. Government and relates only to the sample tested and identified above.

Davis & Floyd, Inc.

CONSULTING ENGINEERS
POST OFFICE DRAWER 428
GREENWOOD, SOUTH CAROLINA 29648
803-229-5211

ASBESTOS BULK SAMPLE ANALYSIS REPORT

Job # : 5548.00
Client : CHARLESTON NAVAL BASE
Location : CHROME PLATING SHOP
: CHARLESTON NAVAL SHIPYARD
: CHARLESTON, S.C.
Clients sample #: 44-0D Laboratory sample #: 9100109
Sample Date: 01/25/91
Description: PIPE INSULATION-WHITE,GLASSY,GRAINY,NONFIBROUS,WAXY, NONHOMOGENEOUS
Asbestos Type(s) Present:

Asbestos Materials	Estimated Percentage
1. Chrysotile :	00
2. Amosite :	00
3. Crocidolite :	00
4. Anthophyllite :	00
5. Tremolite :	00
6. Actinolite :	00
Asbestos Total:	0

Other Components	Estimated Percentage
1. Cellulose Fibers :	05
2. Glass Fibers :	15
3. Mineral Wool Fibers:	00
4. Perlite :	00
5. Mica :	00
6. Binder :	70
7. Other :	10
Other Total:	100

Comments -- The Method used was PLM/DS.
:

Sampled by: BOB HYLER
Affiliation: DAVIS & FLOYD, INC.
Analyzed by: Elizabeth I. Culbertson

Signature - Elizabeth I. Culbertson
Date: 01/30/91
Laboratory EPA No.: 4788
Laboratory NVLAP No.: 1410

TICE: This test must not be used to claim product endorsement by VLAP or agency of the U.S. Government and relates only to the sample sted and identified above.

Davis & Floyd, Inc.

CONSULTING ENGINEERS

POST OFFICE DRAWER 428

GREENWOOD, SOUTH CAROLINA 29648

803-229-5211

ASBESTOS BULK SAMPLE ANALYSIS REPORT

Job # : 5548.00
Client : CHARLESTON NAVAL BASE
Location : CHROME PLATING SHOP
: CHARLESTON NAVAL SHIPYARD
: CHARLESTON, S.C.
Clients sample #: 44-04 Laboratory sample #: 9100110
Sample Date: 01/25/91
Description: HARD JOINT-TAN,GRAINY,GLASSY,NONFIBROUS,NONHOMOGENEOUS, WAXY
Asbestos Type(s) Present:

Asbestos Materials	Estimated Percentage
1. Chrysotile :	00
2. Amosite :	00
3. Crocidolite :	00
4. Anthophyllite :	00
5. Tremolite :	00
6. Actinolite :	00
Asbestos Total:	0

Other Components	Estimated Percentage
1. Cellulose Fibers :	15
2. Glass Fibers :	15
3. Mineral Wool Fibers:	00
4. Perlite :	00
5. Mica :	00
6. Binder :	60
7. Other :	10
Other Total:	100

Comments -- The Method used was PLM/DS.
:

Sampled by: BOB HYLER
Affiliation: DAVIS & FLOYD, INC.
Analyzed by: Elizabeth I. Culbertson

Signature - Elizabeth I. Culbertson
Date: 01/30/91
Laboratory EPA No.: 4788
Laboratory NVLAP No.: 1410

NOTICE: This test must not be used to claim product endorsement by NVLAP or agency of the U.S. Government and relates only to the sample tested and identified above.

Davis & Floyd, Inc.

CONSULTING ENGINEERS

POST OFFICE DRAWER 428

GREENWOOD, SOUTH CAROLINA 29648

803-229-5211

ASBESTOS BULK SAMPLE ANALYSIS REPORT

Job # : 5548.00
Client : CHARLESTON NAVAL BASE
Location : CHROME PLATING SHOP
: CHARLESTON NAVAL SHIPYARD
: CHARLESTON, S.C.
Clients sample #: 44-05 Laboratory sample #: 9100111
Sample Date: 01/25/91
Description: FLOOR COVERING-GREEN, HARD, NONFIBROUS, HOMOGENEOUS, WAXY

Asbestos Type(s) Present:

Asbestos Materials	Estimated Percentage
1. Chrysotile :	00
2. Amosite :	00
3. Crocidolite :	00
4. Anthophyllite :	00
5. Tremolite :	00
6. Actinolite :	00
Asbestos Total:	0

Other Components	Estimated Percentage
1. Cellulose Fibers :	03
2. Glass Fibers :	00
3. Mineral Wool Fibers:	00
4. Perlite :	00
5. Mica :	00
6. Binder :	80
7. Other :	17
Other Total:	100

Comments -- The Method used was PLM/DS.
:

Sampled by: BOB HYLER
Affiliation: DAVIS & FLOYD, INC.
Analyzed by: Elizabeth I. Culbertson

Signature - Elizabeth I. Culbertson
Date: 01/30/91
Laboratory EPA No.: 4788
Laboratory NVLAP No.: 1410

ICE: This test must not be used to claim product endorsement by
LAP or agency of the U.S. Government and relates only to the sample
ted and identified above.

Davis & Floyd, Inc.

CONSULTING ENGINEERS
POST OFFICE DRAWER 428
GREENWOOD SOUTH CAROLINA 29648
803 229 5211

ASBESTOS BULK SAMPLE ANALYSIS REPORT

Job # : 5548.00
Client : CHARLESTON NAVAL BASE
Location : CHROME PLATING SHOP
: CHARLESTON NAVAL SHIPYARD
: CHARLESTON, S.C.
Clients sample #: 44-06 Laboratory sample #: 9100112
Sample Date: 01/25/91
Description: PIPE INSULATION-WHITE,GLASSY,GRAINY,NONFIBROUS,WAXY NONHOMOGENEOUS
Asbestos Type(s) Present:

Asbestos Materials		Estimated Percentage
1.	Chrysotile :	00
2.	Amosite :	00
3.	Crocidolite :	00
4.	Anthophyllite :	00
5.	Tremolite :	00
6.	Actinolite :	00
	Asbestos Total:	0

Other Components		Estimated Percentage
1.	Cellulose Fibers :	20
2.	Glass Fibers :	15
3.	Mineral Wool Fibers:	00
4.	Perlite :	00
5.	Mica :	00
6.	Binder :	55
7.	Other :	10
	Other Total:	100

Comments -- The Method used was PLM/DS.
:

Sampled by: BOB HYLER
Affiliation: DAVIS & FLOYD, INC.
Analyzed by: Elizabeth I. Culbertson

Signature - Elizabeth I. Culbertson
Date: 01/30/91
Laboratory EPA No.: 4788
Laboratory NVLAP No.: 1410

ICE: This test must not be used to claim product endorsement by
VLAP or agency of the U.S. Government and relates only to the sample
ted and identified above.

Davis & Floyd, Inc.

CONSULTING ENGINEERS

POST OFFICE DRAWER 428

GREENWOOD, SOUTH CAROLINA 29648

803-229-5211

ASBESTOS BULK SAMPLE ANALYSIS REPORT

Job # : 5548.00
Client : CHARLESTON NAVAL BASE
Location : CHROME PLATING SHOP
: CHARLESTON NAVAL SHIPYARD
: CHARLESTON, S.C.
Clients sample #: 44-07 Laboratory sample #: 9100117
Sample Date: 01/25/91
Description: HARD JOINT-TAN, GRAINY, GLASSY, FIBROUS, NONHOMOGENEOUS, WAXY
Asbestos Type(s) Present:

Asbestos Materials	Estimated Percentage
1. Chrysotile :	00
2. Amosite :	00
3. Crocidolite :	00
4. Anthophyllite :	00
5. Tremolite :	00
6. Actinolite :	00
Asbestos Total:	0

Other Components	Estimated Percentage
1. Cellulose Fibers :	20
2. Glass Fibers :	15
3. Mineral Wool Fibers:	00
4. Perlite :	00
5. Mica :	00
6. Binder :	55
7. Other :	10
Other Total:	100

Comments -- The Method used was PLM/DS.
:

Sampled by: BOB HYLER
Affiliation: DAVIS & FLOYD, INC.
Analyzed by: Elizabeth I. Culbertson

Signature - Elizabeth I. Culbertson
Date: 01/30/91
Laboratory EPA No.: 4788
Laboratory NVLAP No.: 1410

ICE: This test must not be used to claim product endorsement by
AP or agency of the U.S. Government and relates only to the sample
ted and identified above.

Davis & Floyd, Inc.

CONSULTING ENGINEERS
POST OFFICE DRAWER 428
GREENWOOD, SOUTH CAROLINA 29648
803 229-5211

ASBESTOS BULK SAMPLE ANALYSIS REPORT

Job # : 5548.00
Client : CHARLESTON NAVAL BASE
Location : CHROME PLATING SHOP
: CHARLESTON NAVAL SHIPYARD
: CHARLESTON, S.C.
Clients sample #: 44-08 Laboratory sample #: 9100114
Sample Date: 01/25/91
Description: ROOF MATERIAL-BLACK,FIBROUS,HOMOGENEOUS,GLASSY,WAXY

Asbestos Type(s) Present:

Asbestos Materials	Estimated Percentage
1. Chrysotile :	00
2. Amosite :	00
3. Crocidolite :	00
4. Anthophyllite :	00
5. Tremolite :	00
6. Actinolite :	00
Asbestos Total:	0

Other Components	Estimated Percentage
1. Cellulose Fibers :	40
2. Glass Fibers :	00
3. Mineral Wool Fibers:	20
4. Perlite :	00
5. Mica :	00
6. Binder :	30
7. Other :	10
Other Total:	100

Comments -- The Method used was PLM/DS.
: SAMPLE WAS ASHED.

Sampled by: BOB HYLER
Affiliation: DAVIS & FLOYD, INC.
Analyzed by: Elizabeth I. Culbertson

Signature - Elizabeth I. Culbertson
Date: 01/30/91
Laboratory EPA No.: 4788
Laboratory NVLAP No.: 1410

ICE: This test must not be used to claim product endorsement by
LAP or agency of the U.S. Government and relates only to the sample
ted and identified above.

Davis & Floyd, Inc.

CONSULTING ENGINEERS

POST OFFICE DRAWER 428

GREENWOOD, SOUTH CAROLINA 29648

803-229-5211

ASBESTOS BULK SAMPLE ANALYSIS REPORT

Job # : 5548.00
Client : CHARLESTON NAVAL BASE
Location : CHROME PLATING SHOP
: CHARLESTON NAVAL SHIPYARD
: CHARLESTON, S.C.
Clients sample #: 44-09 Laboratory sample #: 9100115
Sample Date: 01/25/91
Description: ROOF FLASHING-BLACK,NONFIBROUS,HOMOGENEOUS,SILKY,WAVY

Asbestos Type(s) Present: 1

Asbestos Materials		Estimated Percentage
1.	Chrysotile :	10
2.	Amosite :	00
3.	Crocidolite :	00
4.	Anthophyllite :	00
5.	Tremolite :	00
6.	Actinolite :	00
	Asbestos Total:	10

Other Components		Estimated Percentage
1.	Cellulose Fibers :	00
2.	Glass Fibers :	00
3.	Mineral Wool Fibers:	00
4.	Perlite :	00
5.	Mica :	00
6.	Binder :	70
7.	Other :	20
	Other Total:	90

Comments -- The Method used was PLM/DS.
: SAMPLE WAS ASHED.

Sampled by: BOB HYLER
Affiliation: DAVIS & FLOYD, INC.
Analyzed by: Elizabeth I. Culbertson

Signature - Elizabeth I. Culbertson
Date: 01/30/91
Laboratory EPA No.: 4788
Laboratory NVLAP No.: 1410

TICE: This test must not be used to claim product endorsement by NVLAP or agency of the U.S. Government and relates only to the sample tested and identified above.

Davis & Floyd, Inc.

CONSULTING ENGINEERS

POST OFFICE DRAWER 428

GREENWOOD, SOUTH CAROLINA 29648

803 229 5211

ASBESTOS BULK SAMPLE ANALYSIS REPORT

Job # : 5548.00
Client : CHARLESTON NAVAL BASE
Location : CHROME PLATING SHOP
: CHARLESTON NAVAL SHIPYARD
: CHARLESTON, S.C.
Clients sample #: 44-10 Laboratory sample #: 9100116
Sample Date: 01/25/91
Description: ROOF EQUIPMENT FLASHING-BLACK,NONFIBROUS,HOMOGENEOUS, GLASSY,SILKY,WAVY
Asbestos Type(s) Present: 1

Asbestos Materials		Estimated Percentage
1.	Chrysotile :	10
2.	Amosite :	00
3.	Crocidolite :	00
4.	Anthophyllite :	00
5.	Tremolite :	00
6.	Actinolite :	00
	Asbestos Total:	10

Other Components		Estimated Percentage
1.	Cellulose Fibers :	00
2.	Glass Fibers :	10
3.	Mineral Wool Fibers:	00
4.	Perlite :	00
5.	Mica :	00
6.	Binder :	70
7.	Other :	10
	Other Total:	90

Comments -- The Method used was PLM/DS.
: SAMPLE WAS ASHED.

Sampled by: BOB HYLER
Affiliation: DAVIS & FLOYD, INC.
Analyzed by: Elizabeth I. Culbertson

Signature - Elizabeth I. Culbertson
Date: 01/30/91
Laboratory EPA No.: 4788
Laboratory NVLAP No.: 1410

TICE: This test must not be used to claim product endorsement by NVLAP or agency of the U.S. Government and relates only to the sample ted and identified above.

DAVIS & FLOYD
P.O. Drawer 428
Greenwood, SC 29648
(803) 229-5211

Building Name: CHROME PLATING SHOP Building Number: 44
Building Address: CHARLESTON NAVAL SHIPYARD
CHARLESTON, S.C.
Building Owner: CHARLESTON NAVAL BASE
Collection Team: BOB HYLER

SAMPLE LOG/CHAIN OF CUSTODY

Sample ID #	Description of Sampled Material	Photo No.	Sample Site Location	Date/ Time	Mat'l ID #	Quantity Sq Ft	Quantity Ln Ft	Quantity Each
44-01	1¼"φ PIPE INSULATION (POWDER)	774-01	CLEANING ROOM - NEXT TO TANK #45	01-25-91 08:20				
44-02	1¼"φ HARD JOINT	774-02	CLEANING ROOM - NEXT TO TANK #45	01-25-91 08:25				
44-03	¾"φ PIPE INSULATION (POWDER)	774-03	CHROME PLATING ROOM - IN FRONT OF TANK #12	01-25-91 08:50				
44-04	¾"φ HARD JOINT	774-04	CHROME PLATING ROOM - IN FRONT OF TANK #12	01-25-91 08:55				
44-05	FLOOR COVERING	774-05	CLEANING ROOM - NEXT TO TANK #41	01-25-91 09:10				
44-06	1"φ PIPE INSULATION (POWDER)	774-06	ORNAMENTAL PLATING ROOM - AT END OF TANK #25	01-25-91 09:21				
44-07	1"φ HARD JOINT	774-07	ORNAMENTAL PLATING ROOM - AT END OF TANK #25	01-25-91 09:29				
44-08	ROOF MATERIAL	774-08	ROOF · NEAR ACCESS LADDER	01-25-91 10:25				
44-09	ROOF FLASHING	774-09	ROOF - NEAR CENTER OF RIGHT WALL	01-25-91 10:33				
44-10	ROOF EQUIPMENT FLASHING	774-10	ROOF - NEAR CENTER OF LEFT WALL AT SCRUBBER DUCT	01-25-91 10:39				

Released By (Signature)	Date Released	Delivery Method	Received By (Signature)	Co./Agency Affiliation	Date Received	Condition Noted

APPENDIX N

Resumes of Key Project Personnel

Project Manager

Charles E. Beck
Senior Engineer/
Regulatory Specialist

EDUCATION

J.D., Temple University, School of Law, 1979, Law
B.A., Temple University, 1976, Natural Sciences

PROFESSIONAL REGISTRATION

Admitted to bar, Illinois
Admitted to bar, New York

EXPERIENCE

Mr. Beck combines a broad knowledge of environmental science and engineering with legal training and communications skills. He has designed industrial wastewater, groundwater and hazardous waste treatment systems and overseen their construction and start-up. He has designed and managed a variety of environmental audits, remedial investigations and site restorations. He has lectured on the implications of environmental matters in property transactions to groups of lawyers, real estate brokers and industrial managers. He has negotiated environmental permits, consent decrees and environmental aspects of various business transactions. He has served as technical expert at public hearings and represented clients (in a technical capacity) before a variety of regulatory bodies. Mr. Beck is a senior environmental audit manager having conducted Phase I and Phase II assessments of over 100 properties. His experience includes surveys of raw land, abandoned and demolished industrial facilities, commercial property, residential property, service stations and industrial plants. Mr. Beck's unique background provides an engineering perspective with the regulatory awareness of an attorney.

SELECT PROJECT EXPERIENCE

- Project Manager, Union Transformer Services, Henderson, KY. Public health and environmental risk assessment of a PCB processing center under the Toxic Substances Control Act.

- Project Manager, LaRoche Industries, Inc. Environmental Assessment of eleven agrichemical (fertilizer and pesticides) facilities for compliance with CERCLA, RCRA, FWPCA, CAA and FIFRA.

- Project Manager, Fruehauf Corporation, Decatur, AL Plant. ACL petition preparation under RCRA covering cyanide releases from two surface impoundments. (The petition was granted)

- Project Manager, Alternate Energy Resources Emergency Corrective Action. Groundwater contamination of industrial/residential area. Required aquifer restoration and provision of alternative water supply involving coordination of state and local agencies, home owners, and industries.

- Project Manager, Gulf Shores, Alabama Regional Wastewater Treatment Plan. Environmental Impact Statement evaluating treatment alternatives in a barrier island resort community.

PUBLICATIONS

1989. "Effective Management Use of Environmental Auditing." Environmental Management Report, First Quarter. Government Institutes, Inc.

1986. Public Health and Environmental Exposure Assessment; Unison PCB Separation Facility, Henderson County, Kentucky. USEPA.

Project Hydrogeologist

William H. Murdy, III
Senior Hydrogeologist

EDUCATION

M.S., Texas A & M University, 1985, Geology
B.S., Emory University, 1980, Geology

PROFESSIONAL CERTIFICATION

Registered Professional Geologist
Georgia #687
Delaware #513

EXPERIENCE

Mr. Murdy is the Senior Hydrogeologist in the firm's Atlanta office. In this capacity, he is responsible for planning, management and implementation of a variety of contamination assessment projects including industrial facility audits, underground storage tank closures, and hazardous waste site investigations. He has conducted numerous assessments of soil and groundwater contamination within a number of geologic and hydrogeologic settings. He is experienced with hydrogeologic analysis, computer modeling, and evaluation of regional and site specific groundwater flow parameters. He is particularly experienced in the delineation and characterization of groundwater contaminant plumes. Mr. Murdy has also been involved with design and management of soil and groundwater remediation programs. As manager of Project Quality Control, he is responsible for preparing and implementing standard operation procedures for all projects in the Division.

Mr. Murdy is in charge of the development and implementation of all Health and Safety Programs, plans, and seminars for the Atlanta office. He has supervised preparation of generic Health and Safety Plans, Hazard Communication Plans, and Quality Assurance Documents. Mr. Murdy is a registered Professional Geologist in Georgia and Delaware.

Mr. Murdy has fulfilled all Health & Safety Training and Medical Monitoring requirements specified in OSHA Standard 29 CFR 1910.120 and undergoes annual refresher training and semi-annual medical monitoring supplementary physicals.

SELECTED PROJECT EXPERIENCE

- Project Hydrogeologist, Alternate Energy Resources, Inc., Augusta, GA, Groundwater Assessment and Solvent Plume Delineation. Designed and supervised a monitoring well network within the Cretaceous Aquifer at a site just south of the Fall Line. Conducted and evaluated pump test data, provided a detailed interpretation of local hydrogeology,and delineated a groundwater solvent plume of over 4000 feet in length.

- Field Supervisor, Georgia Dept. of Transportation, Environmental Investigation of an Abandoned Municipal Landfill in Macon, GA. This project required the installation of soil borings and monitoring wells to ascertain groundwater quality and local hydrogeologic conditions. The site was located just south of the Fall Line upon permeable Coastal Plain sediments and Recent alluvium.

- Field Supervisor, Confidential Client, Groundwater Assessment for an Oil-based Wood Treater in North Georgia. Supervised the installation and sampling of groundwater monitoring wells in an area of high relief inaccessible to conventional drilling rigs. Delineated a narrow plume of pentachlorophenol which was discharging into a small creek.

- Project Manager, National Linen Service, Contamination Assessment of a Petroleum Release at a facility in Sarasota, FL. Planned and supervised a soil and groundwater investigation to determine the extent of diesel fuel contamination.

- Project Hydrogeologist, Confidential Client, Assessment of Soil and Groundwater Contamination at a Closed Landfill near Atlanta, GA. Designed and installed monitoring wells and temporary soil borings to assess subsurface conditions and the levels of groundwater contamination beneath a 70-year-old landfill.

- Field Supervisor, Confidential Client, Geophysical Investigation at a Major Aluminum Fabrication Facility in AL. Supervised a resistivity survey to ascertain the probable extent of offsite cyanide contamination within the uppermost aquifer.

- Project Geologist, Confidential Client, Delineation and Remediation of PCB Contamination of PCB-Contamination at a site in Ohio. Directed an assessment of a major PCB release to soils downgradient of an unlined surface impoundment. The potential for impacts to local groundwater was also assessed.

- Project Manager, National Linen Service. Delineation and Remedial Action of a Subsurface Fuel Oil Spill at a Facility in Richmond, VA. Delineated the horizontal and vertical extent of vadose zone petroleum contamination at a site near the Fall line. A soil gas survey provided data valuable to the correct placement of soil borings and monitoring wells. Designed and supervised installation of an in-situ bioremediation system presently in operation at the site.

- Project Manager, U.S. Dept. of Energy, Brookhaven National Laboratory, Groundwater and Soil Sampling. Planned and directly supervised the sampling of over 50 monitoring wells and retrieval of 75 soil samples from various locations at the facility. The project was performed under strict EPA guidelines following CLP sampling protocol.

- Project Geologist, Cardinal Industries, Inc., Assessment of the Extent of Petroleum Contamination at a Five-acre construction site in Greensboro, NC. Directed the initial investigation into the horizontal and vertical extent of petroleum contaminated soils ostensibly caused by historical kerosene leakage from a trailer park fuel distribution line.

- Project Manager, Confidential Client, Site Assessment of an Abandoned Oil Terminal in Savannah, GA. Directed and conducted a detailed assessment of an abandoned oil terminal in order to document potential areas of environmental impairment. Soil TPH levels of up to 73,000 ppm were detected from shallow hand-auger borings.

PROFESSIONAL AFFILIATIONS

National Water Well Association
Georgia Groundwater Association

PUBLICATIONS

1989. Murdy, W.H. and C.E. Beck. "Delineation and characterization of solvent contamination within an unconfined aquifer near Augusta, GA". Prepared for the Third National Outdoor Action Conference on Aquifer Restoration, Groundwater Monitoring and Geophysical Methods: Orlando, FL, National Water Well Association, 11 p.

Site Supervisor

Jay Senter
Geologist

EDUCATION

B.S., Mississippi State University, 1969, Geology

EXPERIENCE

Mr. Senter's primary responsibilities include field investigations in the areas of hazardous waste, hydrogeology, and environmental studies. His field experience supplements a basic geological and chemical background and includes drilling, developing, and sampling of groundwater monitoring wells.

He has experience in contamination plume delineation as well as identification of impacted drinking water sources. Mr. Senter has direct field experience in conducting surface and subsurface investigations. He also has a strong working knowledge of hazardous waste sampling procedures, QA/QC guidelines, and health and safety requirements.

Mr. Senter has field supervisory and project management experience in small and large scale site assessments, as well a small and large scale petroleum contaminated soil remediation programs. He has managed projects including the site investigation of a waste oil recovery site and a sequence of 40+ environmental site assessments.

SELECTED PROJECT EXPERIENCE

- Field Technician, Site Investigations, Cardinal Industries, Inc.. Conducted pre- and post-acquisition site investigation programs for commercial developments (hotels and apartments)

- Field Geologist, Investigation project, CSX Transportation. Worked on multiphase investigation project in the placement of multiple boreholes and monitoring wells to delineate contamination plumes at a large railroad yard. Did extensive plume identification and mapping.

- Field Geologist, Site Monitoring, Confidential Client. Conducted extensive boring program for monitoring a large scale groundwater plume contaminated with industrial solvents and waste oils. Installation and testing of additional recovery well with additional observation and monitoring wells.

- Field Geologist, Remediation Program, Amoco Oil Co.. Supervised a large scale remediation program on a site contaminated with petroleum hydrocarbons.

- Field Geologist, Site Investigation, LaRoche Industries, Memphis, TN. Assisted in conducting a comprehensive environmental site investigation following the abandonment of a major inorganic chemical plant. Successful in finding buried pesticide drums using geomagnetic survey.

- Field Geologist, Drill Crew Supervision, Fruehauf Corp., Jacksonville, Florida. Bring a contamination plume delineation project at a truck/trailer facility to completion.

- Field Geologist, Drill Crew Supervision, Confidential Client, Conyers, Georgia. Contamination plume delineation project at a UST release. Moved project to monitoring only status.

- Site Supervisor, Georgia Department of Transportation, Macon, GA. Supervisor in charge of drilling, excavation, and monitoring well installation programs initiated at a 77-acre landfill to determine type, quantity, and map the extent of contaminants present.

- Field Geologist, Delineation program, Amoco Oil Co., Doraville, Georgia. Delineated for a sustained petroleum pipeline leak at a major fuel terminal. Supervised Drill Crew for further plume identification. Installation of trench, recovery equipment and piping to recovery system.

- Field Geologist, Drill Crew Supervision, Confidential Client. Supervised a drill crew in the delineation of contaminated soils at a commercial development.

- Field Geologist, Site Investigation, CSX Transportation. Assisted in investigation and initial soil and liquid sampling program at a former wood treating facility.

- Performed various tasks concerning 24 UST sites; field supervision to project management.

PROFESSIONAL AFFILIATIONS

Kansas Geological Society

Project QA Officer

Les B. Flynn
Environmental Scientist

EDUCATION

M.B.A. Finance and Information Systems, 1988, Valedictorian, The University of Georgia, Athens
M.S. Forest Resources, 1986, The University of Georgia, Athens
B.S. Biology, 1979, State University of New York at Stony Brook, Long Island

EXPERIENCE

Mr. Flynn helped design and carryout an original research project on the ecology of an exotic deer species on St. Vincent National Wildlife Refuge in northwest Florida. The research encompassed habitat use, food habits, social behavior and population analyses. Radio telemetry and drug immobilization techniques were employed. Mr. Flynn also has worked with the U.S Fish and Wildlife Service on a Clarks Hill Lake fish sampling study in Georgia. This study consisted of gill netting, electroshocking and chemically immobilizing fish species to determine the size and structure of the fish population.

Before joining KEMRON, Mr. Flynn was an associate consultant with a healthcare consulting firm. His responsibilities included: analyzing financial status, market and competition of clients; assisting clients in strategic planning for market, product line and staff development; enhancing and maintaining consulting software programs; and, assisting in the development of new products and services.

Mr. Flynn has six years of management and supervisory experience including the operation of a $600,000 per year retail business. He has also been an independent financial analyst for small businesses on various occasions.

Since joining KEMRON, Mr. Flynn has primarily been involved with the following projects and responsibilities:

- U.S. Route 13 Relief Route, Delaware (Delaware Department of Transportation). Responsible for preparation of two of the required permits - State Subaqueous Lands and State Wetlands. Assisted in preparing FHWA bridge approval, US Coast Guard Section 9 permit, and USCOE Section 404 permit.

- Jefferson Proving Ground Base Closure EIS (US Army Corps of Engineers, Louisville District). Prepared baseline and impact sections of the DEIS for wetlands and aquatic resources.

- UST Contamination Investigation (CSXT, Elizabethtown, Kentucky). Project Manager for the investigation of petroleum contamination and preparation of the Contamination Assessment Report and Remedial Action Plan. Also currently managing the implementation of the remedial action.

- Fort Gillem 900 Area Contamination Investigation (Hartrampf Engineering, Inc., Fort Gillem, Georgia. Project Manager for the Phase II assessment of a site contaminated with chlorinated solvents and volatile organic compounds. Also prepared the Conceptual Remedial Action Plan for the site.

Mr. Flynn has also written several Health and Safety Plans for large, hazardous waste investigation and assessment projects (including projects with EPA oversight), and assisted in the preparation and/or review of numerous other reports and permit applications.

PUBLICATIONS

Flynn, L. B., S. M. Shea, J. C. Lewis, and R. L. Marchinton. 1989. *Ecology of Sambar Deer on St. Vincent National Wildlife Refuge, Florida, Part III-Population Statistics, Health, and Habitat Use.* Published by Tall Timbers Research Station, Georgia.

Shea, S. M., L. B. Flynn, R. L. Marchinton, and J. C. Lewis. 1989. *Ecology of Sambar Deer on St. Vincent National Wildlife Refuge, Florida, Part II- Food Habits, Movement Ecology, and Social Behavior.* Published by Tall Timbers Research Station, Georgia.

Davidson, W. R., J. L. Blue, L. B. Flynn, S. M. Shea, R. L. Marchinton, and J. C. Lewis. 1987. *Parasites, Diseases and Health Status of Sympatric Populations of Sambar Deer and White-tailed Deer in Florida.* J. Wildl. Dis. 23:267-272.

Shea, S. M., L. B. Flynn, R. L. Marchinton, and K. S. Johansen. 1987. *Food Habits and Dietary Overlap of White-tailed and Sambar Deer On St. Vincent NWR, Florida.* (Abstract) Southeast Deer Study Group. 10:15-16.

Shea, S. M., L. B. Flynn, R. L. Marchinton, K. V. Miller, and J. C. Lewis. 1987. Rut Activity and Breeding Chronology of Sambar Deer on St. Vincent National *Wildlife Refuge, Florida, U.S.A.* Transactions Congress International Union Game Biologists. 18:8-9. (Abstract Published and Full Length Paper In Press.)

Lentz, W. M., R. L. Marchinton, L. B. Flynn, S. M. Shea, and P. J. Stuart. 1985. *The Immobilization of Sambar Deer With Succinylcholine Chloride.* Austr. Deer. 11:3-9.

Project Laboratory QA Officer

Maren (Nicholas) Burchfield
QA/QC Coordinator

EDUCATION

Ph.D. in progress, Ohio University; Physical Chemistry
M.A. Physical Chemistry, 1990, University of Kentucky
B.S. Chemistry, 1980, Ohio University

EXPERIENCE

Ms. Burchfield has over ten years research experience, including:

- Development of a broad-band Fourier transform ultrasound absorption spectrometer for use in analysis of thermodynamic properties of aqueous samples, Ohio University, 1984-1990.
- Isotope tracer studies of the kinetics of chloride and choline transport across red blood cell membranes in normal and diseased cells, University of Kentucky, 1981-1983.
- Polyacrylamide gel electrophoresis of sulfhydryl crosslinked muscle proteins to probe the protein organization and aggregation in the cell membrane, Ohio University, 1979.
- Atomic absorption analysis of drinking water samples for the presence of mercury as part of a larger project for determination of heavy metals in local water supplies, Ohio University, 1978.

Ms. Burchfield also has two years experience as an Assistant Professor of Chemistry at Ohio University, plus seven years as a Graduate Training Associate.

PUBLICATIONS

Farmer, B.T. II, Nicholas, M.M. and Butterfield, D.A. Biochim Biophys Acta (1985) 778, 260-68.

Butterfield, D.A., Nicholas, M. and Markesbery, W.R. Neurochemical Research (1985) 10(7), 909-18.

PROFESSIONAL MEMBERSHIPS

American Chemical Society
Sigma XI The Scientific Research Society
Phi Beta Kappa Honor Society

APPENDIX O

Integrity Test Data - Waste Oil Reclamation Facility

Analytical Results - PCB Spill Area

MEMORANDUM: SEPT. 26, 1991

FROM: S. A. WASHINGTON, JR. CODE 700A

TO: LES FLYNN, KEMRON ENV.

SUBJ: WASTE OIL LINES TESTING, 1988, 89 & 90

1. LES PER OUR CONSERVATION 25 SEP 91 THE INFORMATION IS AS FOLLOWS.

(A) OCT. 13, 1988:
PRESSURE TESTED WASTE OIL LINE FROM TANK 3906-O TO, TANKS 39-A & D, 3901-A AND PIER KILO, FOR TWO (2) HOURS @ 40 PSI

(B) NOV. 7, 1989:
PRESSURE TESTED WASTE OIL LINE FROM TANK 3901-A TO, TANKS 39-A & D, 3906-O AND PIER KILO, FOR TWO (2) HOURS @ 45 PSI PRESSURE LOSS DURING TEST 3 PSI.

(C) NOV. 8, 1990:
PRESSURE TESTED WASTE OIL LINE FROM TANK 3901-A TO, TANKS 39-A & D, 3906-O AND PIER KILO, FOR TWO (2) HOURS @ 45 PSI PRESSURE LOSS DURING TEST 3 PSI.

S. A. Washington, Jr.
S. A. WASHINGTON, JR.
DEPUTY DIRECTOR

Post-it™ brand fax transmittal memo 7671	# of pages ▸
To LES FLYNN	From S. A. WASHINGTON
Co. KEMRON ENV.	Co. NAVAL SUPPLY CENTER
Dept.	Phone (803) 743-6086
Fax # 404-636-7162	Fax # 803-743-4128

GENERAL ENGINEERING LABORATORIES

1313 Ashley River Road
Charleston, S.C. 29407

P.O. Box 30712
Charleston, S.C. 29417
Phone (803) 556-8171

gineering Consulting
emical Analysis

oratory Certification Number 10120

CLIENT: CHARLESTON NAVAL SHIPYARD
BLDG.12, CODE 460
CHARLESTON , SC 29408

DATE: 08/12/87

CONTACT: MR. WAYNE H. NEVILLE

RELEASED BY: GEORGE C. GREENE PE,PHD

CC/FC: NVBA/PCB4

PAGE NO.: 1

PARAMETER	SAMPLE ID :	N102	N103	N104	N105
	LAB ID :	87080224	87080225	87080226	87080227
	DATE RECEIVED:	08/06/87	08/06/87	08/06/87	08/06/87
PCB ANALYSIS					
AROCLOR 1016		<10 ppm	<10 ppm	<10 ppm	<10 ppm
AROCLOR 1221		<10 ppm	<10 ppm	<10 ppm	<10 ppm
AROCLOR 1232		<10 ppm	<10 ppm	<10 ppm	<10 ppm
AROCLOR 1242		<10 ppm	<10 ppm	<10 ppm	<10 ppm
AROCLOR 1248		<10 ppm	<10 ppm	<10 ppm	<10 ppm
AROCLOR 1254		<10 ppm	<10 ppm	<10 ppm	<10 ppm
[illegible] 1260		<10 ppm	<10 ppm	<10 ppm	<10 ppm
AROCLOR 1262		<10 ppm	<10 ppm	<10 ppm	<10 ppm
EXTRACTION & CONCENTRATION		YES	YES	YES	YES

GENERAL ENGINEERING LABORATORIES
1313 Ashley River Road
Charleston, S.C. 29407
P.O. Box 30712
Charleston, S.C. 29417
Phone (803) 556-8171

ngineering Consulting
mical Analysis

aboratory Certification Number 10120

CLIENT: CHARLESTON NAVAL SHIPYARD
BLDG.12, CODE 460
CHARLESTON , SC 29408
CONTACT: MR. WAYNE H. NEVILLE

DATE: 08/12/87

RELEASED BY: A M Greene
for: GEORGE O. GREENE PE,PHD

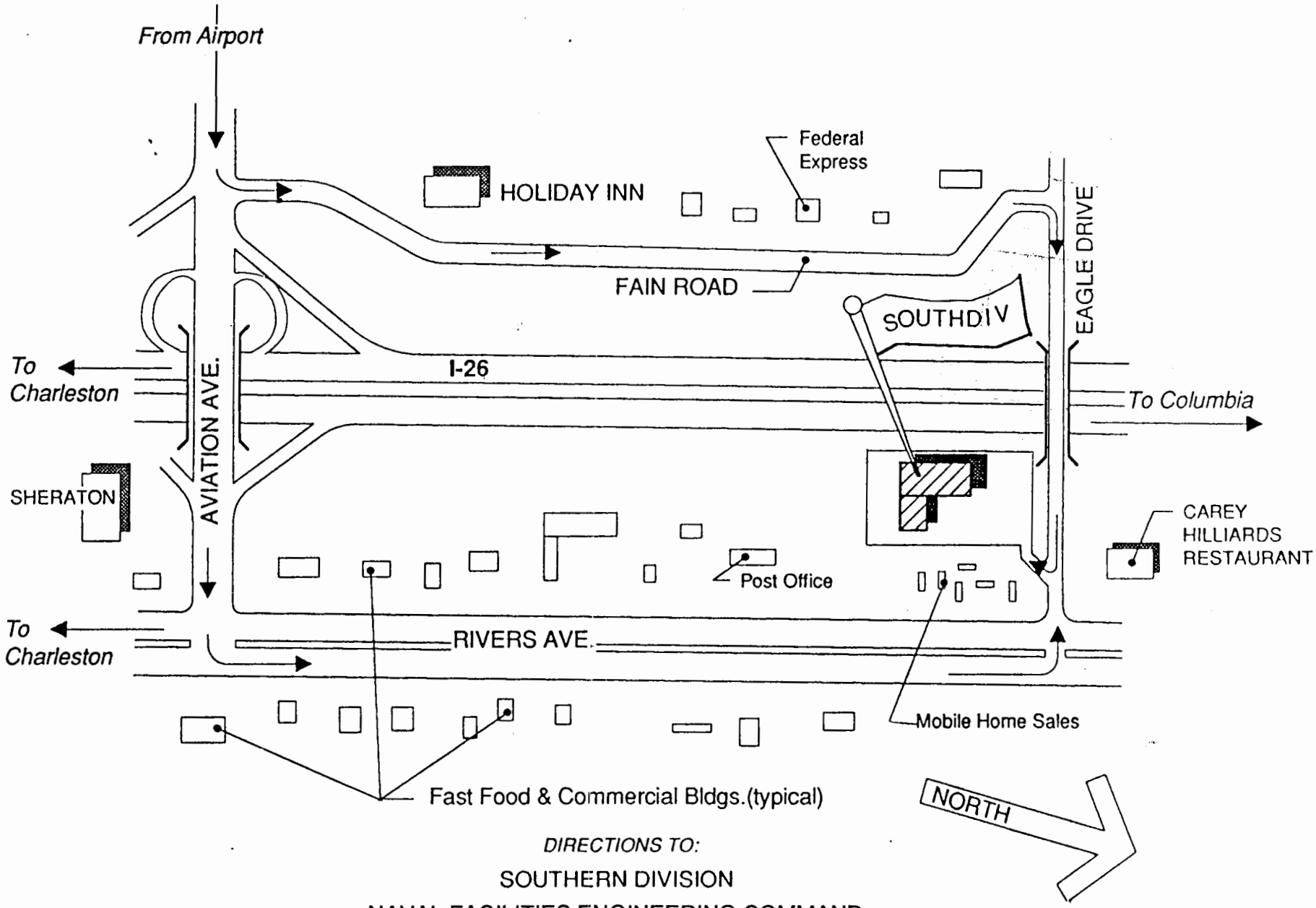
CC/FC: NVBA/PCB4

PAGE NO.: 1

SAMPLE ID : #106

LAB ID : 87080228
DATE RECEIVED: 08/06/87

PARAMETER	
PCB ANALYSIS	
AROCLOR 1016	<10 ppm
AROCLOR 1221	<10 ppm
AROCLOR 1232	<10 ppm
AROCLOR 1242	<10 ppm
AROCLOR 1248	<10 ppm
AROCLOR 1254	<10 ppm
AROCLOR 1260	<10 ppm
AROCLOR 1262	<10 ppm
EXTRACTION & CONCENTRATION	YES



DIRECTIONS TO:

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

2155 EAGLE DRIVE - N. CHARLESTON, SC

FINAL RCRA FACILITY INVESTIGATION (RFI) WORKPLAN
CHARLESTON NAVAL BASE
CHARLESTON
UIC: 60169

* * *

Prepared by:

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Atlanta, Georgia 30329

Contract No. N62467-87-D-0650

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* * *

Southern Division Naval Facilities Engineering Command

Todd Daniels

Prepared for:

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Charleston, South Carolina 29411

September 1991

RELEASE OF THIS DOCUMENT REQUIRES THE PRIOR NOTIFICATION OF THE COMMANDING OFFICER OF THE CHARLESTON NAVAL SHIPYARD

KEMRON
ENVIRONMENTAL SERVICES

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Project 520

30 September 1991

Corrective Action Management Plan
To Complete The
RCRA Facility Investigation (RFI)
Charleston Naval Base
Charleston, South Carolina

Prepared for:
Naval Facilities Engineering Command
Southern Division
Charleston, South Carolina

Prepared by:

WAPORA, Inc.

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Protecting Our Environmental Future

1.0 INTRODUCTION

Nominally, this document is a Corrective Action Management Plan for use during the RCRA Facility Investigation (RFI) planned for the Charleston (South Carolina) Naval Shipyard. As such it discusses scheduling priorities, the grouping of work elements to promote efficiency, interim measures necessary to protect human health or the environment, and the necessity for a groundwater monitoring plan. However, since the RFI is largely investigatory, this document is primarily devoted to management of the investigations to be conducted and discusses corrective action at the facility only to the extent that the need for interim corrective measures may be uncovered during the investigation.

This is not a stand alone document. It is intended for use in conjunction with, and supplements, the RFI Workplan submitted 9 September 1991 to the U.S. Environmental Protection Agency (USEPA), Region IV and to the South Carolina Department of Health and Environmental Control by the Charleston Naval Shipyard (NSY). It was prepared at the request of USEPA by Southern Division, Naval Facilities Engineering Command (Todd Daniels, Engineer in Charge) under the direction of the Commanding Officer, Charleston Naval Base.

Section 2 of this document discusses the potential need for interim corrective measures to abate contaminant migration if and as such migration is documented during the investigation. Section 3 describes scheduling priorities and the potential for efficiencies through the ordering of SWMUs in the investigation schedule. Section 4 provides the actual schedule for implementing the RFI Workplan. Finally, Section 5 provides a general plan for developing a groundwater monitoring plan for all existing and future monitoring wells.

2.0 INTERIM CORRECTIVE MEASURES

No interim corrective measures are planned at this time. An earlier draft of the RFI Work Plan had planned interim corrective measures at SWMU #2. However, Hurricane Hugo inundated the area since it was last sampled and it is uncertain what current lead concentrations are or whether the contamination has spread or attenuated. Consequently, the site will be resampled and interim corrective measures will be reproposed as necessary.

Interim corrective measures may be appropriate at SWMU #8 if free floating petroleum is detected. Appropriate measures will be proposed as necessary. It currently appears unlikely that interim corrective measures will be warranted at any other site. However, as the RFI is implemented, the need for interim corrective measures will be reevaluated as often as the data warrant. SCDHEC and USEPA will be kept abreast of data indicating that interim corrective measures may be warranted and the need for and approach to such measures will be determined in consultation with the agency project officers.

3.0 SCHEDULING OF RFI WORKPLAN

The schedule for implementing the contamination investigation of the 11 sites (13 SWMUs) will encompass approximately 41 weeks. A single field crew will perform all field activities associated with all sites in a specified order. The order of the SWMUs in the investigation schedule was developed to

minimize the total amount of time necessary to complete the first phase of investigation and to achieve some groupings of the SWMUs. Because of the large number of wells to be installed, surveying of these wells was split into two periods with one week of surveying occurring approximately halfway through field activities. The remaining wells will be surveyed at the end of field activities.

None of the SWMUs were considered to have a more significant release than any of the others, therefore, there was no prioritization of SWMUs in the schedule based on this factor. SWMUs #2 and #1, and also SWMUs #29 and #34, are investigated as pairs as described in the RFI Workplan. Each pair shares the same physical location and has contaminant plumes commingled. Data gathering activities for one SWMU of a pair will satisfy data gathering needs of the other. A similar situation exists for SWMUs #6 and #7. Although treated as separate sites for data gathering needs, SWMU #7 will use the same monitoring wells that will be installed for SWMU #6. Therefore, SWMU #7 follows SWMU #6 in the schedule.

For certain SWMUs, laboratory analysis of samples will occur in a phased manner. That is, samples from a greater depth or further distance from the source of contamination at a site will be analyzed only after it is determined that shallower (or closer) samples are contaminated. Because of this approach, total laboratory time for a particular SWMU can be several weeks if all samples need to be analyzed. Field activities at those SWMUs with the potential for the greatest amount of laboratory time will be performed early enough in the investigation so that laboratory analysis does not extend well beyond the completion of fieldwork. The schedule assumes that all potential phases of laboratory analysis will have to be performed. Sample analytical work in SWMUs other than the ones with phased analyses will be conducted within normal laboratory turnaround times and will occur concurrently with ongoing field activities. An average turnaround time of three weeks has been proposed in the project schedule. However, sample analytical work will be expedited to a one week (five business days) turnaround time as necessary. An expedited turnaround time will be primarily needed for SWMU's where a phased sampling approach is proposed. For a SWMU that has several laboratory analysis phases, a two day delay is assumed between the results from an earlier phase and the decision to begin the next phase of analysis.

Field activities will commence within six weeks of final Agency approval of the RFI Workplan. It is assumed that all activities will be performed five days per week. In addition, the length of time estimated for various activities accounts for potential downtime such as inclement weather and other unforseen events. A description of the work schedule for each SWMU is provided below. The days referred to are the business days of the schedule.

SWMUs #29 and #34: Field activities will begin with SWMU #29 (and includes SWMU #34) because of the need for five phases of laboratory analyses. Soil borings and sampling will take three days (days 1-3) with all phases of laboratory analyses taking 33 days (days 4-36).

SWMU #25: Field activities will begin on day four and continue through day 10 and consist of boring and monitoring well installation and sampling. Four phases of laboratory analyses will take 26 days (days 11-36).

SWMU #6: Monitoring well installation and sampling will take place on days 11-14 with three weeks of laboratory analysis.

SWMU #7: Soil boring and sampling, and sampling of the monitoring wells installed for SWMU #6, will be performed on days 15-20 with two phases of laboratory analysis on days 21-39.

SWMUs #2 and #1: Field activities for SWMU #2 include SWMU #1 and will include soil boring and sampling, sediment sampling, storm sewer sampling, and monitoring well installation and sampling. These activities will take two weeks (days 21-30). A treatability study for lead will occur right after sampling on days 27-46. Two phases of laboratory analysis will occur on days 31-42.

SWMU #8: Soil boring and sampling, pit sampling, and monitoring well installation and sampling will take two weeks (days 31-40). Two phases of laboratory analysis will occur on days 41-52.

SWMU #21: Boring and monitoring well installation and sampling will be on days 41-45 with two phases of laboratory analysis on days 46-57.

SWMU #9: First, a magnetometer survey and a resistivity survey will be performed on days 46-51. These will be followed by a soil gas survey on days 52-56. Soil sampling will be performed during test trenching on days 57-63. Sampling of current monitoring wells will take place on days 64-66 with three weeks of laboratory analysis on days 67-81.

SWMU #5: Boring and monitoring well installation and sampling will be on days 67-72. A treatability study for lead will occur right after sampling on days 70-89. Three weeks of laboratory analysis will occur on days 73-87.

SWMU #14: A magnetometer survey and a resistivity survey will be performed on days 73-78. Soil boring and sampling, and sampling of existing monitoring wells will occur on days 79-85. Three weeks of laboratory analysis will take place on days 86-100.

SWMU #17: Boring and monitoring well installation and sampling will be on days 86-89. One week of laboratory analysis will occur on days 90-104.

Quarterly reports will be sent to EPA at approximately 15 and 28 weeks. Additional communication with EPA will occur at approximately six and 21 weeks of the schedule. It is assumed that several of the SWMUs will need a Phase II Investigation including installation of additional monitoring wells, sampling and analysis. The Phase II Investigation will be initiated immediately after all results from the Phase I are received and after communicating with EPA. A period of two months (days 106-145) is estimated for completion of the Phase II field work and laboratory analyses. A full contamination assessment report will take approximately 12 weeks (days 146-205) to complete.

4.0 IMPLEMENTATION SCHEDULE

Figure 1 shows the 38-week schedule for implementation of the RFI Workplan including Phase I field work, report preparation, and a Phase II investigation period.

5.0 GROUNDWATER MONITORING

In view of the number of existing SWMU's and associated monitoring wells across NSY, a comprehensive groundwater monitoring program should be implemented for the entire facility. All existing monitoring wells can be placed on a facility base map. The map can then be used to display a variety of well gauging and analytical data. Ultimately, the program will allow comparison of analytical and hydrogeological data across the entire facility. The program will consist of the following two major components:

5.1 Surveying and gauging of all NSY monitoring wells.

A list of all existing monitoring wells will be compiled. The list will include well ID number, date of installation, well depth, depth to water, surveyed coordinates (if available), vertical elevation of well casing, and types and concentrations of constituents (if any) detected by analysis of groundwater samples. The wells will be accurately located on a base map of the facility. Monitoring wells installed in support of the RFI will be incorporated into the list and identified on the base map. Water levels in all NSY monitoring wells should be periodically gauged to determine the overall pattern of groundwater flow rate and direction across the facility. Well gauging data combined with analytical results from the RFI should provide a comprehensive illustration of groundwater conditions at NSY.

5.2 Surveying all public and private wells

A record search for public and private wells at or within one-half mile of the NSY boundaries will be conducted. Any existing water supply wells are expected to be screened in the artesian Santee Limestone aquifer as opposed to the shallow uppermost unconfined aquifer. However, the survey is recommended as a final check. Compilation of this data will confirm that groundwater constituents present at some of the NSY SWMUs are not a threat to water supply wells in the area.

RCRA FACILITY INVESTIGATION WORK PLAN
ADDENDUM FOR SWMU 36,
BUILDING 68, BATTERY SHOP

CHARLESTON NAVAL SHIPYARD

PERMIT NO. SC0 170 022 560

15 OCTOBER 1991

PREPARED FOR: COMMANDER, CHARLESTON NAVAL SHIPYARD
CHARLESTON, SOUTH CAROLINA

PREPARED BY: SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

EXECUTIVE SUMMARY

As requested by Charleston Naval Shipyard (CNSY) a Visual Site Inspection (VSI) of the building 68 battery shop was conducted by Southern Division Naval Facilities Engineering Command. After the VSI it was determined that this site was a potential Solid Waste Management Unit (SWMU). A RCRA Facility Assessment was prepared in accordance with the EPA HSWA Permit issued to CNSY and submitted on 10 July 1991. As required by the permit this RCRA Facility Investigation (RFI) Work Plan has been prepared.

General information which applies to the entire facility has been previously provided in the RFI Work Plan dated September 1991 produced by KEMRON Environmental Services. Provided in this addendum is the site specific information required in sections 2, Background Information; 3, Investigative Activities; 4, Quality Assurance / Quality Control Plan; and 7, Health and Safety Plan. All general information can be found in the existing work plan.

1. INTRODUCTION

1.1 OBJECTIVES
1.2 RCRA FACILITY INVESTIGATION WORK PLAN

See the RFI Work Plan dated September 1991 for the above sections.

2. BACKGROUND INFORMATION

2.1 LOCATION AND ORGANIZATION
2.2 LAND USE
2.3 HYDROGEOGRAPHIC FEATURES
2.4 INDUSTRIAL OPERATIONS AND GENERATION
2.5 NATURE AND EXTENT OF CONTAMINATION

See the RFI Work Plan dated September 1991 for the above sections.

2.6 SWMU DESCRIPTIONS AND INTERIM CORRECTIVE MEASURES

2.6.36 Building 68, Battery Shop. The Battery Shop (SWMU 36) began use in the early 1940's and is presently in use. The unit is contained inside of building 68 which is approximately 48,000 SF. in size. During normal Battery Shop operations all spills are contained within the building, drained to a holding tank at the south end of the building and pumped to a neutralization pit at Building 1278.

Virgin sulfuric acid and sodium bicarbonate are stored at this site in bulk quantities of thousands of gallons and hundreds of pounds respectively. Various other chemicals are stored in building 68, but in smaller quantities. They are detergents, lacquers, adhesives, penetrating oil, kerosene, dry cleaning solvent, and hydraulic fluid to name a few.

The building's acid tank room floor is elevated about 2 feet above the soil. Drain lines run

between the bottom of the floor and the surface of the soil to the edge of the building. From the edge of the building they run below ground to the holding tank.

On two occasions the floor drain to the holding tank separated from the floor allowing approximately 1025 gallons of sulfuric acid to discharge to the soil below the building. Following each spill a sodium carbonate solution was used in an attempt to neutralize the surface below the building.

3. INVESTIGATIVE ACTIVITIES

3.1 CORRECTIVE ACTION MANAGEMENT PLAN

It is anticipated that the phase I field investigation at the building 68 battery shop could be completed in one day. The current schedule in the Corrective Action Management Plan for the existing RFI work plan, both produced by KEMRON, proposes 25 weeks until the end of the phase I field work. This schedule should allow enough time to get this addendum approved and conduct the phase I field activities planned in section 3.13 of this addendum before the phase I field activities for the existing RFI work plan are complete.

3.13 SWMU #36, BUILDING 68, BATTERY SHOP.

The sampling program for this SWMU will be conducted in a phased approach. Phase I is designed to determined if the attempts to neutralize the sulfuric acid following the spills were successful and if any contaminants have migrated from under the building. Also, phase I will be used to determine if the spilled acid washed any lead dust, which may have been present, from the floor through the broken drain to the soil below the building. If the laboratory results from phase I indicate the presence of contamination then a phase II sampling program will be conducted to fully define the extent of the contamination from this site.

3.13.1 Soil Sampling. Two soil borings will be installed adjacent to the spill area as shown in figure 2. Each boring will be advanced to a maximum depth of five feet and samples will be collected from two sampling intervals (0-2′ & 3-5′). Also a stainless steel shovel will be used to collect two surface (0-6") samples from within the spill area. The six samples will be analyzed for pH and total lead. If the laboratory results indicate low pH levels and/or high lead levels then a phase II soil sampling program will be conducted.

3.13.2 Groundwater Sampling. In-situ groundwater samples will be collected through each boring via a Hydropunch sampling device. The two samples will be analyzed for pH and total lead. If results indicate low pH levels and/or high lead levels then a phase II groundwater sampling program will be conducted. A phase II groundwater sampling program would include the installation of permanent monitoring wells.

3.13.3 Temporary Land Use Restrictions. The site activities should be limited to those which do not disturb the soil or groundwater. Utility construction should be minimized and conducted with proper preventive measures to prevent physical contact with potential contaminants.

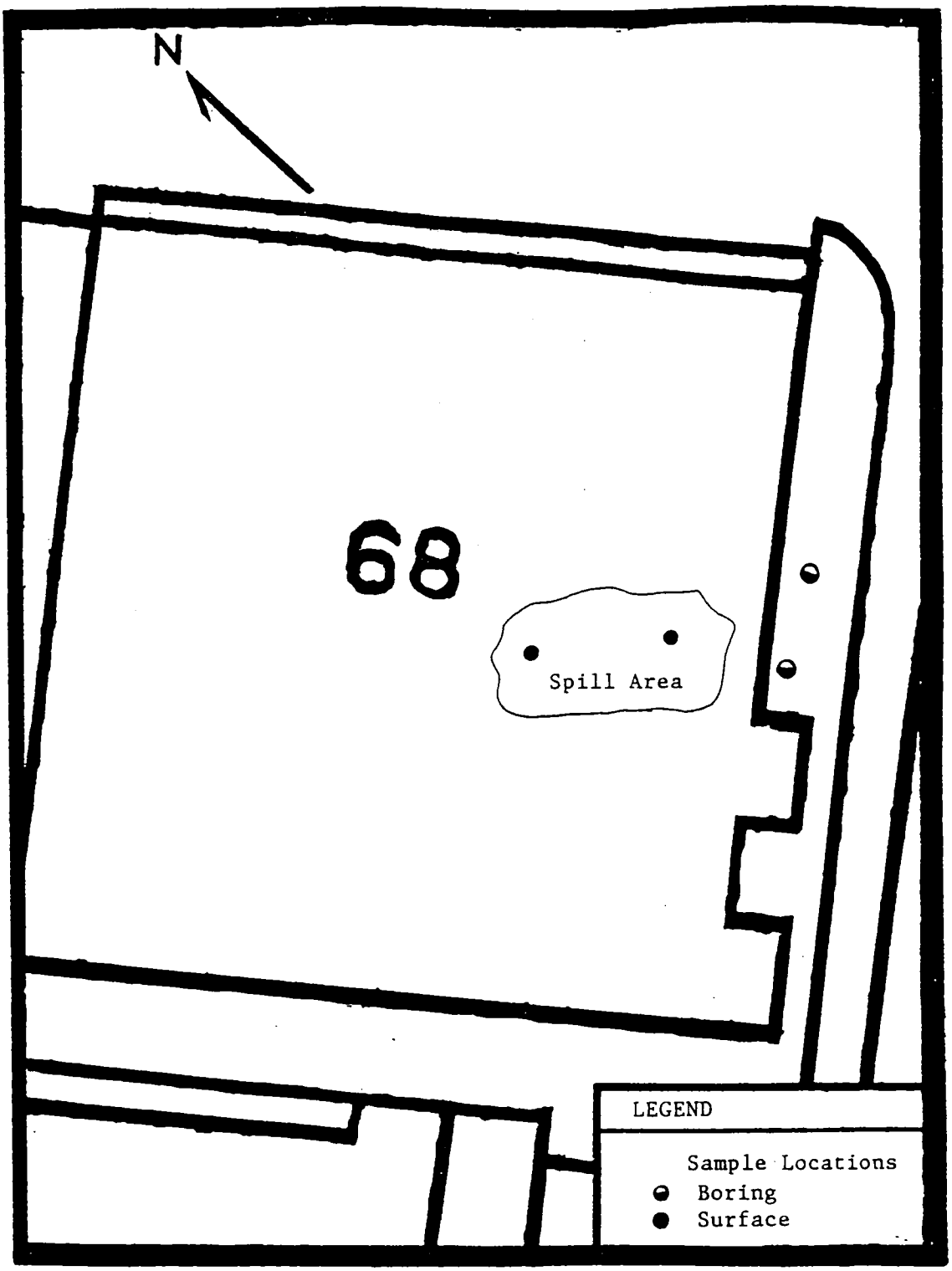

Figure 2. Proposed Sample Locations at SWMU #36

4. QUALITY ASSURANCE / QUALITY CONTROL PLAN

4.1 PROJECT DESCRIPTION
4.2 PROJECT ORGANIZATION AND RESPONSIBILITIES
4.3 QA /QC OBJECTIVES AND PROCEDURES

See the RFI Work Plan dated September 1991 for the above sections.

4.4 SAMPLING PROTOCOLS

4.4.6 Groundwater sampling with Hydropunch. The Hydropunch is a stainless steel in-situ groundwater sampling device that is attached to the drill rod, lowered to the bottom of the boring and hydraulically pushed a minimum of five feet in depth into the aquifer. The Hydropunch is then partially withdrawn to open the sleeve and expose the screen to allow water to pass into the sampling chamber. The Hydropunch is then removed from the boring and a sample is collected.

4.5 SAMPLE CUSTODY
4.6 CALIBRATION PROCEDURES
4.7 ANALYTICAL PROCEDURES
4.8 DATA REDUCTION, VALIDATION, AND REPORTING
4.9 INTERNAL QUALITY CONTROL CHECKS
4.10 PERFORMANCE AND SYSTEM AUDITS
4.11 PREVENTIVE MAINTENANCE
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4.14 QUALITY ASSURANCE REPORTS TO MANAGEMENT

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5. DATA MANAGEMENT PROCEDURES

5.1 GENERAL DOCUMENTATION PROCEDURES
5.2 FIELD DOCUMENTATION
5.3 OTHER RELATED DATA

See the RFI Work Plan dated September 1991 for the above sections.

6. IDENTIFICATION OF POTENTIAL RECEPTORS

See the RFI Work Plan dated September 1991 for the above section.

7. HEALTH AND SAFETY PLAN

7.1 INTRODUCTION

See the RFI Work Plan dated September 1991 for the above section.

7.2 POTENTIAL RISKS

7.2.12 SWMU #36, Building 68, Battery Shop. Chemical and physical hazards may exist around the building 68 battery shop. Low pH levels and/or high lead levels in the soil around the spill area are anticipated for this unit. A soil sampling program increases the potential for chemical exposure when collecting samples in areas where contamination in undefined. Safety precautions are also required around structures where above ground and underground utilities such as gas, electric, or water may service the area.

7.3 WORK ZONES

See the RFI Work Plan dated September 1991 for the above section.

7.4 PERSONAL PROTECTIVE EQUIPMENT AND SAFETY MEASURES

7.4.12 Building 68, Battery Shop. During sampling of this area, the sampling crew will wear full-faced respirators, tyveks, disposable latex gloves, steel-toed boots, and hard hats. Workers will wear at least two pair of latex gloves and monitor pH levels in samples during collection. If pH decreases to <3, workers will add an outer acid resistant glove. The outer latex gloves will be changed between each sample. If acid resistant gloves are worn, then they will be decontaminated between each sample as well to prevent cross-contamination.

Workers exiting the work zone will enter the decontamination area. All workers will pass through the boot wash, glove wash, then remove tyvek and latex gloves.

Sample containers and field equipment will be left in the decon area. Any equipment or samples exiting the work zone will be wiped down to remove any fugitive dust or residues. Equipment used in collecting samples will be decontaminated following the procedures as specified in section 4.3.2.2 of the RFI work plan produced by KEMRON dated September 1991.

7.5 PERSONNEL DECONTAMINATION
7.6 EQUIPMENT DECONTAMINATION
7.7 TRAINING
7.8 SURVEILLANCE
7.9 EMERGENCY RESPONSE

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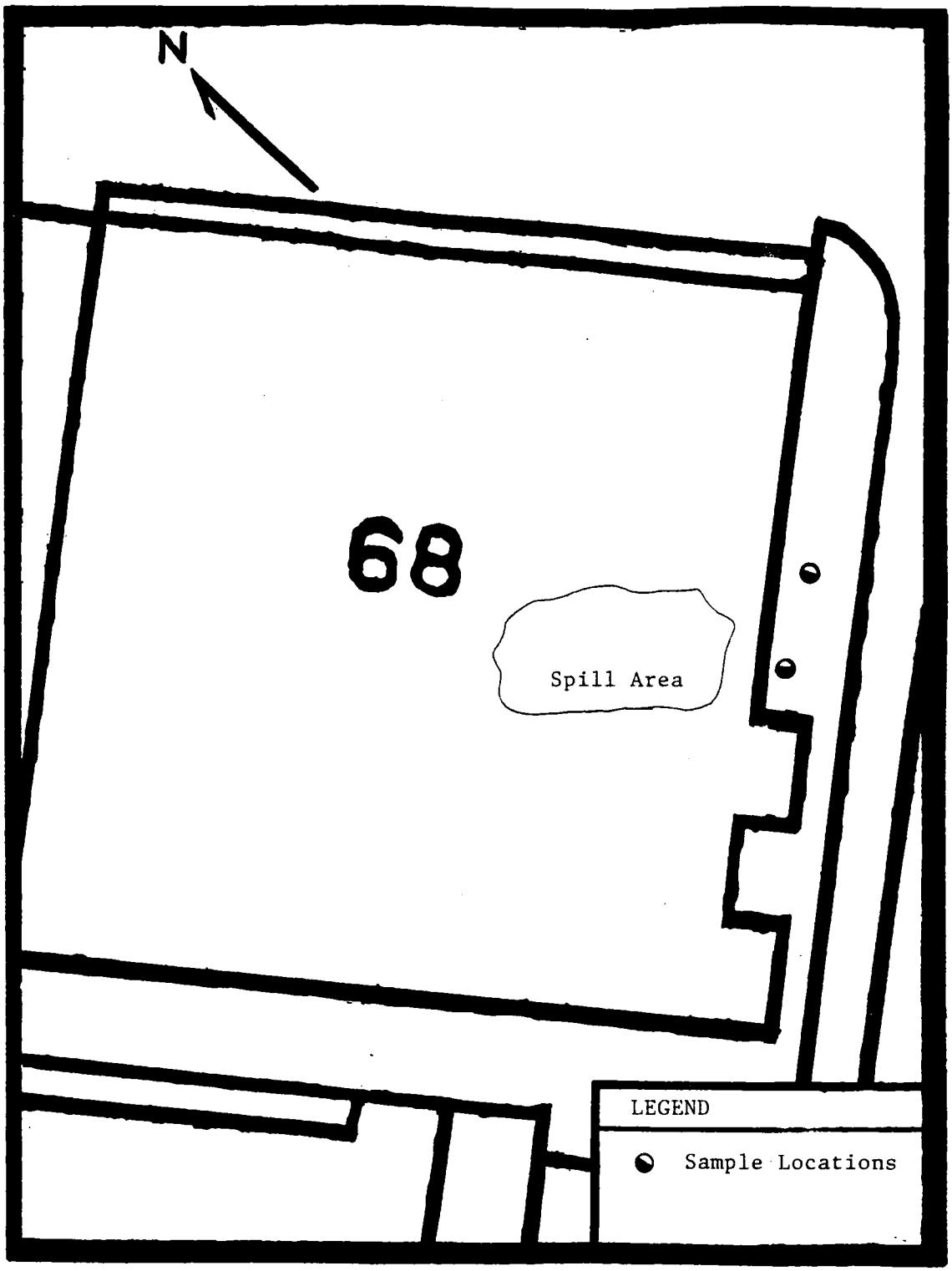

Figure 2. Proposed Sample Locations at SWMU #36

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4.4.6 Groundwater sampling with Hydropunch. The Hydropunch is a stainless steel in-situ groundwater sampling device that is attached to the drill rod, lowered to the bottom of the boring and hydraulically pushed a minimum of five feet in depth into the aquifer. The Hydropunch is then partially withdrawn to open the sleeve and expose the screen to allow water to pass into the sampling chamber. The Hydropunch is then removed from the boring and a sample is collected.

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4.7 ANALYTICAL PROCEDURES
4.8 DATA REDUCTION, VALIDATION, AND REPORTING
4.9 INTERNAL QUALITY CONTROL CHECKS
4.10 PERFORMANCE AND SYSTEM AUDITS
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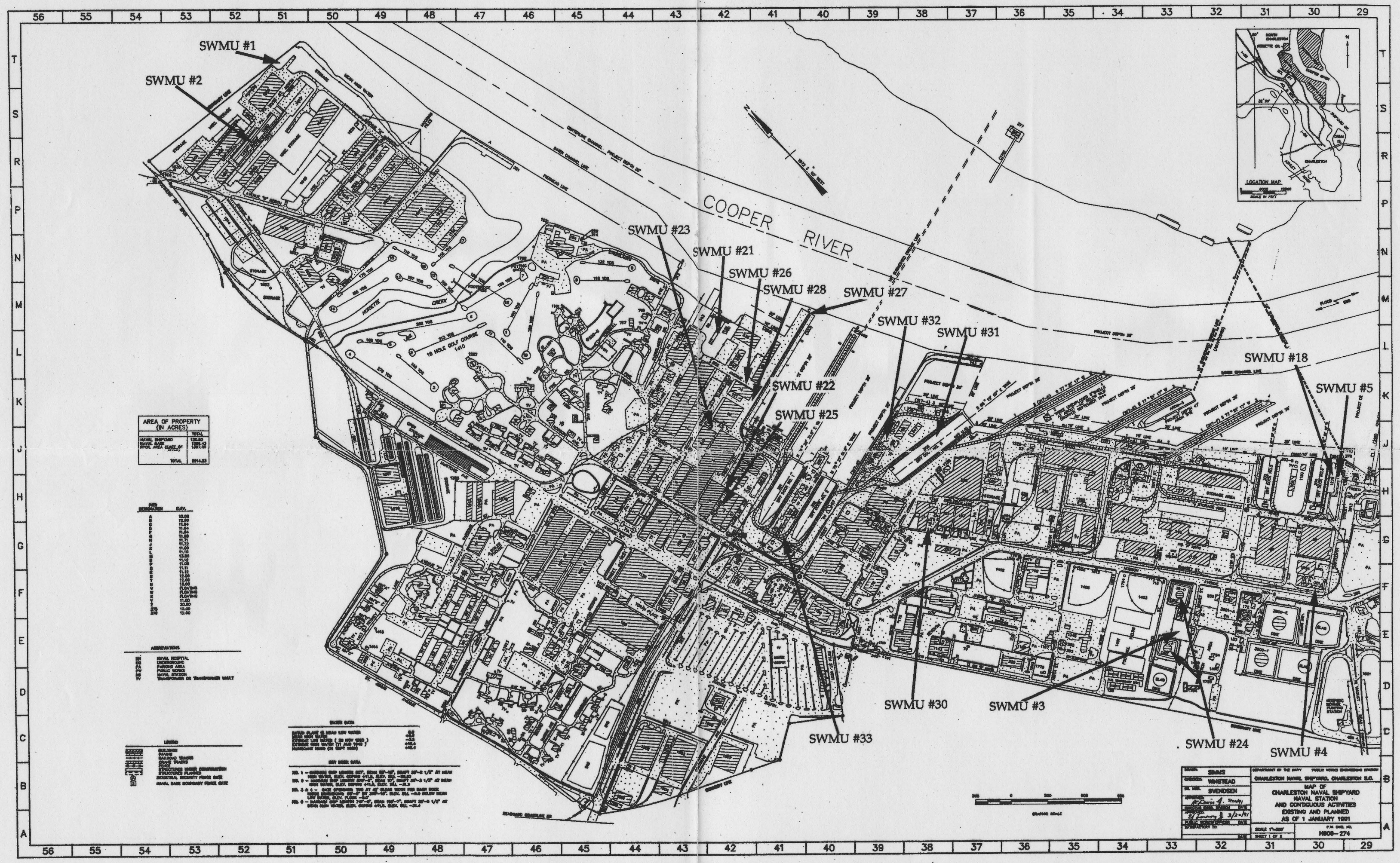
Workers exiting the work zone will enter the decontamination area. All workers will pass through the boot wash, glove wash, then remove tyvek and latex gloves.

Sample containers and field equipment will be left in the decon area. Any equipment or samples exiting the work zone will be wiped down to remove any fugitive dust or residues. Equipment used in collecting samples will be decontaminated following the procedures as specified in section 4.3.2.2 of the RFI work plan produced by KEMRON dated September 1991.

7.5 PERSONNEL DECONTAMINATION
7.6 EQUIPMENT DECONTAMINATION
7.7 TRAINING
7.8 SURVEILLANCE
7.9 EMERGENCY RESPONSE

See the RFI Work Plan dated September 1991 for the above sections.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SWMU #2
COOPER RIVER
SWMU #23
SWMU #21
SWMU #26
SWMU #28
SWMU #27
SWMU #32
SWMU #31
SWMU #18
SWMU #5
SWMU #22
SWMU #25
SWMU #30
SWMU #3
SWMU #33
SWMU #24
SWMU #4
LOCATION MAP
AREA OF PROPERTY (IN ACRES)
SIMMS
WINSTEAD
SVENDSEN
CHARLESTON NAVAL SHIPYARD, CHARLESTON S.C.
MAP OF CHARLESTON NAVAL SHIPYARD NAVAL STATION AND CONTIGUOUS ACTIVITIES EXISTING AND PLANNED AS OF 1 JANUARY 1991
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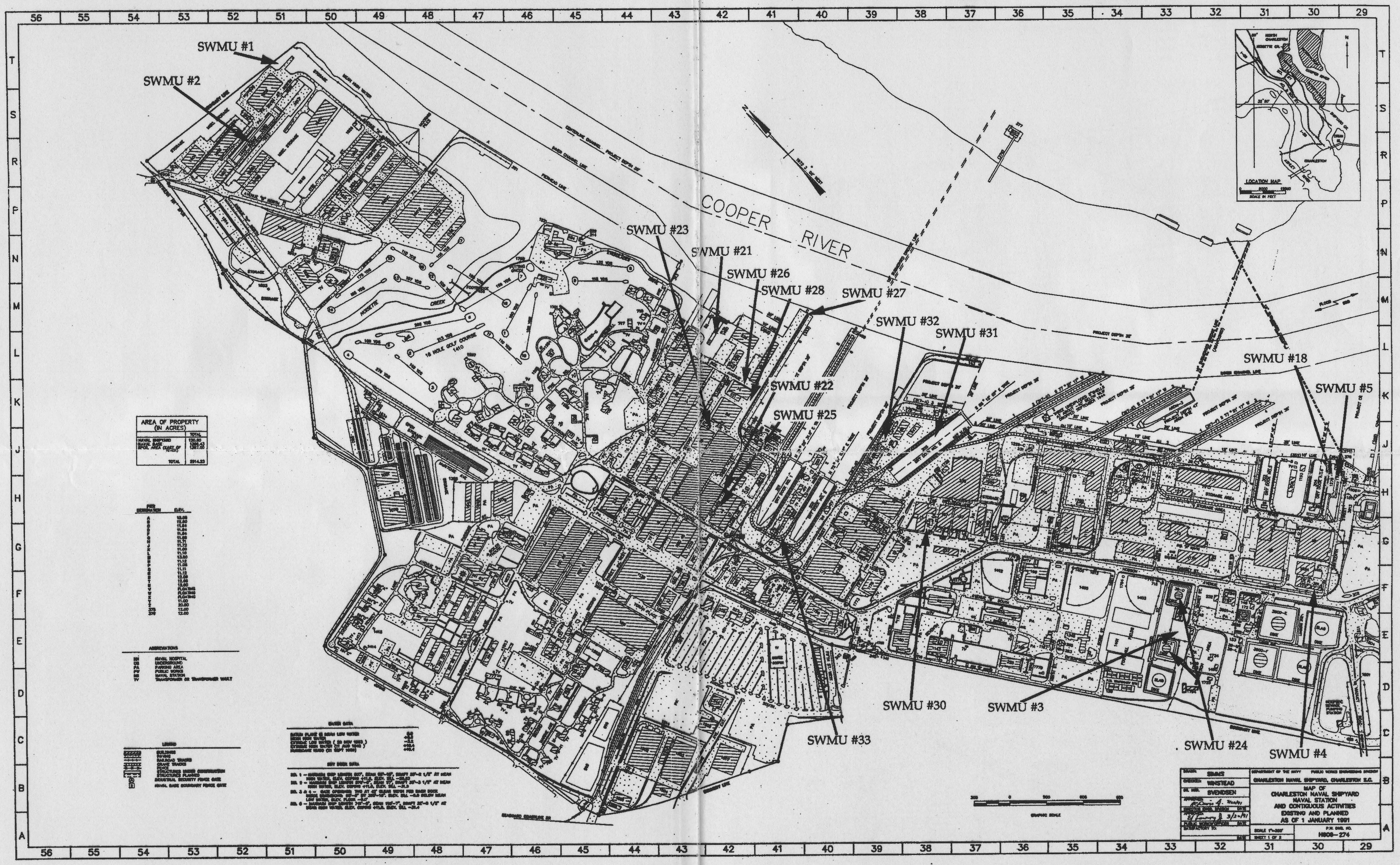
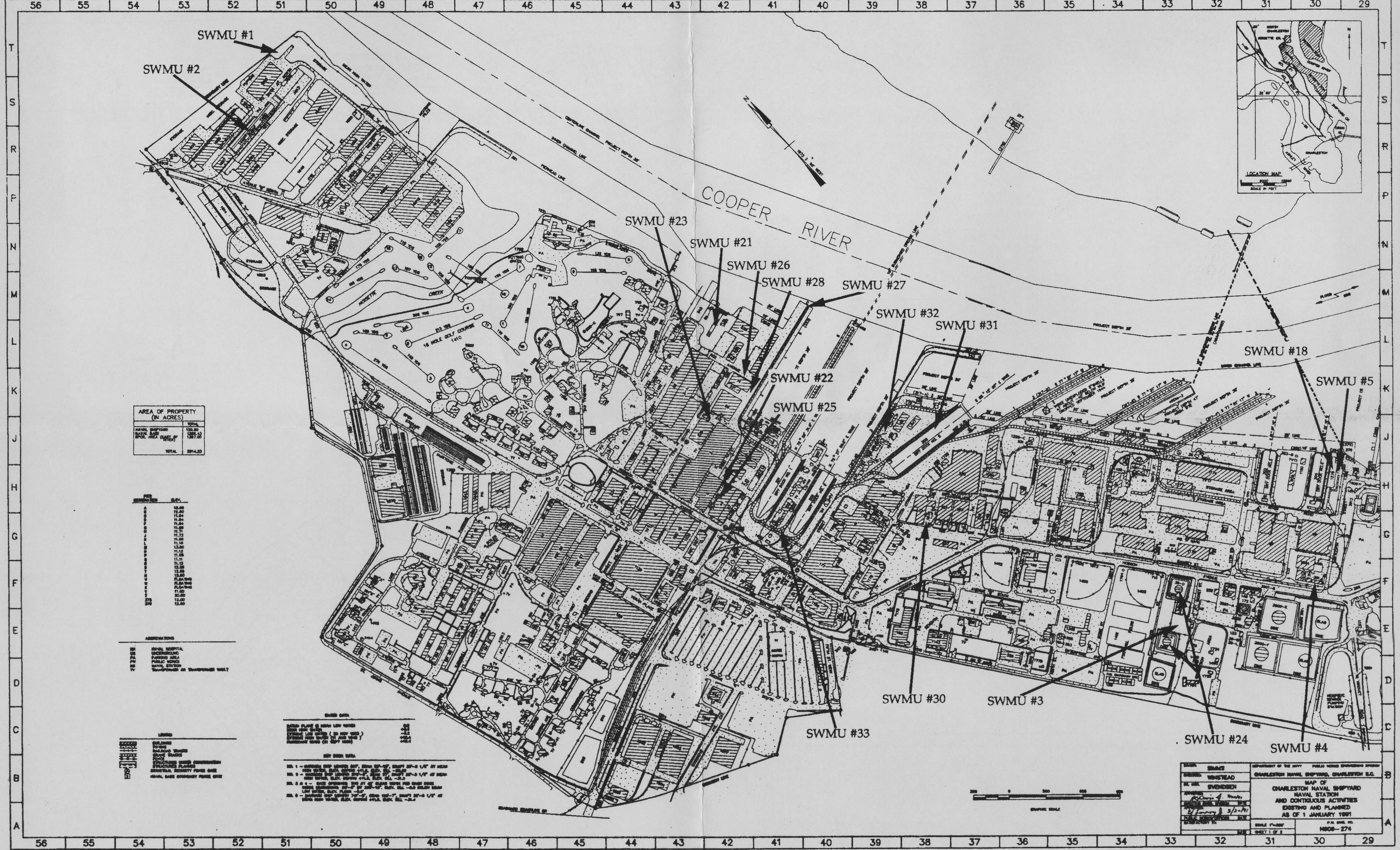
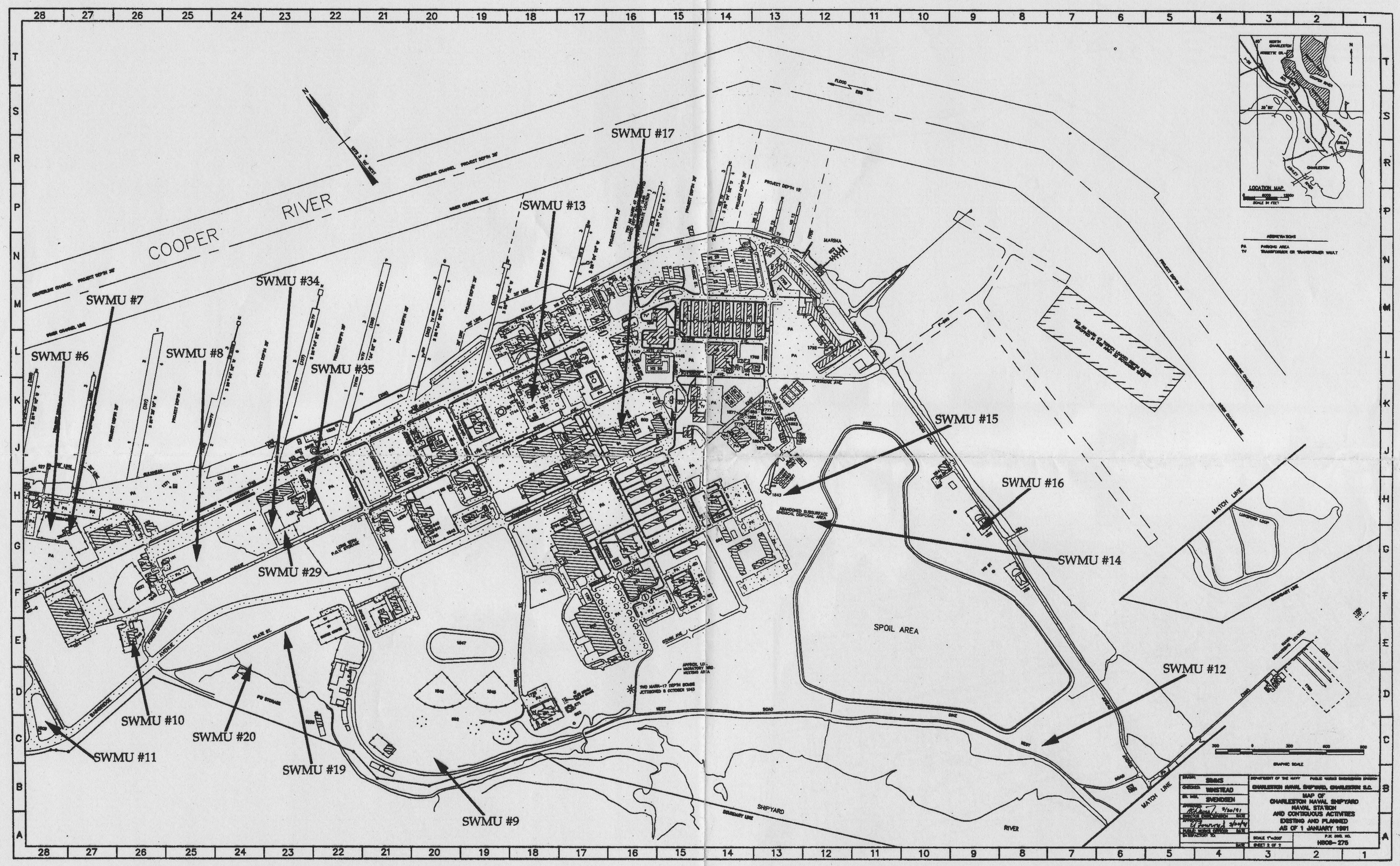


SWMU #1
SWMU #2
SWMU #23
SWMU #21
SWMU #26
SWMU #28
SWMU #27
SWMU #32
SWMU #31
SWMU #22
SWMU #25
SWMU #18
SWMU #5
SWMU #30
SWMU #3
SWMU #33
SWMU #24
SWMU #4
COOPER RIVER
NOSETTE CREEK
18 HOLE GOLF COURSE
LOCATION MAP
AREA OF PROPERTY (IN ACRES)
MAP OF CHARLESTON NAVAL SHIPYARD NAVAL STATION AND CONTIGUOUS ACTIVITIES EXISTING AND PLANNED AS OF 1 JANUARY 1991
SIMMS
WINSTEAD
SVENDSEN

SWMU #24
SWMU #4



SWMU #1
SWMU #2
COOPER RIVER
SWMU #23
SWMU #21
SWMU #26
SWMU #28
SWMU #27
SWMU #32
SWMU #31
SWMU #22
SWMU #25
SWMU #18
SWMU #5
SWMU #30
SWMU #3
SWMU #33
SWMU #24
SWMU #4
LOCATION MAP
AREA OF PROPERTY (IN ACRES)
CHARLESTON NAVAL SHIPYARD, CHARLESTON S.C.
MAP OF CHARLESTON NAVAL SHIPYARD NAVAL STATION AND CONTIGUOUS ACTIVITIES EXISTING AND PLANNED AS OF 1 JANUARY 1991
SIMMS
WINSTEAD
SVENDSEN
H609-274


COOPER RIVER
SWMU #17
SWMU #13
SWMU #34
SWMU #7
SWMU #6
SWMU #8
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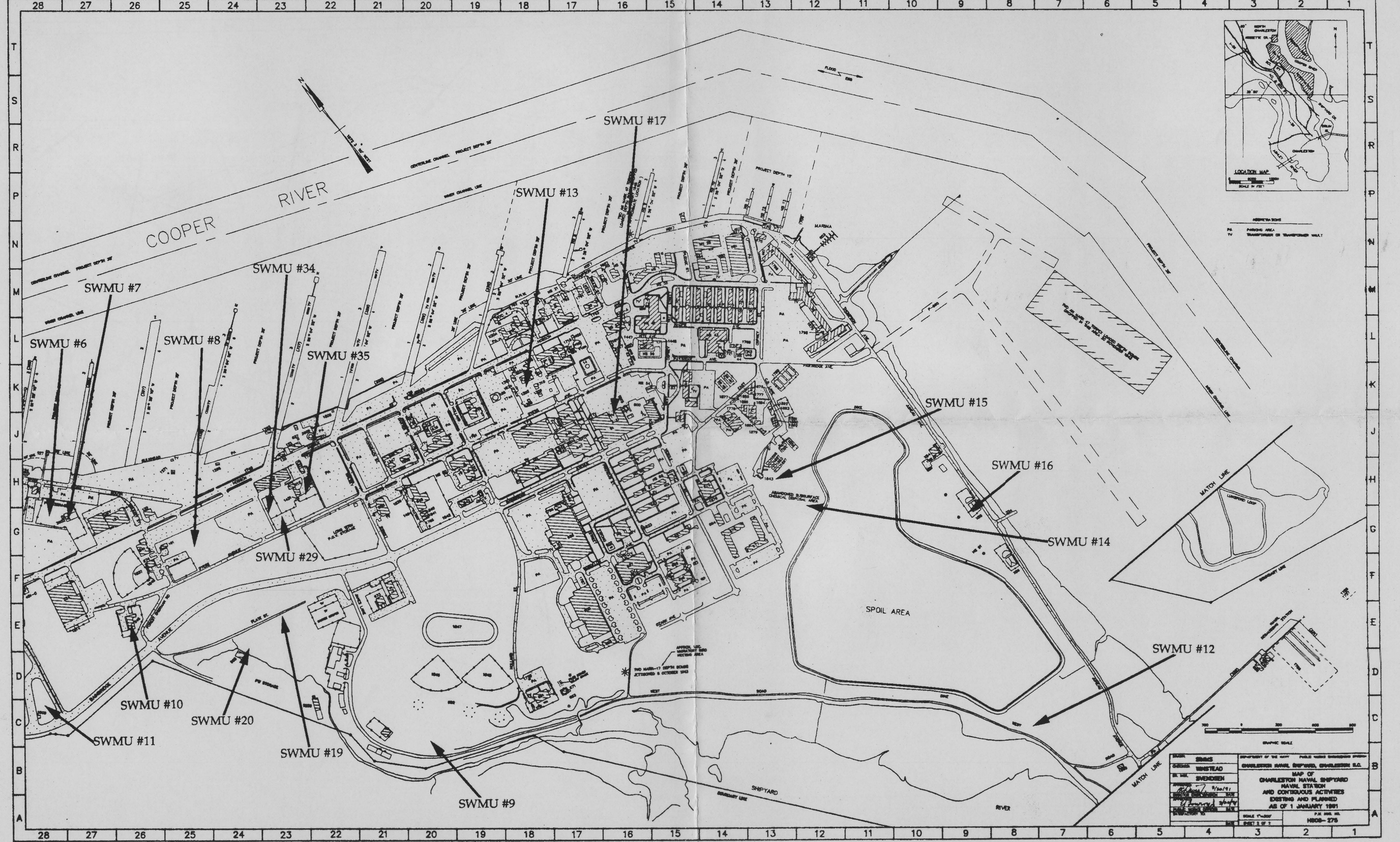
SWMU #15
SWMU #16
SWMU #14
SWMU #29
SWMU #12
SWMU #10
SWMU #20
SWMU #11
SWMU #19
SWMU #9
SPOIL AREA
SHIPYARD
RIVER
MARINA
MATCH LINE
LOCATION MAP
ABBREVIATIONS
PA PARKING AREA
TV TRANSFORMER OR TRANSFORMER VAULT
GRAPHIC SCALE
MAP OF
CHARLESTON NAVAL SHIPYARD
NAVAL STATION
AND CONTIGUOUS ACTIVITIES
EXISTING AND PLANNED
AS OF 1 JANUARY 1991
CHARLESTON NAVAL SHIPYARD, CHARLESTON S.C.
SHEET 2 OF 2
H808-275


COOPER RIVER
SWMU #17
SWMU #13
SWMU #34
SWMU #7
SWMU #6
SWMU #8
SWMU #35
SWMU #15
SWMU #16
SWMU #14
SWMU #29
SWMU #12
SWMU #10
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SWMU #11
SWMU #19
SWMU #9
SPOIL AREA
MARINA
SHIPYARD
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MATCH LINE
LOCATION MAP
MAP OF
CHARLESTON NAVAL SHIPYARD
NAVAL STATION
AND CONTIGUOUS ACTIVITIES
EXISTING AND PLANNED
AS OF 1 JANUARY 1991
HSCB-275