Site:
Break: 3.8 x-10.5
Other: AR

10095472

EXPANDED SITE INSPECTION REPORT

NATIONAL PARK SERVICE
CHARLESTON HARBOR SITE
CHARLESTON, SOUTH CAROLINA

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Submittal Date: November 20, 1992

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Signature Page

This document entitled "Expanded Site Inspection Report" has been prepared for the Charleston Harbor Site located on Concord Street in Charleston, South Carolina. It has been prepared by Thomas Hutto in accordance with accepted quality control practices at the request of and for the exclusive use of the National Park Service, the Environmental Protection Agency, the South Carolina Department of Health and Environmental Control, and the City of Charleston. It has been reviewed by the undersigned.

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EXPANDED SITE INSPECTION REPORT

NATIONAL PARK SERVICE
CHARLESTON HARBOR SITE
CHARLESTON, SOUTH CAROLINA

EXECUTIVE SUMMARY

The 4-acre National Park Service (NPS) Charleston Harbor Site (CHS) is located adjacent to the Cooper River in an area that has been developed for commercial and industrial use since the mid-1700s. The NPS plans to construct a visitors center and tour boat dock on the site. The tour boats will provide transportation to the Fort Sumter National Historical Monument, which is located on an island in Charleston Harbor. A portion of the site will also be leased to the City of Charleston for construction of the South Carolina Aquarium.

The majority of the CHS was a tidal flat until progressively filled after 1940. Previous investigations of surrounding sites and limited investigations of the CHS identified soil and groundwater impact from polynuclear aromatic hydrocarbons (PAHs) associated with creosote and coal gasification processes. This Expanded Site Inspection (ESI) of the CHS was performed to: 1) identify the extent and severity of impact to site soils and groundwater, as well as to surface water and sediments of the adjacent Cooper River, 2) identify potential exposure pathways, and 3) provide the EPA with adequate data to rank the site using the Hazard Ranking System.

To accomplish this, [redacted] The analyses detected impact to soils and groundwater primarily from PAHs with lesser amounts of impact from metals and polychlorinated biphenyls (PCBs).

The [redacted] When removed from the well, however, the free product did not reenter the well in measurable volumes. This indicates that it is present in only small volumes in this area.

[redacted]

northwest of the site. The most significant impact on the CHS site is located in proximity to this former plant. Other impact detected at the site may have been caused by:

- Heavy metal containing marine paints used on the site and surrounding sites.
- Lead impacted stormwater runoff which crosses the site in subsurface stormwater piping. Extremely elevated lead concentrations are common in soils along roadways because of the former use of lead-containing fuels.
- Incidental spills of PCB-containing oils.
- Releases from a former creosote plant located immediately west of the site.

Analysis of river sediments identified impact from PAHs, metals and PCBs, and analysis of surface water identified impact from PAHs and metals. The samples were collected immediately upriver of the site, bordering the site, and immediately downriver of the site. The sample in front of the site was collected in the discharge area of the stormwater outfall which drains stormwater from an extensive area around the CHS. The piping system, which also passes through the impacted sites west of the CHS, is tidally influenced and drains groundwater which seeps into it. Evaluation of the data indicates that the major source of the impact to the Cooper River estuary is this stormwater outfall.

The potential for direct human exposure to the contaminants on the site is not believed to be significant. This conclusion is based on the following:

- Ambient Air - The contaminants are not volatile and do not pose a vapor phase hazard. This position is supported by the absence of ambient air impact detected by previous studies and the absence of widespread impact to surface soils.
- Groundwater - The groundwater at the site is brackish and not suitable for a potable water source regardless of the amount of contamination. There is also no significant potential for impacted groundwater to migrate to deeper usable aquifers.
- Soil - The surface soil is not significantly impacted except for limited areas, and the site is secured. Personnel performing excavation activities, however, should be properly trained to handle impacted subsurface soils which underlie significant portions of the site.
- Surface Water - There are no drinking water supply intakes downstream or in a tidally connected upstream location from the CHS.

However, the elevated concentrations of PAHs, metals, and PCBs in the river sediments near the stormwater outfall and immediately downriver of the outfall may cause exposure to environmental receptors such as fish and crustaceans. The consumption of these organisms could also result in limited human exposure to the impact.

Based on the widespread extent of relatively low contaminant concentrations, remediation of the impact is neither technically feasible or justified – especially considering the groundwater is not a potable water source. However, as part of site development, appropriate measures should be taken to mitigate and contain the impact in order to minimize discharges to the Cooper River.

The primary migration pathway for impact to reach the Cooper River is through discharges from the stormwater piping. Rerouting the stormwater piping so that it does not pass through contaminated areas of the site or surrounding sites where impacted groundwater can infiltrate the piping and then discharge to the Cooper River will prevent the majority of the contaminants from this area from entering the river. The City of Charleston has agreed to perform this project as part of site development.

Additional containment and mitigation of the impact on the site can be accomplished by many techniques. The specific techniques will be determined as part of subsequent studies.

EXPANDED SITE INSPECTION REPORT

NATIONAL PARK SERVICE
CHARLESTON HARBOR SITE
CHARLESTON, SOUTH CAROLINA

I. INTRODUCTION

This document presents the details of the Expanded Site Inspection (ESI) of the National Park Service (NPS), Charleston Harbor Site (CHS) located in Charleston, South Carolina. The site, shown on Figure 1, covers approximately 4 acres and borders the Cooper River, a saline, tidal river approximately 1 mile wide in the area of the site. Previous environmental site investigations on the CHS and surrounding sites have identified soil impacted by organic compounds typical of creosote and coal tar, and lead and other metals typically contained in marine paints. This ESI provides data on the source, extent, and severity of impact to the CHS, and evaluates potential migration pathways and receptors.

The site is presently an undeveloped, relatively flat, grassy field. The NPS plans to construct a visitors center and tour boat dock on the site. The tour boats will provide transportation to the Fort Sumter National Historical Monument, which is located on an island in Charleston Harbor. A portion of the site will also be leased to the City of Charleston for construction of the South Carolina Aquarium. As shown on Figure 2, a privately owned parcel less than 1 acre adjoins the southeastern corner of the CHS. Although not formally a portion of the CHS, it has been included in the ESI at the suggestion of regulatory agency personnel to provide more complete data on overall site conditions.

Because of the impact identified on the CHS, portions of these projects are being delayed pending determination by the Environmental Protection Agency (EPA) of the significance of the impact. In particular, the EPA has agreed to advise the NPS on potential mitigation measures and related development issues. The site must also be evaluated by the EPA using the Hazard Ranking System (HRS) for potential inclusion on the National Priority List (NPL). Therefore, this ESI has been conducted to provide the EPA data to perform these evaluations.

II. SITE BACKGROUND AND HISTORY

The site, shown on Figure 2, is located in an area of the Charleston Peninsula that has been developed since the mid-1700s. The history of the site through 1938 is presented in a documented entitled "Historical Study, Fort Sumter National Monument, Dockside II"

prepared by Clark G. Reynolds in 1987, a copy of which is included in Appendix I. This study documents that the site was originally open water of the Cooper River estuary. In 1767, the southern edge of the site was filled and developed as one of the largest wharves in North America. The western edge of the site was filled in the 1800s and used as part of a lumber yard.

The majority of the site remained a tidal flat until approximately 1940 as shown by an aerial photograph of the site taken at approximately that time. A copy of this photograph is included in Appendix II. Between 1940 and 1942, the western half of the site was filled. The eastern half of the site was used for ship docking/repair as indicated by the reference to "ship ways" shown by the 1942 Sanborn Fire Insurance Map included in Appendix II. A 1967 aerial photo shows the site completely filed and used for dry docks. A 1981 aerial photo shows the site as an empty field similar to its present condition. Copies of these aerial photos are also included in Appendix II.

The Chain of Title for the site is included as Table 1. This information was provided by the most recent former owner Mr. George E. Campsen, Jr. and dates back to 1887. This data shows that the CHS has been included as a portion of sites where industrial activities occurred. However, as noted above, the majority of the site itself was not filled until after 1940.

No underground public utilities or storm drains are present at the site with the exception of subsurface piping contained in the drainage easement shown on Figure 2. The drainage easement is located in the approximate area of a former tidal creek that extended westward over 1/2 mile along the present route of Calhoun Street as shown in many of the maps in Appendix I. This tidal creek was progressively filled during the development of the area. The stormwater piping in the easement terminates as an outfall to the Cooper River. Much of the eastern portion of Calhoun Street and surrounding areas is drained by this outfall. The stormwater piping is tidally influenced and is completely submerged at high tide.

Since there are no storm water drains on the site, most precipitation falling on the site infiltrates site soil.

Adjoining properties were used for a variety of industrial purposes as shown by the historical maps included in Appendix I. The South Carolina Electric and Gas Company (SCE&G) substation site shown on Figure 2 and in some of the aerial photos in Appendix II is the former location of a manufactured gas plant (MGP) that operated from the late 1800s through the 1950s. Coal and/or oil were heated and a variety of products were

generated, including manufactured gas (vapor form), light and heavy petroleum products, coal tar, and coke.

The Calhoun Park site shown on Figure 2 was the location of a lumber yard for much of its developed history. Based on evaluation of Sanborn Fire Insurance maps, the site was used by the Fernoline Chemical Company to treat wood with creosote during some of the period between 1884 and 1902.

Adjoining the site to the south are the Dockside Condominiums. This site was formerly a heavily developed shipping wharf and ship repair facility as shown by the 1940 and 1967 aerial photographs included in Appendix II. A "Naval Store and Rosin Yard" was located on the site in the late 1800s. This yard included areas used for turpentine storage.

III. PREVIOUS ASSESSMENT ACTIVITIES

Numerous previous assessment activities which provide data on the source, extent, and severity of impact have been performed on the subject site and some surrounding sites. These surrounding sites, shown on Figure 2, include the Ansonborough Homes, Calhoun Park, and SCE&G substation. These assessments and a brief scope of each investigation are presented in Table 2.

III.A - Surrounding Sites

Previous work provides a significant amount of data on the Ansonborough Homes and Calhoun Park sites located west of the subject site. This data shows that subsurface soil and groundwater underlying these sites are significantly impacted. The primary constituents identified at these sites are polynuclear aromatic hydrocarbons (PAHs) that are common constituents of creosote and coal gasification byproducts such as heavy oil and coal tar.

This finding is consistent with the presence of a several inch thick layer of solidified tar in the upper 1 to 2 feet of soil underlying large portions of the Calhoun Park and Ansonborough Homes sites (Davis & Floyd, Inc., September, 1989). Elevated concentrations of volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and metals have also been detected in limited areas of these sites and the adjacent SCE&G site.

A dense, non-aqueous phase liquid (DNAPL) was detected in five of the six monitoring wells installed at the Calhoun Park and Ansonborough Homes sites (Davis & Floyd, Inc., December, 1990). The thickness of the DNAPL is reported to be 8 inches or

less in four of the wells. However, the well located at the northeast corner of Calhoun Park is reported to contain over 6 feet of DNAPL. The presence of 6 feet of DNAPL in this well demonstrates significant impact at this location, although the thickness of DNAPL in the subsurface is probably less than 6 feet since DNAPLs can accumulate in wells at greater thicknesses than are present in the surrounding subsurface.

The South Carolina Department of Health and Environmental Control (DHEC) performed a Site Screening Investigation (SSI) of the Ansonborough Homes, Calhoun Park, and SCE&G sites. A copy of the text of this report is included in Appendix III. This study developed data on exposure pathways through analysis of surface soil, surface water, sediments, and ambient air. The SSI also includes extensive data on surrounding populations.

III.B - National Park Service Charleston Harbor Site

At the CHS, the previous environmental investigations were limited to subsurface soil extending to a maximum depth of approximately 5 feet below land surface. Each of these investigations is noted below, and the sample locations are shown on Figure 2.

- Davis and Floyd, Inc. collected two discrete soil samples from depths less than or equal to 4 feet below land surface and analyzed them for the EPA's Appendix IX constituent list. A copy of these analyses is included in Appendix IV.
- Chen Northern, Inc. collected 14 composite soil samples from depths less than or equal to 5 feet below land surface and analyzed them for the complete Hazardous Substances List of constituents. The findings of Chen Northern soil investigation are summarized in their May 1991 "Preliminary Assessment Report" included in Appendix V.
- General Engineering Laboratories (GEL) collected two samples composited from soil recovered during the construction of test pits installed as part of the Test Pile Program. The Test Pile Program was conducted in early 1992 to provide data on soil load bearing capacities for use in the Aquarium design. These samples were analyzed for Target Compound List (TCL) constituents, lead, hazardous waste characteristics, and other parameters necessary to obtain a permit for offsite disposal of soil generated by the pile construction. The findings of this investigation are included in Appendix VI.

Like the adjacent sites located west of the subject site, these assessments detected soil impact, although no free product or solidified tar was identified. The impact detected was primarily from PAHs with concentrations of total PAHs as high as approximately 50 milligrams/kilogram (mg/kg). Significant impact from metals, primarily lead, was also detected. PCBs were detected at a maximum concentration of 1 mg/kg. No VOCs were detected at concentrations exceeding 50 micrograms/liter (ug/l). Phenolic compounds were

not detected although they have been detected on adjoining sites. In addition, the analyses performed by GEL indicated that the soil is not a characteristic hazardous waste.

As part of the June 1992 "Site Screening Investigation" performed by DHEC, surface water and sediment samples were collected at the stormwater drainage outfall on the subject site. Elevated concentrations of PAHs were identified in the sediment sample; however, no impact was identified in the surface water sample. These findings are included in Appendix III.

III.C - Ambient Air

The previous studies of the CHS and surrounding sites include substantial data on potential impact to ambient air from the contaminants identified in the soil and groundwater. Ambient air analyses performed as part of these studies identified no impact to ambient air in either open areas of any site or in residences of Ansonborough Homes (Davis & Floyd, Inc., September, 1989; Davis & Floyd, Inc., September, 1991; General Engineering Laboratories, October, 1991; DHEC, June, 1992). These findings indicate that ambient air in unconfined areas in not impacted by site contaminants. Impact was identified in the crawlspace underlying two of the residences of Ansonborough Homes and just above soil borings constructed during investigation of the Calhoun Park site.

IV. HYDROGEOLOGIC AND GEOLOGIC SETTING

Significant data on regional and site hydrogeology has been generated in earlier reports and is summarized below. Much of the data on groundwater use in the area is taken from DHEC's "Site Screening Investigation" for the adjoining Calhoun Park/Ansonborough Homes/Coal Gas site.

A. Regional Setting

The Charleston Peninsula, which includes the CHS, is underlain by the following geologic units as presented below.

Name	Description	Estimated Hydraulic Conductivity (cm/sec)	Depth of Occurrence (feet)
Terrace Deposits	Fine to medium grained sands, shelly sands, and shell beds	10^{-4}	0-50
Cooper Formation	Sandy, calcareous phosphatic limestone and marl with layers of clay	10^{-8}	50-225
Santee Limestone	Fossiliferous, locally phosphatic limestone	10^{-4}	225-375
Black Mingo	Fossiliferous limestone, argillaceous sands, sandstones and clays	10^{-4}	375-725
Pee Dee	Fossiliferous, muddy sands, and silty and sandy calcareous clays	10^{-6}	725-1150
Black Creek	Muddy sands, silty clays, and shelly limestone	10^{-6}	1150-1950
Middendorf	Feldspathic sands, clay, silty clay, and clayey silt	10^{-6}	1950-3000

This stratigraphy is believed to be generally representative of the subject site except for the nature of the uppermost sediments and the depth to the Cooper Formation. Based on the soil boring logs contained in Appendix VII, the stratigraphy from land surface to a depth of 80 feet can be summarized as follows.

Name	Description	Estimated Hydraulic Conductivity (cm/sec)	Depth of Occurrence (feet)
Fill	Sand, silt, and clay with varying amounts of debris including gravel, sawdust, wood pilings, and timbers	variable	varies from 0-4 to 0-24
Clayey, sandy silt	Gray to black, plastic, and cohesive silt with localized occurrences of sand strata	10^{-7}	base of fill (4-24) to 80
Cooper Formation	Sandy, calcareous phosphatic limestone and marl with layers of clay	10^{-8}	80-225+

The presence of relatively impermeable silt deposits overlying the Cooper Formation is consistent with the site's location adjacent to a tidal river. This clayey, sandy silt strata, combined with the underlying Cooper Formation, is the uppermost aquitard.

The Cooper Formation, directly underlying the silt strata, is a documented regionally extensive aquitard. The Cooper Formation prevents interconnection between the uppermost aquifer and lower aquifers for at least a 2 mile area around the CHS site. In the area of the CHS, it is approximately 200 feet thick as indicated by regional studies and the boring log from a well installed at the MGP in 1911. The log from this well is contained in an appendix of DHEC's SSI of the adjoining sites. There are no known wells or foundation piles which penetrate the Cooper Formation on the CHS. The site setting is discussed in greater detail in the following section.

B. Site Setting

Data used to determine the site geology and hydrogeology was gathered from the following sources:

- The Preliminary Soil Investigation conducted to obtain data used to develop the ESI work plan
- Foundation investigations conducted by Soil Consultants, Inc.
- Well logs developed as part of this investigation

The lithologic logs prepared during the Preliminary Soil Investigation and the foundation investigations are included in Appendix VII. The well logs developed during this investigation are included in Appendix VIII. The soil sample locations are shown on Figure 3, and the monitoring well locations are shown on Figure 4.

The lithologic descriptions show that the uppermost soil strata is composed entirely of fill. Except for locations in the area of the tidal zone adjacent to the Cooper River, the fill is primarily silt and sand with varying amounts of debris. In the area of the tidal zone, the fill is composed primarily of clay. The fill overlies native fine grained sediments deposited in a former tidal marsh/shallow fluvial environment. These sediments are soft, plastic, and cohesive.

Field evaluation of these sediments identify them as clay containing varying amounts of silt and sand. However, a sieve analysis of a sample collected from 9 to 11 feet below land surface at the location of S-1, shown on Figure 4, shows that the soil is a clayey sandy silt. Permeability of the sample, which was collected in a shelby tube, was

measured to be 1.0×10^{-7}. This low permeability confirms that this unit is an aquitard. A copy of the sieve and permeability analyses are included in Appendix IX.

The lithologic descriptions were used to construct Figure 5, a structural contour map of the upper surface of the aquitard. This map was constructed using SURFER software which uses an equation to determine and smooth the surface which best fits the known data points. As a result, some contouring errors occur in areas of missing data and near the edges of the contoured area, such as in the northeast edge of Figure 5.

As shown by these figures, the thickness of the fill varies significantly across the site. Along the western border of the site, the thickness varies from approximately 4 to 12 feet. The 12-foot thickness occurs in the area of the drainage easement and may be related to the former presence of a creek in this area. From the western edge of the site, the fill generally thickens to the area of the present shoreline. Proceeding offshore, the fill thins and changes from primarily sand to clay.

Figure 5 identifies potential migration pathways where the sandy fill is relatively thick. DNAPL would tend to migrate into these "troughs" since it is heavier than water and will migrate to the bottom of an aquifer. One of the pronounced potential migration pathways generally parallels the drainage easement, the former location of a creek. At various times during the site history, the creek was likely dredged to a greater depth than the remainder of the site in order to accommodate ships at the wharves located along the southern edge of the site. Another "trough" where the sand thickens originates in the areas of GEL borings B-2 and D-3 and trends to the northeast.

The water table at the site is encountered at a depth 2 to 4 feet below land surface. Measurements of groundwater elevations in the groundwater monitoring wells installed as part of this study show that variations up to 0.20 foot can be caused by tidal influences. Figure 6 is a potentiometric surface map based on groundwater elevations measured in the 12 wells at the site. The overall flow indicated by these measurements is toward the Cooper River. While net groundwater flow toward the Cooper River is expected, the overall groundwater flow regime for the site is probably highly variable considering the inhomogeniaty of site soils and variations caused by tidal influences.

C. Area Groundwater Use

Within a 4-mile radius of the site, shallow groundwater is not used for drinking water, and there are no known private wells. Groundwater in aquifers below the Cooper Formation is used for industrial, irrigation, domestic, and community water supply. The only public supply wells within a 4-mile radius are located in Mount Pleasant, which is on

the opposite side of the Cooper River. Groundwater analysis by DHEC has not identified impact to these wells. These wells are part of the City of Mount Pleasant supply system which serves 31,746 people, as reported in DHEC's Site Screening Investigation.

Except for the Mount Pleasant, the public water supply in the Charleston area is provided by the Commissioners of Public Works of the City of Charleston. Their water is obtained from surface water sources upgradient of the site. The intake for over 90% of the water is the Edisto River, which is located over 30 miles from the site in a different drainage basin.

V. SAMPLING AND ANALYSIS

As part of the ESI, samples of potentially impacted media were collected and analyzed. These media included:

- Surface soil
- Subsurface soil
- Groundwater
- Surface water from the adjacent Cooper River estuary
- Sediment from the adjacent Cooper River estuary

The Certificates of Analysis for all of these analyses are included in Appendix X and summarized in Tables 3-13. A complete laboratory data package including Quality Assurance/Quality Control information has been submitted to the EPA and DHEC as a separate document.

Typically, ambient air samples would also be collected for laboratory analysis. However, the non-volatile nature of the contaminants indicates that there is not a significant potential for a vapor phase hazard to the site ambient air. Furthermore, the potential for ambient air impact from airborne dust is also unlikely since the site is vegetated. These conclusions are supported by the ambient air analyses performed by DHEC and Davis and Floyd on adjoining sites, and the analyses previously performed by GEL on the subject site. These analyses did not identify impact to ambient air on any of the sites. This conclusion is further supported by the relatively low contaminant concentrations identified in surface soils on the CHS as discussed below.

V.A - Surface and Subsurface Soil

During installation of the monitoring wells, soil samples were collected for laboratory analysis from nine locations at the site using the techniques described in Appendix VIII.

The locations are shown on Figure 4. Each soil sample location corresponds to the groundwater monitoring well with the same numeric designation. At each location, samples were collected at the following depth intervals.

LOCATION AND DEPTH INTERVALS OF SOIL SAMPLES

Sample	Land Surface	Water Table	Aquitard Interface	2'-5' Into Aquitard
S-1	0"-6"	3'-4'	7'-9'	13'-15'
S-3	0"-6"	3'-4'	9'-13'	17'-19'
S-4	0"-6"	3'-4'	11'-13'	15'-17'
S-6	0"-6"	3'-4'	12.5'-14'	18'-20'
S-8	0"-6"	3'-4'	19'-23'	26'-30'
S-9	0"-6"	3'-4'	13'-17'	23'-25'
S-10	--	3'-4'	10'-12'	--
S-11	--	3'-4'	27'-31'	--
S-12	--	3'-4'	13'-15'	19'-21'

These locations and depth intervals were selected to provide data on the vertical and horizontal extent of impact.

All of the samples were analyzed for the following:

- TCL Base/Neutral Extractable Compounds (BNs), including tentatively identified compounds (TICs) - PAHs are a subset of BNs
- Polychlorinated Biphenyls (PCBs)
- Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver

For the aquitard interface samples collected from locations S-1, S-3, and S-4, this list was expanded to include the complete TCL and Target Analyte List (TAL). The complete TCL and TAL includes volatile organic compounds, acid extractable compounds, herbicides, pesticides, cyanide and a comprehensive list of metals. This expanded parameter list was chosen for these locations to identify the nature of the contaminants migrating onto the site.

The results of these analyses are summarized in Tables 3-10, and the Certificates of Analysis with the Chain of Custody documents are included in Appendix X. Figures 7, 8, and 10 show the distribution in site soils of TCL PAHs, PCBs, and lead and mercury, respectively.

V.A.i - Surface Soil - 0"-6"

Analysis of the six surface soil analyses, summarized in Table 3, did not detect PAHs identified by the earlier studies on the subject site and surrounding sites. One TIC, 2-pentanone-4-hydroxy-4-methyl, was identified in five of the surface soil samples. This compound was also detected in the laboratory blank and is believed to be a laboratory contaminant introduced in the sample extraction process. Therefore, it is not included on the summary table.

PCBs were identified at four locations; the concentrations detected were all approximately 1 ppm or less except for location S-1 where 88.8 ppm was detected. No other organic compounds were identified.

Table 3 also summarizes the metals detected in surface soils. This table includes the concentrations detected in two background surface soil samples analyzed by DHEC as part of the SSI performed at the adjoining site. This table shows that the metals concentrations detected are comparable to background concentrations except for arsenic and mercury. Furthermore, the concentrations of arsenic detected are all below 9 ppm and are not significantly elevated above typical naturally occurring concentrations in soils. However, the concentrations of mercury detected are greater than typical natural concentrations and may be related to the former industrial activities on the site and surrounding sites.

These results show that surface soil on the site is not as impacted as on surrounding sites – probably as a result of the more recent filling of this site compared to nearby sites. These findings provide additional evidence that there is no apparent potential vapor phase hazard under ambient conditions.

V.A.ii - Soil at the Water Table (3'-4')

The analyses of nine soil samples collected at the water table, summarized in Table 4, detected impact from PAHs at five of the locations, S-1, S-9, S-10, S-11, and S-12. The presence of these compounds at the water table, considered with their absence at land surface (0"-6"), demonstrates that the impact is migrating to the site in the groundwater and suggests that it was not present in the soil used to fill the site surface. When the site was a marsh/open water prior to filling, impact could also have migrated into these deeper sediments from surface water runoff from the surrounding sites.

PCBs were detected at a concentration of 225 ppm in the sample collected from S-1. Considered with the 88.8 ppm PCBs detected in surface soil at this location, a release of PCBs apparently occurred near S-1.

The results of the metals analyses are summarized in Table 6. Elevated concentrations of arsenic, barium, and lead were detected at the location of S-10. Most significant among these was the elevated concentration of lead. An elevated lead concentration was also detected at S-9. Potentially elevated concentrations of mercury were also detected.

V.A.iii - Soil at the Interface with the Uppermost Aquitard

PAHs were detected in six of the nine samples collected at the interface between the surface soil and the uppermost aquitard. As summarized in Table 5 and illustrated by Figure 7, the highest concentrations were detected at S-1, S-9, and S-12. Intermediate concentrations were detected at S-3, S-6, and S-11. No PAHs were detected at S-4, S-8, and S-10.

This contaminant distribution suggests that there are two primary migration pathways onto the site for organic compounds typical of coal tar. These are: 1) in groundwater entering the site along the northwestern border, and 2) in groundwater which infiltrates the stormwater piping system that passes through the site along the drainage easement. The area south of the drainage easement does not appear to be significantly impacted by PAHs.

As summarized in Table 7, analysis for TCL VOCs in samples S-1, S-3, and S-4 detected impact in all three samples. The impact in S-1 shows that VOCs are present in site soils in the northwest corner of the site. However, the VOCs are at a relatively low concentration compared to the PAHs indicating that impact from PAHs is more severe than from VOCs. The primary VOC compounds detected are mononuclear aromatic hydrocarbons such as benzene, toluene, ethylbenzene, and xylene (BTEX), and dinuclear aromatic hydrocarbons such as indene and benzofuran. These compounds are coal distillates and are commonly found at MGPs.

Except for 97.5 ppb xylene detected in S-3, the compounds detected in S-3 and S-4 are methylene chloride and acetone. Methylene chloride was also detected in laboratory method blanks and acetone was detected in the field and trip blanks collected with the groundwater samples. These occurrences indicate that these compounds are the result of laboratory interferences and are not representative of site conditions. The presence of xylene in S-3 may be related to the former MGP although xylene is common in many fuels and solvents.

The results of the metals analyses are summarized in Table 8. Concentrations of some metals, such as arsenic, appear to be elevated over typical naturally occurring

concentrations. However, the concentrations detected do not appear to be significantly elevated compared to those commonly found at industrial sites.

V.A.iv - Soil 2'-5' Into the Uppermost Aquitard

As summarized by Table 9 and illustrated by Figure 7, PAHs penetrate the uppermost aquitard. Compared to the concentrations detected at the interface with the aquitard, the concentrations detected below the interface were:

- Significantly lower at S-1 and S-6
- Comparable at S-3 and S-9
- Higher at S-12

Consistent with analyses at other depths, no impact was detected at the locations of S-4 and S-8.

The greater penetration at S-12 may result from the presence of a DNAPL at this location since the higher density of free product may promote penetration of the aquitard. These findings demonstrate that the aquitard retards, but does not prevent, the downward migration of contaminants. However, considering that the uppermost aquitard extends approximately 70 feet to the Cooper Formation, which is over 200 feet thick, it can be concluded that on the CHS contaminants will not penetrate these aquitards and migrate into lower aquifers.

The results of the metals analyses are summarized in Table 10. Evaluation of these results does not identify any significantly elevated metals concentrations compared to typical naturally occurring ranges of concentrations.

V.B - Groundwater

To obtain data on the extent and severity of groundwater impact on the site, 12 shallow groundwater monitoring wells were installed at the locations shown on Figure 4. The well construction details, including lithologic logs, monitoring well schematics, and latitude and longitude coordinates, are included in Appendix VIII.

In each well, the bottom of the screen was set approximately 1 foot into the aquitard and screened upwards into the fill where impact would be most concentrated. A 2-foot sump was installed below the screen in each well to collect sediment and any DNAPL free product which infiltrated the well.

An effort was made to screen each well above the water table to detect light non-aqueous phase liquids (LNAPL). However, the water table in most locations is less than 3 feet below land surface making it difficult to set the screen above the water table and still

maintain well integrity. Therefore, the top of the screen is slightly below the water table in some wells. However, as shown by the analyses discussed below, there are no indications that LNAPLs are present at the site.

The wells were developed and sampled as described in Appendix XI. Free product was not detected in any well except for MW-12. Approximately 2.5 inches of a black viscous DNAPL were identified in the sump of this well; therefore, it was not developed and samples of product were collected on September 4, 1992, and September 15, 1992. These samples were combined for laboratory analysis. When all of the wells were rechecked for the presence of DNAPLs on September 28, 1992, no measurable thickness of product was detected in MW-12 although product residue was noted on the tip of the probe. No product was detected in any of the other wells. These findings show that free product is present in only small quantities along a limited area of the northern boundary of the site.

Groundwater (or product in the case of MW-12) from each well was analyzed for the following:

- TCL BN (including TICs) - PAHs are a subset of BNs
- PCBs
- Total Dissolved Solids (TDS)
- Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver

The analysis of groundwater samples collected from wells MW-1, MW-2, MW-3, and MW-4 was expanded to include the complete TCL and TAL. This expanded parameter list was chosen for these locations to identify the nature of the contaminants migrating onto the site. The results of these analyses are summarized on Tables 7, 11, and 12, and the Certificates of Analysis are included in Appendix X with Chain of Custody documents. Figures 7-10 illustrate the distribution of various parameters in groundwater.

The concentration of TDS in water provides a measure of the overall quality and suitability of water for use as potable water. Some concentrations and standards for TDS, and the average and range of TDS concentrations detected at the CHS are:

Concentration, ppm	Media/Regulatory Limit
10,000+	Saline Water
1,000-10,000	Brackish Water
500	Safe Drinking Water Act (SDWA) Secondary Maximum Contaminant Level
3,288	Average TDS in CHS Groundwater
1,100-8,030	TDS Range in CHS Groundwater

As demonstrated by this information, the TDS at the CHS is typical of brackish water and is far in excess of the SDWA limit for TDS. This finding is consistent with the site being located on fill overlying a former salt marsh and bordering a saltwater river. Examination of the TDS concentrations in each well, shown on Table 9, shows that the impact is not related to a contaminant source but rather is representative of natural conditions; in fact, the highest TDS concentration was detected in MW-4 where analyses have not identified significant impact.

Considering this information, the groundwater in the uppermost aquifer at the CHS is not a potential potable water source because of its brackish nature. The EPA standard for designating groundwater non-potable based on TDS is 10,000 ppm. However, this is not a realistic standard considering the SDWA limit and historical area groundwater use. Historically, wells on the Charleston Peninsula, especially in proximity to tidal rivers, have been drilled to aquifers below the Cooper Formation because of the poor water quality in the uppermost aquifer. Therefore, SDWA standards and South Carolina Class GB standards should not be applicable to groundwater in the uppermost aquifer underlying the site.

Figure 7 shows the total concentration of PAHs in the groundwater samples as well as in the soil samples. Figure 9 is an isoconcentration map of total PAHs. Consistent with the soil samples, this figure illustrates that:

- Contaminant concentrations are greatest in the northwestern portion of the site closest to the former MGP.
- The area of the drainage easement is a preferential migration pathway as demonstrated by the impact detected in wells MW-3 and MW-9.
- Impact from PAHs has not occurred in the southern portion of the site or directly across the street from the former Fernoline Chemical Company where creosoting operations are thought to have occurred.

This distribution of contaminants indicates that the primary source of impact from PAHs to the CHS is the former MGP. This conclusion is based on the presence of the greatest impact located proximal to the MGP and the absence of impact located adjacent to the former Fernoline Chemical Company.

Evaluation of metals detected in groundwater, summarized in Table 12, shows that only lead and mercury concentrations appear to be elevated. Figure 10 illustrates the distribution of these elements in groundwater; it shows that lead concentrations are elevated in wells MW-3, MW-9 and MW-10, and mercury concentrations are elevated in well MW-10. The concentrations detected in these wells are higher than those detected in wells closer to the former MGP indicating that the former MGP is not the source of these elevated metals.

The presence of elevated lead in wells MW-3 and MW-9, located along the drainage easement, indicates that the impact may be related to surface water runoff. Considering the history of the area, a potential source of lead is marine paints used at the former ship building and repair industry that operated on the CHS and adjacent properties to the south of the CHS. Another source of lead likely to have contributed to the elevated concentrations in MW-3 and MW-9 is non-point source runoff from roadways. Elevated lead concentrations are common along roadways because of the former use of lead additives in gasoline.

PCBs were detected in groundwater samples collected from MW-7 and MW-10 at concentrations of 1.23 and 4.91 ppb, respectively. The source of these PCBs in not evident, the concentrations are relatively low, and the occurrences appear to be isolated.

Significant concentrations of VOCs were not detected in the analyses of MW-1 through MW-4, although mononuclear aromatic hydrocarbons were detected in MW-1 and MW-3. However, as shown by Table 7, the maximum concentration of any of these compounds was 71.3 ppb of xylene detected in MW-1. Toluene was detected in MW-2 and MW-4 at concentrations which are not indicative of significant impact. Odors similar to turpentine were noted in soils and groundwater from MW-4. However, the compounds causing these odors were not identified.

V.C - Surface Water and Sediment

Surface water samples SW-1 through SW-3 and sediment samples SD-1 through SD-4 were collected from the Cooper River to provide an indication of the significance of impact to the river in the vicinity of the CHS. The sample locations are shown on Figure 4

- No impact from PAHs was identified at SD-3. This sample was collected less than 125 feet from the northern edge of the site and nearer to the former MGP than any of the other samples. If significant impact were migrating to the river via groundwater discharges or overland surface water runoff, it would be reasonable to expect that this sample would have been impacted.

Evaluation of metals and PCB data identifies the following:

- The highest concentrations were detected in SD-2, collected in the discharge area of the outfall from the drainage easement. In fact, sediments in the area of the drainage outfall are the only area where PCBs were detected.
- The lead concentrations in SD-2 are over twice as high as any detected in soils at the CHS during this study. With few exceptions, the concentrations of arsenic, chromium, mercury, and PCBs are also higher than those detected in soils collected from the CHS.
- Lead was detected in SW-2 and SW-3. Like the sediment samples collected at these locations, lower lead concentrations were detected at SW-3.

These observations show that metals and PCBs, especially lead, are discharging to the river through the drainage easement. The elevated concentrations of metals and PCBs in SD-2 compared to soils on the CHS indicate that the source of metals is not the CHS; rather, these contaminants probably originate from runoff in other portions of the drainage basin which discharge through the outfall on the CHS.

The presence of lead in the SD-3/SW-3 sample, where no PAHs were detected, further indicates that the metals impact is not caused by the MGP. The metals detected at this location are likely related to surface water runoff from the adjacent Luden's Marine site where ship repair is performed.

VI. EXPOSURE PATHWAYS

The evaluation performed as part of this and earlier investigations of the site and surrounding sites provides significant data to evaluate potential exposure pathways to the contaminants present on the CHS. Potential human exposure pathways to environmental contaminants are through:

- Ingestion of impacted soils, water, or impacted foods
- Inhalation of impacted air
- Dermal exposure to contaminants contained in soils or water

Significant potential environmental exposures from site contaminants would be through discharges to the adjacent Cooper River estuary.

except for location SD-4 which is shown on Figure 1. Relative to net flow in the river, the locations are:

SD-1/SW-1	Immediately downstream and adjacent to the southern edge of the CHS
SD-2/SW-2	Adjacent to the CHS in the discharge area of the outfall from the drainage easement at the CHS
SD-3/SW-3	Approximately 125 feet upstream from the northern edge of the CHS
SD-4	3/4 mile downstream from the site

The sample collection procedures are described in Appendix XII.

All of the samples were analyzed for:

- TCL BN (including TICs) - PAHs are a subset of BNs
- PCBs
- Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver

The results of these analyses are summarized in Table 13, and the Certificates of Analysis are included in Appendix X.

Table 13 shows that the highest concentration of PAHs in sediments were detected in the downstream sample, SD-1. Lower concentrations were detected at the drainage outfall, SD-2, and no PAHs were detected in the upstream sediment sample, SD-3, or in SD-4, located 3/4 mile downstream of the site.

Organic compounds typical of the impact on the CHS and surrounding sites were not detected in any surface water sample except SW-2. The presence of low concentrations of naphthalene and 2-methylnaphthalene in this sample indicates that impacted groundwater from either the CHS site and/or sites inland of the CHS is discharging to the river along the drainage easement.

These findings show that discharges from the area of the CHS are impacting river sediments in front of and at least a short distance downstream of the site. The distribution of compounds indicates that the primary migration pathway to the river is via discharges from the drainage easement. This conclusion is based on the following:

- The highest contaminant concentrations were detected in SD-1 which was collected near the southern end of the site where no impact from PAHs has been identified in the subsurface soils or groundwater. This shows that the impact in SD-1 was not the result of impacted groundwater seeping into the river; instead, it must have resulted from inland sources discharging to the river through the stormwater drain.

- Surface water discharging through the drainage easement contained low concentrations of PAHs.

As discussed in section V.A.i, surface soils (0"-6") on the CHS are not significantly impacted by organic contaminants with the exception of localized occurrences of PCBs. Except for mercury, concentrations of metals detected in surface soils at the CHS are comparable to background concentrations or typical naturally occurring concentrations.

An acceptable concentration of mercury in soils can be calculated from the Referenced Verified Dose (RfD) of mercury. Based on the RfD of 0.0003 mg/kg/day for mercury, a 16 kilogram child could ingest 0.2 grams per day for five years of soil impacted with up to 24 mg/kg of mercury without exceeding the RfD. The assumption that a child would consume 0.2 grams per day is conservative and is based on the amount of soil an unusually active (pica) child would consume. The highest concentration of mercury detected in the soil samples collected at the CHS is 1.37 mg/kg – far less than 24 mg/kg. Therefore, the elevated concentrations of mercury on the site do not pose a health risk.

Since access to the site is restricted, there is no present threat from soil exposure to the public from the localized PCBs in surface soils. However, based on the presence of significant soil impact in the subsurface, individuals involved with excavation activities at the site should be properly trained to avoid prolonged exposure to the subsurface soils.

Ambient air impact is not a potential exposure pathway from the contaminants on the CHS because:

- Widespread surface soil impact is not present
- The primary contaminants identified are non-volatile
- The site is covered with vegetation, thereby minimizing airborne dust

Previous evaluations of open excavations on the CHS have not identified a vapor phase hazard. However, periodic ambient air monitoring should be performed during excavation activities in areas of the site where significant subsurface impact has been identified.

Exposure to site contaminants through ingestion of groundwater is not a potential exposure pathway since the groundwater in the uppermost aquifer is not potable. The brackish groundwater is believed to be caused by the salinity of the adjacent Cooper River and by the native soils which were part of a saltwater estuary until filled. Therefore, there is no significant potential for the groundwater in the uppermost aquifer to ever be used as a potable water source. The occurrence of an over 250 feet thick aquitard between the uppermost aquifer and deeper usable aquifers will also prevent migration of contaminants to these deeper aquifers.

There is also not a potential for contaminants to migrate to the surface water intakes of drinking water supply systems. There are no intakes downstream or in a tidally connected upstream location from the CHS.

Earlier studies have identified elevated concentrations of contaminants in oysters and blue crabs collected in the Charleston Harbor as summarized in the SSI performed by DHEC and included in Appendix III. Ingestion of oysters and blue crabs which bioaccumulate contaminants is a potential exposure pathway. However, the earlier studies do not provide adequate data to identify the source of the contaminants.

Moreover, the PAHs found on the CHS and surrounding sites are common to many products such as creosote timbers used in marine docks and fuel oils. The common occurrence of these compounds suggests that the contaminants detected in the organisms likely originate from many sources. However, regardless or whether these occurrences are caused even in part by the impact on the CHS, efforts to minimize continuing discharges to the river would be appropriate.

VII. MITIGATION AND CONTAINMENT

Based on the extent and nature of the contaminants detected at the CHS site, remediation of the entire site is neither feasible nor warranted. Elimination of widespread, relatively low concentrations of PAHs from an inhomogenous and largely fine-grained matrix is not technically feasible. However, consistent with EPA policy, it is appropriate to take measures to contain and mitigate the impact. Performing mitigation and containment activities can 1) minimize potential future exposures and 2) minimize migration of additional contaminants on to and off the site.

This investigation has confirmed that the area of the drainage easement is a preferential migration pathway for contaminants – most of which apparently originate from off-site sources. Closing this drainage way would minimize discharges of contaminants to the Cooper River. The City of Charleston is presently in the process of rerouting this drainage as part of a project intended to eliminate flooding of Calhoun Street and other nearby areas. This project includes removing the stormwater piping from the CHS. Completion of this project will substantially reduce the discharge of contaminants to the Cooper River.

Other potential mitigation and containment mechanisms will be determined as part of subsequent studies. Regardless of the mechanism chosen, a primary consideration will be evaluating and controlling the source of the impact, which is located on an adjoining site.

VIII. CONCLUSIONS

This ESI provides a significant volume of detailed information about the history and environmental condition of the CHS. The data shows that the soils and groundwater of

portions of the site are impacted – but to a lesser extent than that found on some surrounding sites. This variation in severity is likely related to: 1) the relatively recent filling of the CHS compared to adjoining sites, 2) the relatively limited industrial use of the site, and 3) the short duration of site use.

The field and analytical data support the conclusion that the contaminants on the site do not present a significant threat to human health. Exposure to isolated areas of significantly impacted surface soil and to contaminants while performing subsurface excavations are the only potential exposure pathways on the site. Furthermore, the exposures in these cases represent a chronic risk rather than an acute risk.

Use of groundwater as a present or future potable water source is also not a consideration at the CHS because of the naturally brackish nature of the uppermost aquifer. The contaminants present in the uppermost aquifer also will not migrate to usable aquifers due to the presence of over 250 feet of impermeable strata between the uppermost aquifer and potable water aquifers. This conclusion assumes that significant volumes of additional contaminants do not migrate to the CHS from surrounding sites.

The City of Charleston's removal of the stormwater drain system, which is the primary contaminant migration pathway to the Cooper River, will substantially reduce migration of contaminants to the Cooper River. Additional containment and remediation measures, which will be identified and implemented in future activities, will further protect the environment from discharges. To maximize the success of these measures, the source of impact must be controlled or eliminated. Since the source of the impact is on an adjoining site, these additional activities should be coordinated with the parties responsible for the adjoining sites.

As acknowledged by the EPA, complete removal of DNAPLs such as PAH compounds from fine grained soils is not technically feasible using presently available technologies. However, in the event that remediation of the site becomes necessary in the future, emerging technologies which show promise, such as in-situ bioremediation, could be employed. These technologies remediate impacted materials in place, do not require significant excavation, and do not interfere with normal site activities.

TABLE 1

CHAIN OF TITLE - DOCKSIDE II

Page 1

DEED REFERENCE	GRANTOR	GRANTEE	DATES OWNED BY GRANTEE	COMMENTS
H160,661	George E. Campsen, Jr.	United States	12/18/86 to	Conveyance of Tract B consisting of 4.15 acres high land and 3.48 acres submerged land. Use of residual tract retained by Grantor limited to food service, gift shop, lounge, dwelling unit and admin-istrative offices.
C151,288	William J. Detyens	George E. Campsen, Jr.	Tract A 1/15/86 to present Tract B 1/15/86 to 12/18/86	Conveyance of 4.81 acres high land and 4.1 acres submerged land.
C151,283	Deytens Shipyard, Inc.	William J. Detyens	1/15/86 to 1/15/86	Conveyance of 4.81 acres high land and 4.1 acres submerged land.
H93,383	Edward K. Pritchard, et al	Detyens Shipyard, Inc.	9/30/69 to 1/15/86	19.036 acres plus certain personal property described in Deed P72, 199.

TABLE 1 (cont.)

CHAIN OF TITLE - DOCKSIDE II

DEED REFERENCE	GRANTOR	GRANTEE	DATES OWNED BY GRANTEE	COMMENTS
H92,282	Edward K. Pritchard, et al	Detyens Shipyard, Inc.	9/30/69 to 1/15/86	19.036 acres plus certain personal property described in Deed P72, 199.
P72,199	United States	Edward K. Pritchard, et al	1/24/61 to 9/30/69	19.036 acres plus personal property constituting the Naval Industrial Reserve Shipyard.
Order of District Court dated 5/14/57 Case #5487	Charleston Shipbuilding and Drydock Company, et al	United States	5/14/57 to 1/24/61	17.11 acres and miscellaneous buildings.
C38,15	Matthew A. McLaughlin, Jr., Master	Charleston Drydock Company	8/7/34 to 5/14/57	Master's Deed. In this Deed two separate tracts described as "Parcels I and II" and "Parcel XII" are merged. The resultant property as merged encompasses the subject property. "Parcels I and II" are described in Plat Book C, Page 3. "Parcel XII" is described in Plat Book A, Page 120. Hereafter, separate title chains will be traced for "Parcels I and II" and "Parcel XII" as described in Deed C38, 15.

TABLE 1 (continued)
PARCELS I AND II

DEED REFERENCE	GRANTOR	GRANTEE	DATES OWNED BY GRANTEE	COMMENTS
R29, 72	Valk and Murdoch Co.	Charleston Drydock and Machine Co.	10/22/19 to 8/7/34	Conveys business assets and buildings.
Y25, 617	Charles V. Boykin	Valk and Murdoch Co.	4/23/14 to 10/22/19	No indications as to use or personal property conveyance.
Y25, 420	William H. Mixson	Charles V. Boykin	1/9/14 to 4/23/14	Conveys buildings and improvements known as "Vennings Wharf".
Y25, 111	Charleston Basket and Veneer Mfg. Co.	William H. Mixson	5/25/11 to 1/9/14	No indications as to use or personal property conveyance.
F23,79	G. H. Sass, Master	Charleston Basket and	1/20/98 to 5/25/11	Master's Deed. No indications as to use or personal property conveyance.

TABLE 1 (cont[illegible]d)

PARCEL XII

DEED REFERENCE	GRANTOR	GRANTEE	DATES OWNED BY GRANTEE	COMMENTS
K29, 449	Interstate Land Holding Co.	Charleston Drydock and Machine Co.	7/12/20 to 8/7/34	No indication as to use or personal property conveyance.
W27, 577	Fredrick Ayer	Interstate Land Holding Co.	5/28/17 to 7/12/20	No indication as to use or personal property conveyance.
L21, 319	Feroline Chemical Co.	Fredrick Ayer	3/3/92 to 5/28/17	Includes machinery, buildings, tanks and other personal property on the premises.
XN20, 763	George C. Moore	Feroline Chemical Co.	5/8/87 to 3/3/92	Deed not reviewed.

TABLE 2
SUMMARY OF PREVIOUS ASSESSMENT ACTIVITIES

December 1987 - Clark G. Reynolds - CHS - "Historical Study, Fort Sumter National Monument, Dockside II" - research of site and area history

November 1988 - Soil Consultants, Inc. - Calhoun Park - geotechnical borings for proposed stormwater pump station

March 1989 - Soil Consultants, Inc. - Calhoun Park - geotechnical borings for proposed stormwater pump station, one soil sample analyzed by Davis and Floyd

March 1989 - Soil Consultants, Inc. - CHS - geotechnical borings

April 1989 - Soil Consultants, Inc. - CHS - geotechnical borings

September 1989 - Davis and Floyd, Inc. - "Calhoun Park Site Investigation Report, Health Hazard Assessment" - near surface and shallow subsurface soil screening and lab analysis

November 1989 - Davis and Floyd, Inc. - CHS - two shallow soil samples analyzed for Appendix IX parameters

April - May 1990 - Soil Consultants, Inc. - CHS (Aquarium portion) - geotechnical borings

November 1990 - Chen Northern, Inc. - CHS - "Environmental Site Investigation" - 14 shallow soil samples analyzed

December 1990 - Davis and Floyd, Inc. - "Ansonborough Homes, Preliminary Soils Investigation" - surface and shallow subsurface soils screened with field organic vapor meter and 27 shallow subsurface soils analyzed

December 1990 - Davis and Floyd, Inc. - "Initial Groundwater Investigation for the Calhoun Park/Ansonborough Homes Sites," - six shallow groundwater wells installed and samples analyzed

April 1991 - Keystone Environmental Resources, Inc. - SCE&G site - "Work Plan, Phase I Investigation, Soil and Groundwater, Former Manufactured Gas Plant Site, Charlotte Street" - surface soil sample results and plan for soil and groundwater sampling and analysis

April 1991 - Soil Consultants, Inc. - CHS (Aquarium portion) - seven test pits to observe debris thickness

May 1991 - Chen Northern, Inc. - CHS - "Preliminary Assessment Report" - evaluates release pathways

August 1991 - Davis and Floyd, Inc. - "Health Risk Assessment for Calhoun Park/Ansonborough Homes Site" - surface soil, surface water, and air analyses

TABLE 2 (CONTINUED)

SUMMARY OF PREVIOUS ASSESSMENT ACTIVITIES

August 1991 - South Carolina Department of Health and Environmental Control - "Preliminary Assessment Report - Calhoun Park/Ansonborough Homes" - research of site history and summary of available data

October 1991 - General Engineering Laboratories - CHS (Aquarium portion) - analysis of subsurface soil and air samples in preparation for execution of a test pile program

January 1992 - General Engineering Laboratories - CHS (Aquarium portion) - "Safety Training Program" - safety training for pile driving personnel

June 1992 - South Carolina Department of Health and Environmental Control - "Site Screening Investigation, Calhoun Park/Ansonborough Homes/ Coal Gas" - analysis of surface soil, surface water, sediment, groundwater, and air samples

July 1992 - General Engineering Laboratories - "Expanded Site Inspection Plan" - plan for executing the Expanded Site Inspection including findings of Preliminary Site Inspection

TABLE 3 - ANALYTES DETECTED IN SURFACE SOIL (0" TO 6")*

Charleston Harbor Site
Charleston, South Carolina

ANALYTE	S-1**	S-3	S-4	S-6	S-8	S-9	Control*** SS-01	Control SS-02
PCB-1248, µg/kg	88800	U	U	U	1050	U	U	U
PCB-1254, µg/kg	U	U	U	494	U	181	U	U
PCB-1260, µg/kg	U	U	U	479	U	216	U	U
arsenic, mg/kg	8.82	4.99	5.75	4.72	7.84	8.12	U	0.99
barium, mg/kg	51.3	40.8	34.4	17.6	33.2	35.5	U	62
cadmium, mg/kg	0.412J	U	U	U	U	0.789J	U	U
chromium, mg/kg	27.7	201	10.3	14.7	21.8	28.1	600	9
mercury, mg/kg	1.02	0.248	U	U	0.585	0.835	U	U
lead, mg/kg	137	146	7.27	109	121	151	82	150
Total B/N TICs†	0	0	0	0	0	0	--	--

-- = Not Analyzed
U = Not Detected

* No Target Compound List Base/Neutral compounds, including Polynuclear Aromatic Hydrocarbons, were detected in surface soil.

** Soil sample locations correspond to monitoring well locations. For example, S-1 was collected at the location of well MW-1.

*** Control concentrations taken from DHEC's "Site Screening Investigation" which is included as Appendix IV.

† Base Neutral Extractable Tentatively Identified Compounds (PAHs are a subset of B/N)

TABLE 4 - ORGANIC COMPOUNDS DETECTED IN SOIL AT THE WATER TABLE (3'-4')

Charleston Harbor Site, Charleston, South Carolina
Concentrations in µg/kg

	S-1*	S-3	S-4	S-6	S-8	S-9	S-10	S-11	S-12
ANALYTE	3'-4'	3'-4'	3'-4'	3'-4'	3'-4'	3'-4'	3'-4'	3'-4'	3'-4'
PCB-1248	225000	U	U	U	U	U	U	U	U
2-methylnaphthalene	1980J	U	U	U	U	U	U	U	U
benzo(a)pyrene	3830	U	U	U	U	U	U	U	U
acenaphthene	U	U	U	U	U	30200	U	U	U
anthracene	2410J	U	U	U	U	27000	U	11200J	U
chrysene	4400J	U	U	U	U	U	U	U	U
dibenzofuran	529J	U	U	U	U	17500	U	U	U
fluoranthene	U	U	U	U	U	52400	3250J	11200J	U
fluorene	2230J	U	U	U	U	27000	U	U	U
indeno(1,2,3-c,d)pyrene	1600J	U	U	U	U	U	U	U	U
naphthalene	1680J	U	U	U	U	17500	U	U	U
phenanthrene	6760	U	U	U	U	90500	U	11200J	U
pyrene	7820	U	U	U	U	42900	2850J	9640J	U
Total B/N TICs**	0	80392	4472	34136	60975	39682	0	28916	7390
TOTAL TCL PAHs DETECTED***	18410	0	0	0	0	305000	6100	43240	0
								0	
J= Estimated Concentration									
U= Not Detected									
* Soil sample locations correspond to monitoring well locations. For example, S-1 was collected at the location of well MW-1.									
** Base/Neutral Extractable Tentatively Identified Compounds (PAHs are a subset of B/N)									
*** Target Compound List Polynuclear Aromatic Hydrocarbons									

TABLE 5 - METALS DETECTED IN SOIL AT THE WATER TABLE (3'-4')

Charleston Harbor Site
Charleston, South Carolina
Concentrations in mg/kg

	S-1*	S-3	S-4	S-6	S-8	S-9	S-10	S-11	S-12
ANALYTE	3'-4'	3'-4'	3'-4'	3'-4'	3'-4'	3'-4'	3'-4'	3'-4'	3'-4'
arsenic	8.60	2.70	4.92	6.97	6.18	9.73	37.8	10.3	10.4
barium	34.6	18.8	43.5	34.1	14.6	43.8	329	16.7	19.1
cadmium	0.194J	U	0.188J	0.083J	U	3.01	1.90J	U	U
chromium	21.5	11.7	7.17	10.1	8.97	37.7	21.1	28.6	7.14
lead	77.5	15.3	89.7	34.6	4.57	340	539	19.6	5.69
mercury	0.213	0.014J	0.19	0.05	0.043J	0.486	0.159	1.37	0.01
selenium	U	U	U	5.11J	3.15J	2.70J	U	U	U

J - Estimated Concentration
U - Not Detected
* Soil sample locations correspond to monitoring well locations. For example, S-1 was collected at the location of well MW-1.

TABLE 6 - SEMI-VOLATILE ORGANIC COMPOUNDS LIST DETECTED IN SOIL AT THE INTERFACE WITH THE UPPERMOST AQUITARD

Charleston Harbor Site, Charleston, South Carolina
Concentrations in µg/kg

ANALYTE	S-1* 7'-9'	S-3 9'-13'	S-4 11'-13'	S-6 12.5'-14'	S-8 19'-23'	S-9 13'-17'	S-10 10'-12'	S-11 27'-31'	S-12 13'-15'
PCB-1248	U	U	U	U	U	U	141	U	54500
2-methylnaphthalene	565000	U	U	U	U	31400	U	U	13600
acenaphthene	268000	U	U	U	U	27500	U	U	5440J
anthracene	623000	5230J	U	U	U	24000	U	4320	U
benzo(a)anthracene	471000	U	U	U	U	U	U	U	8840
benzo(a)pyrene	457000	6410	U	U	U	U	U	U	6800
benzo(b)fluoranthene	406000	U	U	U	U	U	U	U	4080
benzo(ghi)perylene	123000	U	U	U	U	U	U	U	U
benzo(k)fluoranthene	304000	U	U	U	U	U	U	U	U
chrysene	406000	U	U	U	U	U	U	U	U
dibenzofuran	428000	U	U	U	U	19600	U	U	4760J
fluoranthene	1010000	9800	U	10500	U	35300	U	U	19000
fluorene	652000	5840	U	4300J	U	27500	U	U	8840
indeno(1,2,3-c,d)pyrene	101000	U	U	U	U	U	U	U	U
naphthalene	1300000	11100	U	11800	U	47100	U	U	46900
phenanthrene	1680000	17000	U	U	U	72500	U	3700	U
pyrene	841000	9150	U	13400	U	31400	U	U	16300
Total B/N TICs**	0	0	10798	0	0	100975	23076	3086	21088
TOTAL TCL PAH DETECTED***	9635000	64530	0	40000	0	316300	0	8020	134560
U= Not Detected									

* Soil sample locations correspond to monitoring well locations. For example, S-1 was collected at a depth 7'-9' below land surface at the location of well MW-1.

** Base/Neutral Extractable Tentatively Identified Compounds (PAHs are a subset of B/N)

*** Target Compound List Polynuclear Aromatic Hydrocarbons

TABLE 7 - VOLATILE ORGANIC COMPOUNDS DETECTED IN SOIL AT THE UPPERMOST AQUITARD AND IN GROUNDWATER

Charleston Harbor Site
Charleston, South Carolina
Concentrations in parts per billion†

ANALYTE	S-1* 7'-9'	S-3 9'-13'	S-4 11'-13'	MW-1	MW-2	MW-3	MW-4
acetone**	1040	454	590	111	140	183	623B
benzene	4720	U	U	36.2	U	10.6	U
carbon disulfide	U	U	U	U	5.75	U	U
ethylbenzene	1600	U	U	23.7	U	4.14J	U
methylene chloride**	337	150	125	14.5	17.1	25.9	15JB
styrene	492	U	U	U	U	U	U
toluene	4060	U	U	24.7	2.38J	22.2	4.10J
xylenes (total)	9570	97.5	U	71.3	U	41.8	U
Total VOC TICs***	26720	743	1428	445	105	190	230

J= Estimated Concentration

U= Not Detected

* Soil sample locations correspond to monitoring well locations. For example, S-1 was collected at a depth 7'-9' below land surface at the location of well MW-1.

** Methylene chloride was detected in the laboratory blank, field blank, and trip blank. Acetone was detected in the field blank and trip blank.

*** Volatile Organic Tentatively Identified Compounds

† ppb may be equated to µg/kg for soil samples and µg/l for groundwater samples.

TABLE 8 - METALS DETECTED IN SOIL AT THE INTERFACE WITH THE UPPERMOST AQUITARD

Charleston Harbor Site, Charleston, South Carolina
Concentrations in mg/kg

ANALYTE	S-1* 7'-9'	S-3 9'-13'	S-4 11'-13'	S-6 12.5'-14'	S-8 19'-23'	S-9 13'-17'	S-10 10'-12'	S-11 27'-31'	S-12 13'-15'
aluminum	7320	6990	3280	--	--	--	--	--	--
arsenic	16.3	7.24	7.55	7.07	4.98	6.29	6.16	14.8	19.0
barium	15.4	33.8	7.00	12.1	15.9	36.3	17.1	10.1	11.1
beryllium	0.619J	0.564J	0.422J	--	--	--	--	--	--
cadmium	U	U	0.0440J	0.043J	U	0.277J	0.050J	U	U
calcium	2940	10100	10100	--	--	--	--	--	--
chromium	15.5	15.1	10.3	9.73	8.74	8.73	7.36	17.6	19.0
cobalt	2.43J	2.35J	1.71J	--	--	--	--	--	--
copper	10.6	23	1.83J	--	--	--	--	--	--
iron	10700	11100	7810	--	--	--	--	--	--
lead	30.7	144	4.07	9.83	15.9	118	61.3	8.16	6.99
magnesium	2100	3030	2000	--	--	--	--	--	--
manganese	88.4	98.6	152	--	--	--	--	--	--
mercury	0.275	0.646	U	0.04J	0.020J	0.583	0.057J	U	0.0450J
nickel	5.11	5.75	2.94	--	--	--	--	--	--
potassium	1190	1450	1020	--	--	--	--	--	--
selenium	U	U	U	1.68J	1.07J	1.091J	0.473J	U	U
silver	U	0.0294J	U	--	--	--	--	--	--
sodium	2820	6120	1730	--	--	--	--	--	--
vanadium	22.3	18.8	11.4	--	--	--	--	--	--
zinc	25.6	29.7	11.3	--	--	--	--	--	--

J= Estimated Concentration
U= Not Detected
-- = Not Analyzed

* Soil sample locations correspond to monitoring well locations. For example, S-1 was collected at a depth 7'-9' below land surface at the location of well MW-1.

TABLE 9 - ORGANIC COMPOUNDS LIST DETECTED IN SOIL 2' TO 5' INTO THE UPPERMOST AQUITARD

Charleston Harbor Site, Charleston, South Carolina
Concentrations in µg/kg

ANALYTE	S-1* 13'-15'	S-3 17'-19'	S-4 15'-17'	S-6 18'-20'	S-8 26'-30'	S-9 23'-25'	S-12 19'-21'
PCB-1248	1560	U	U	U	0.185J	U	U
2-methylnaphthalene	U	U	U	U	U	20600	14600
acenaphthene	U	U	U	U	U	16400	2860J
anthracene	4490	4940	U	U	U	16400	11100
benzo(a)anthracene	U	U	U	U	U	13200	9720
benzo(a)pyrene	U	2660J	U	U	U	7940	6250
benzo(b)fluoranthene	U	30000	U	U	U	7410J	6940J
benzo(ghi)perylene	U	U	U	U	U	U	4860J
benzo(k)fluoranthene	U	U	U	U	U	7410J	U
chrysene	U	U	U	U	U	11600	6940
dibenzofuran	551J	3700	U	U	U	11100	7640
fluoranthene	2460J	9470	U	U	U	31200	25700
fluorene	U	4530	U	U	U	16400	11100
indeno(1,2,3-c,d)pyrene	U	U	U	U	U	U	U
naphthalene	1840J	13200	U	U	U	9520	70100
phenanthrene	3850J	15200	U	U	U	55000	35400
pyrene	2170J	7820	U	U	U	23300	21500
Total B/N TICs**	0	31685	3042	0	--	127493	19445
TOTAL TCL PAHs DETECTED***	15361	91520	0	0	0	247480	234710

J= Estimated Concentration
U= Not Detected
-- = Not Analyzed

* Soil sample locations correspond to monitoring well locations. For example, S-1 was collected at a depth 13'-15' below land surface at the location of well MW-1.

** Base/Neutral Extractable Tentatively Identified Compounds (PAHs are a subset of B/N)

*** Target Compound List Polynuclear Aromatic Hydrocarbons

TABLE 10 - METALS DETECTED IN SOIL 2' to 5' INTO THE UPPERMOST AQUITARD

Charleston Harbor Site
Charleston, South Carolina
Concentrations in mg/kg

	S-1*	S-3	S-4	S-6	S-8	S-9	S-12
ANALYTE	13'-15'	17'-19'	15'-17'	18'-20'	26'-30'	23'-25'	19'-21'
arsenic	14.4	4.80	3.74	6.20	8.81	8.59	14.2
barium	8.80	32.1	5.10	8.05	7.01	22.1	8.67
cadmium	U	U	0.065J	0.117J	U	U	U
chromium	17.1	9.47	8.05	13	12.3	9.39	15.6
lead	4.12	110	2.43J	4.16	3.48	61.0	4.81
mercury	U	0.814	U	0.014J	0.005J	0.262	0.013J
selenium	U	U	U	U	0.185J	0.593J	U
silver	U	0.130J	U	U	U	U	U

J= Estimated Concentrations

U= Not Detected

* Soil sample locations correspond to monitoring well locations. For example, S-1 was collected at a depth 13'-15' below land surface at the location of well MW-1.

TABLE 11 - ORGANIC COMPOUNDS LIST DETECTED IN GROUNDWATER AND FREE PRODUCT

Charleston Harbor Site, Charleston, South Carolina
Concentrations in µg/l

COMPOUND	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12*
1,2-dichlorobenzene	U	U	U	U	0.816J	U	U	U	U	U	U	U
1,4-dichlorobenzene	U	U	U	U	0.905J	U	U	U	U	U	U	U
2,4-dimethylphenol	U	U	10.5J	U	U	U	U	U	U	U	U	U
2-methylnaphthalene	480	U	130	U	7.0J	U	60	80	72	U	140	2160000
acenaphthene	240J	U	50J	U	21	76	110	60	109	U	130	773000
acenaphthylene	U	U	U	U	U	51	U	U	31	U	U	U
anthracene	U	U	50J	U	10	20	U	U	22	U	U	507000
dibenzofuran	195J	U	80J	U	4.56J	71	60	48J	53	U	44J	347000
fluoranthene	240J	U	80J	U	13	22	U	U	35	U	U	1040000
fluorene	240J	U	100	U	18	89	90	50	76	U	47	667000
naphthalene	2560	U	370	U	U	1130	90	570	240	U	290	2530000
phenanthrene	600	U	210	U	37	150	90	120	99	U	70	2050000
pyrene	240J	U	70J	U	12	18	120	U	26	U	U	1230000
benzo(a)anthracene	U	U	U	U	U	U	U	U	U	U	U	507000
benzo(a)pyrene	U	U	U	U	U	U	U	U	U	U	U	347000
benzo(ghi)perylene	U	U	U	U	U	U	U	U	U	U	U	187000J
benzo(k)fluoranthene	U	U	U	U	U	U	U	U	U	U	U	587000
chrysene	U	U	U	U	U	U	U	U	U	U	U	400000
indeno(1,2,3-c,d)pyrene	U	U	U	U	U	U	U	U	U	U	U	187000J
Total B/N TICs**	240	0	140	437	29	476	70	443	187	0	150	31997
TOTAL TCL PAHs DETECTED***	4795	0	1040	0	124	1627	620	928	763	0	724	13332000
PCB-1248	U	U	U	U	U	U	1.23	U	U	4.91	U	U

J= Estimated Concentration
U= Not Detected
* Sample of free product collected and analyzed from well MW-12.
** Base/Neutral Extractable Tentatively Identified Compounds (PAHs are a subset of B/N)
*** Target Compound List Polynuclear Aromatic Hydrocarbons

TABLE 12 - TARGET ANALYTE LIST PARAMETERS DETECTED IN GROUNDWATER AND FREE PRODUCT

Charleston Harbor Site, Charleston, South Carolina
Concentrations in mg/l

ANALYTE	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12*
aluminum	1.34	4.68	2.93	0.49	--	--	--	--	--	--	--	--
antimony	0.002J	0.003J	0.002J	0.002J	--	--	--	--	--	--	--	--
arsenic	0.003J	0.005	0.004J	0.006	0.001J	0.006	0.002J	0.02	0.004J	0.005	0.042	5.53
barium	0.279	0.303	0.458	0.09	0.218	0.235	0.137	0.272	0.408	0.266	0.137	14.9
calcium	145	267	327	178	--	--	--	--	--	--	--	--
cadmium	U	U	U	U	U	U	U	U	0.001J	U	U	0.230J
chromium	0.007J	0.011J	0.011J	0.006J	0.003J	0.010J	0.003J	0.031	0.021J	0.028J	0.010J	2.80
cobalt	U	0.002J	U	U	--	--	--	--	--	--	--	--
copper	0.017J	0.020J	0.024J	0.004	--	--	--	--	--	--	--	--
iron	40.3	22.7	34.9	4.00	--	--	--	--	--	--	--	--
lead	0.02	0.046	0.123	0.006	0.004J	0.01	0.002J	0.015	0.162	0.216	0.007	24.1
magnesium	13.7	85.6	188	327	--	--	--	--	--	--	--	--
manganese	0.892	0.739	2.58	0.84	--	--	--	--	--	--	--	--
mercury	U	U	U	U	U	U	U	U	U	0.370J	U	0.604
nickel	0.006J	U	0.015J	U	--	--	--	--	--	--	--	--
potassium	5.85	43.6	48.5	182	--	--	--	--	--	--	--	--
selenium	U	U	U	U	U	U	U	U	U	U	U	1.16J
sodium	47.6	324	5100	5090	--	--	--	--	--	--	--	--
thallium	U	0.002J	U	0.002J	--	--	--	--	--	--	--	--
zinc	0.032J	0.026J	0.132	0.003J	--	--	--	--	--	--	--	--
vanadium	0.004J	0.012J	0.001J	U	--	--	--	--	--	--	--	--
					--	--	--	--	--	--	--	--
cyanide	0.079	0.014	U	U	--	--	--	--	--	--	--	--
total dissolved solids	--	1930J	6170J	8030J	1160J	1510J	2900J	4580J	3900J	1100J	4620J	--

J= Estimated Concentration
U= Not Detected
-- = Not Analyzed
* Sample of free product collected and analyzed from well MW-12.

TABLE 13 - ORGANIC AND INORGANIC PARAMETERS DETECTED IN SEDIMENTS AND SURFACE WATER OF THE COOPER RIVER ESTUARY

Charleston Harbor Site, Charleston, South Carolina

Parameter	SD-1	SD-2	SD-3	SD-4	SW-1	SW-2	SW-3
PCB-1254, ppb*	U	2740	U	U	U	U	U
PCB-1260, ppb	U	688	U	U	U	U	U
2-methylnaphthalene, ppb	U	U	U	U	U	3.87J	U
benzo(a)anthracene, ppb	2020J	483J	U	U	U	U	U
benzo(a)pyrene, ppb	1010J	U	U	U	U	U	U
chrysene, ppb	2020J	1060J	U	U	U	U	U
dimethylphthalate, ppb	6330	2890	2680	U	U	U	U
fluoranthene, ppb	3740J	1340J	U	U	U	U	U
naphthalene, ppb	U	U	U	U	U	2.87J	U
pyrene, ppb	4340J	U	U	U	U	U	U
arsenic, ppm*	15.2	28.4	8.26	8.65	U	U	0.003J
barium, ppm	18.1	177	32.3	7.17	0.017J	0.024J	0.023J
cadmium, ppm	U	2.09	U	U	U	U	U
chromium, ppm	21.1	170	16.1	9.57	U	U	U
mercury, ppm	U	0.215	U	U	U	U	U
lead, ppm	62.6	1140	209	8.29	U	56	6.18
Total BN TICs, ppb**	0	0	0	--	189	--	94

-- = Not Analyzed

* ppb may be equated to ug/kg for sediment samples and ug/l for water samples
ppm may be equated to mg/kg for sediment samples and mg/l for water samples

** Base/Neutral Extractable Tentatively Identifed Compounds (PAHs are a subset of B/N)

FIGURES

CHARLOTTE ST.

LUDENS
MARINE EQUIPMENT

SCE&G SUBSTATION

CONCORD ST.

CALHOUN PARK
(FORMER PLAYGROUND)

CALHOUN ST.

ANSONBOROUGH
HOMES

NATIONAL PARK
SERVICE SITE

40' DRAINAGE EASEMENT

PARCEL 1
TO BE LEASED
BY THE CITY OF
CHARLESTON

DOCK
(RUINS)

PROPERTY OF
GEORGE E. CAMPSEN

DOCK

DOCKSIDE CONDOMINIUMS

COOPER RIVER

FLOOD

EBB

N

1 2 3 4 5 6 7 8 9 10 11 12 13 14

DF1 DF2

TP-20 TP-21 TP-22 TP-23 TP-24

EXPLANATION

DF1 — SOIL SAMPLE LOCATIONS DAVIS & FLOYD, INC.

11 — SOIL SAMPLE LOCATIONS- CHEN NORTHERN, INC.

TP-20 — TEST PIT LOCATIONS GENERAL ENGINEERING LABORATORIES

SCALE: 1"=80'

0' 80' 160'

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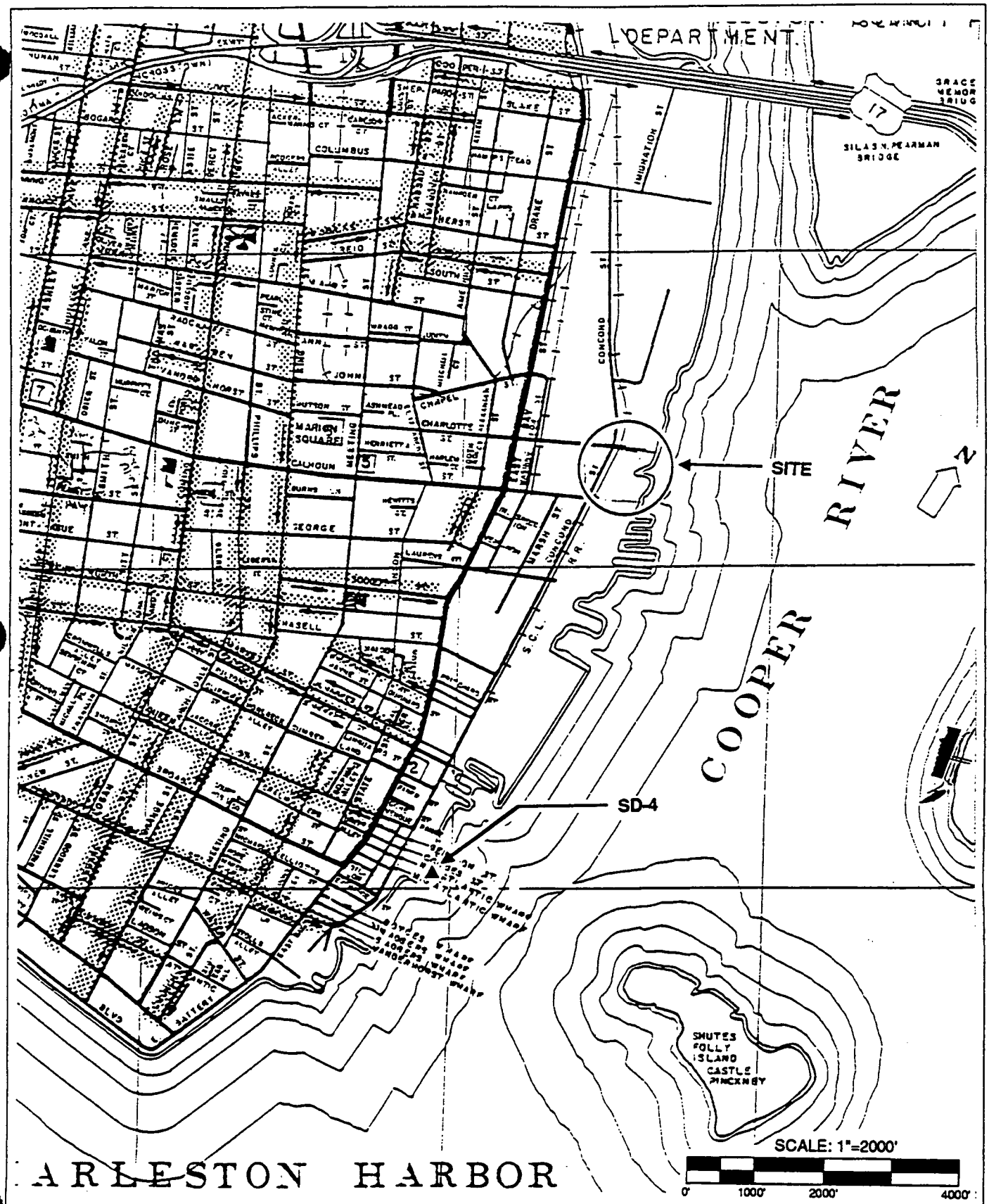
NATIONAL PARK SERVICE CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	PREVIOUS SOIL SAMPLE LOCATIONS		FIGURE 2
DATE June 15, 1992	DRAWN BY JAM	APPRV. BY TH	Of



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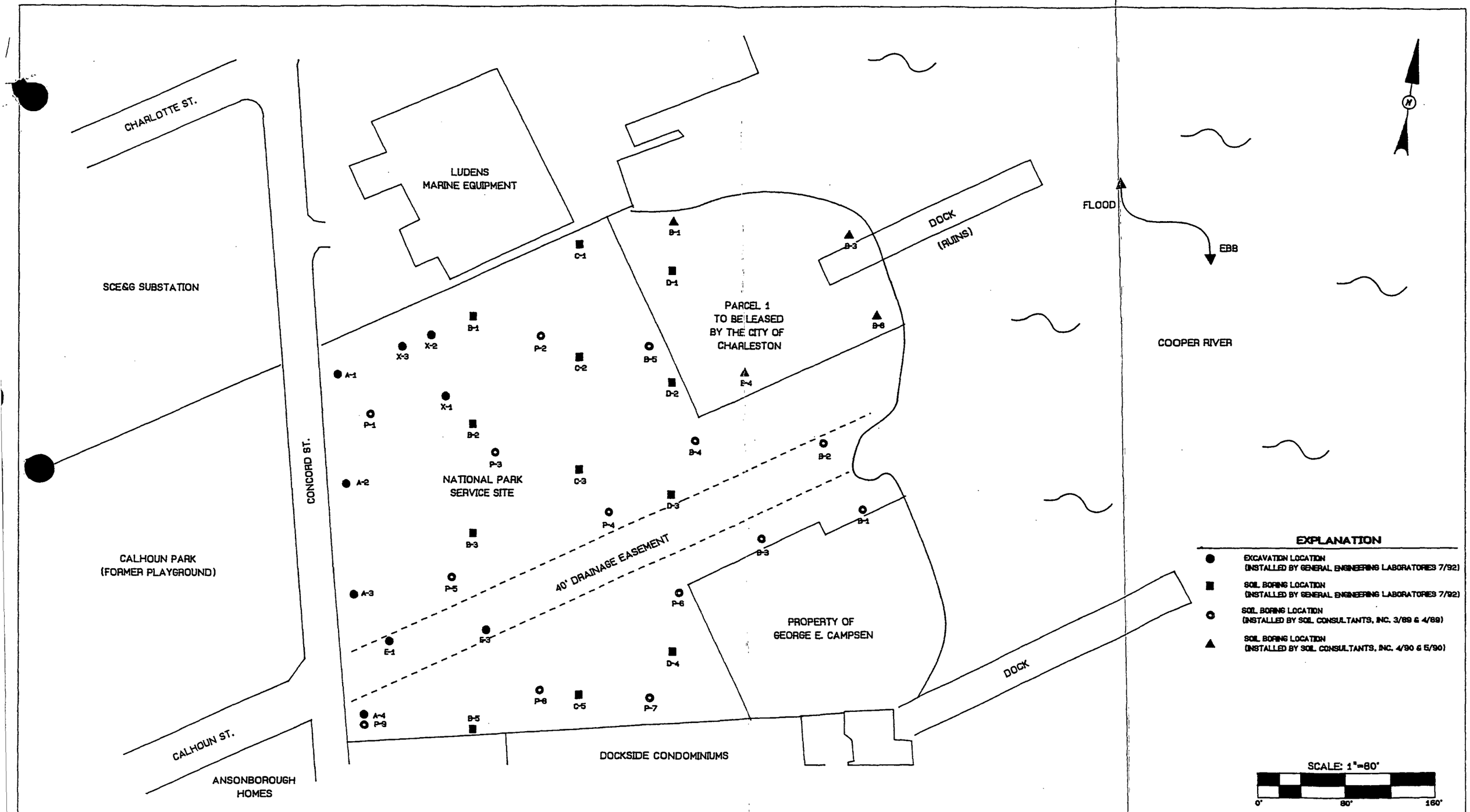
	NATIONAL PARK SERVICE CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	SITE LOCATION MAP	FIGURE 1
	DATE: June 15, 1992	DRAWN BY: JAM / APPRV. BY: TH	



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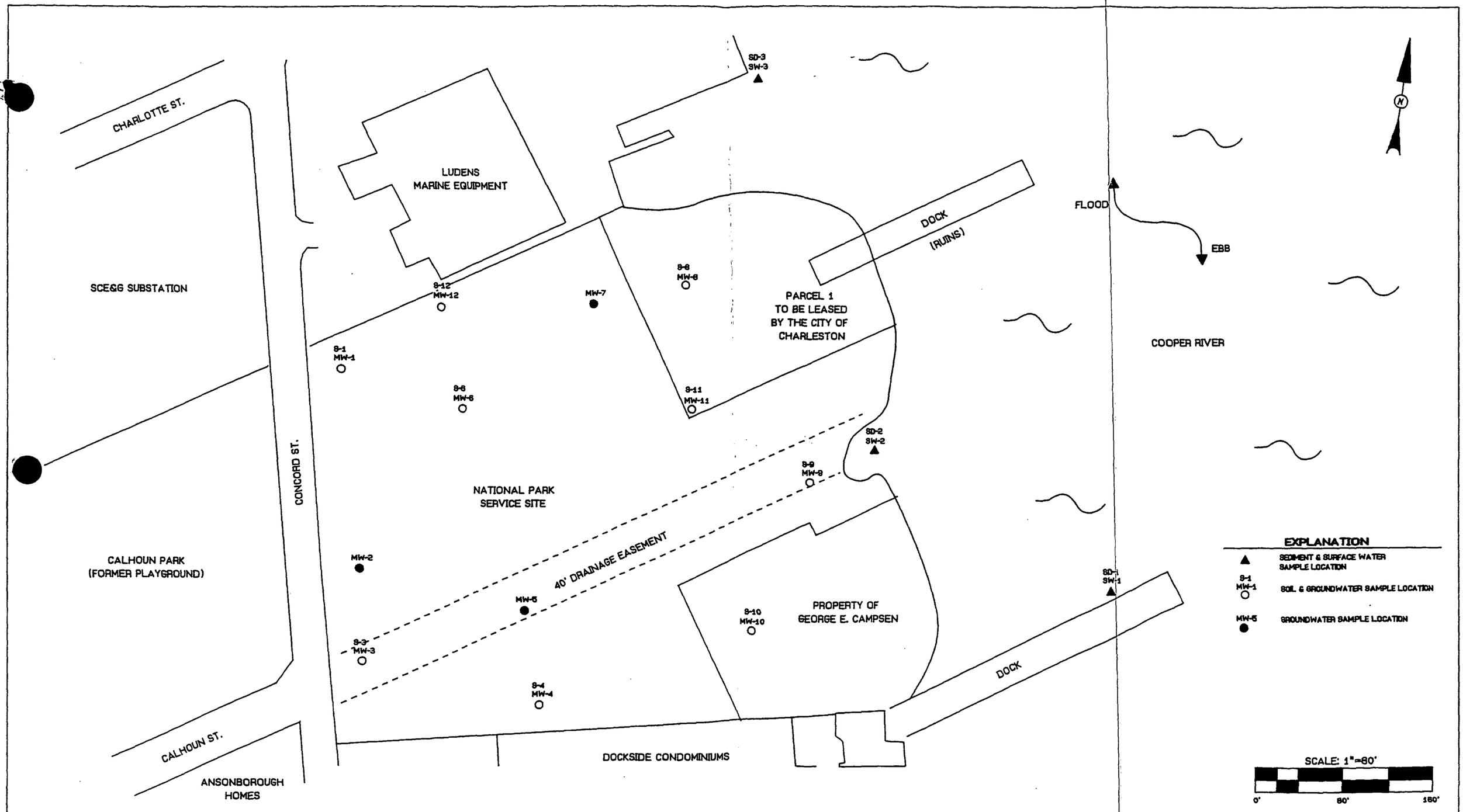
NATIONAL PARK SERVICE CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	SITE MAP SHOWING BORING & EXCAVATION LOCATIONS	FIGURE 3
DATE June 15, 1992	DRAWN BY JAM / APPRV. BY TH	Of



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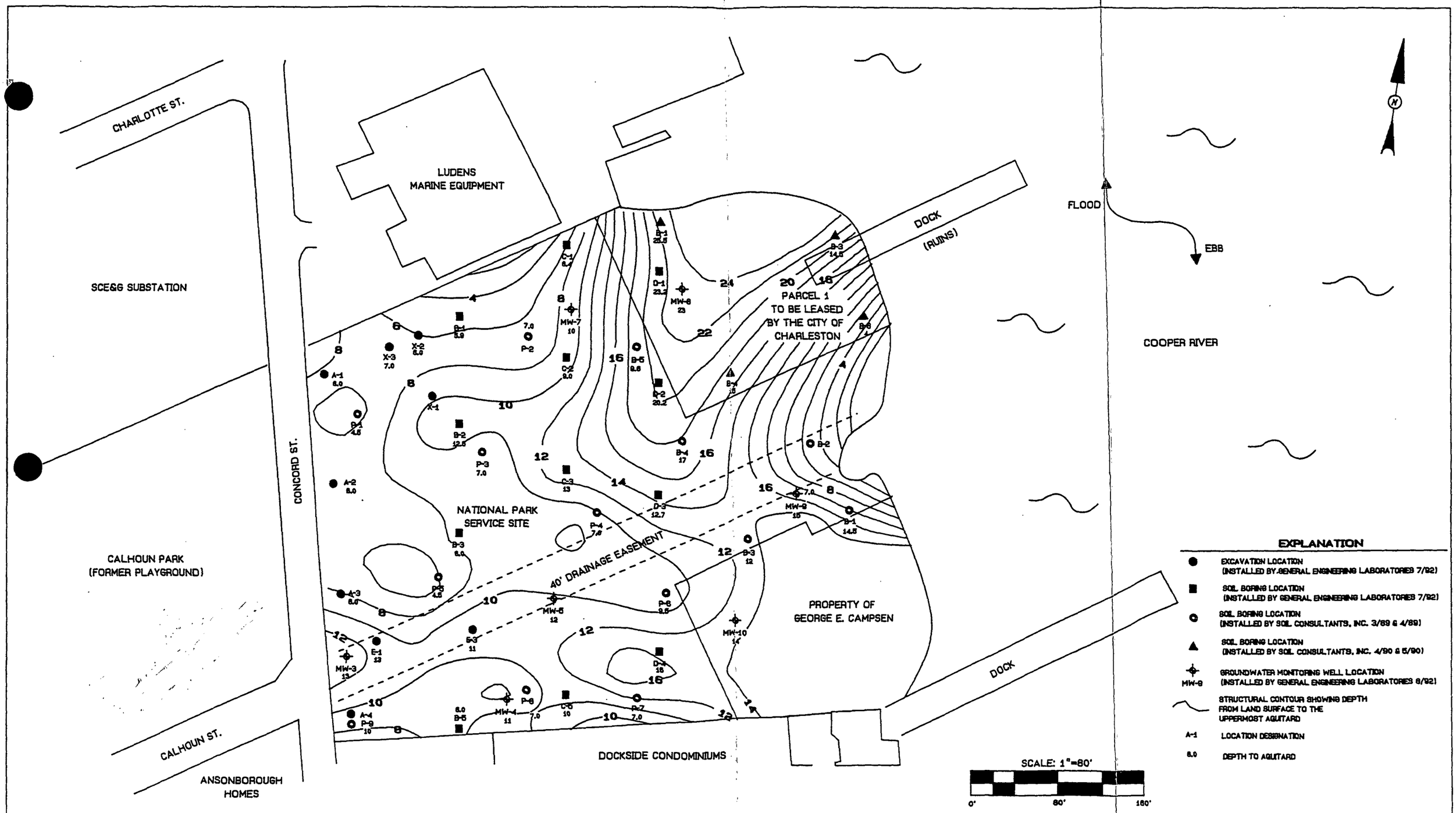
NATIONAL PARK SERVICE CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	MONITORING WELL AND SOIL SAMPLE LOCATIONS	FIGURE 4
DATE June 15, 1992	DRAWN BY JAM / APPRV. BY TH	Of



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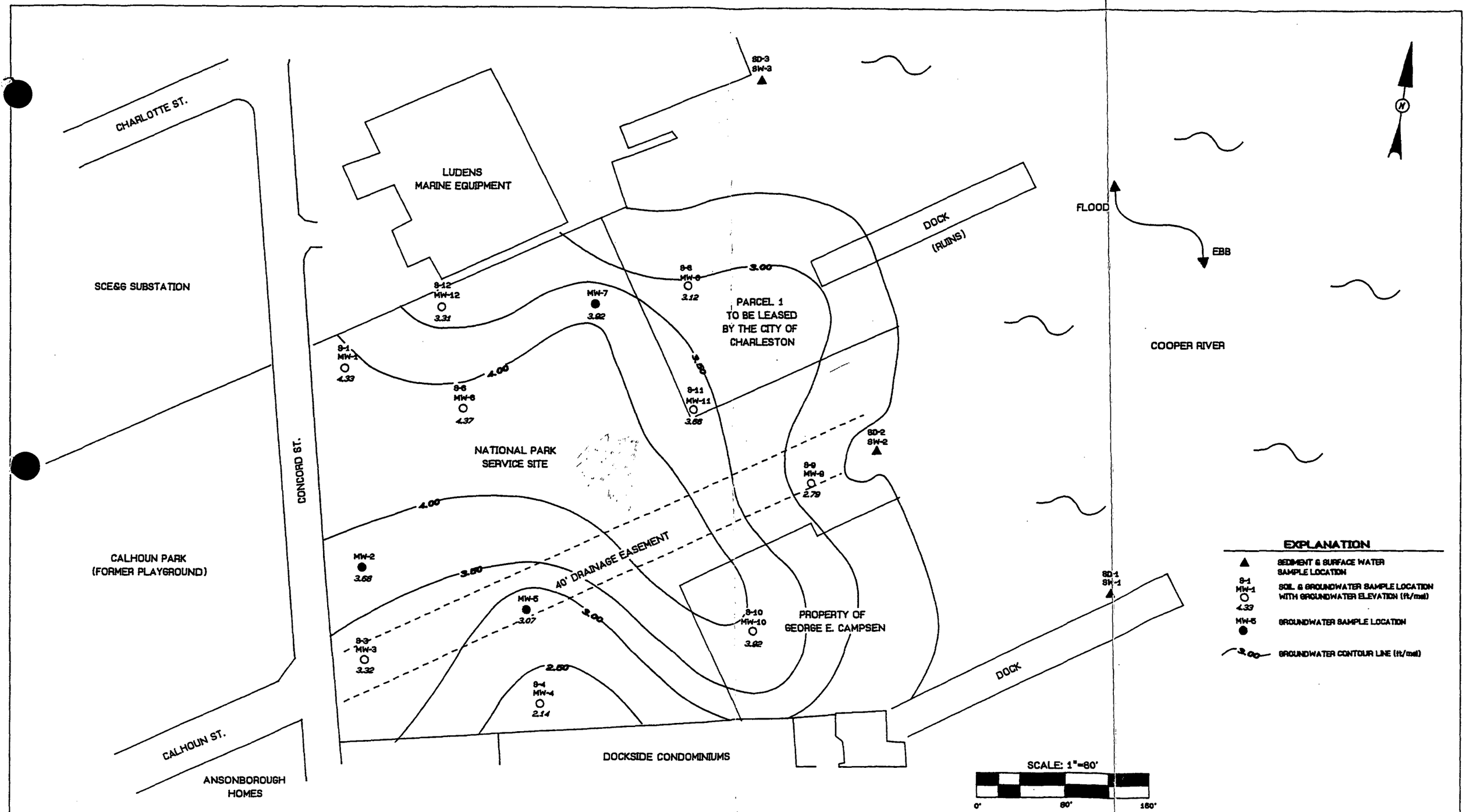
NATIONAL PARK SERVICE CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	STRUCTURAL CONTOUR MAP OF THE UPPERMOST AQUITARD	FIGURE 5
DATE June 15, 1992	DRAWN BY JAM / APPRV. BY TH	Of



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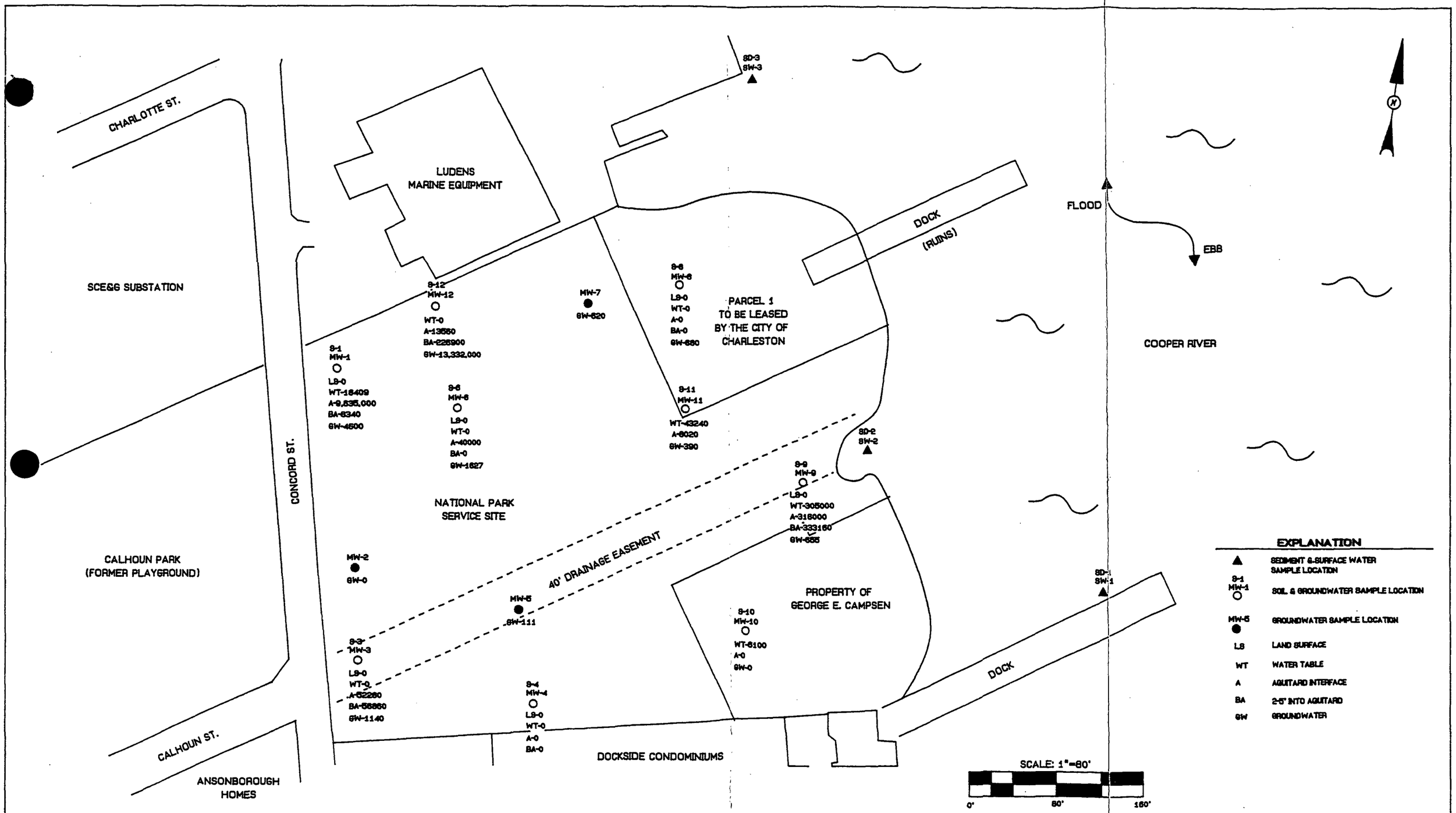
NATIONAL PARK SERVICE CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	GROUNDWATER CONTOUR MAP FOR THE UPPERMOST AQUIFER (MEASURED SEPTEMBER 3 & 4, 1992)	FIGURE 6
DATE June 15, 1992	DRAWN BY JAM / APPRV. BY TH	Of



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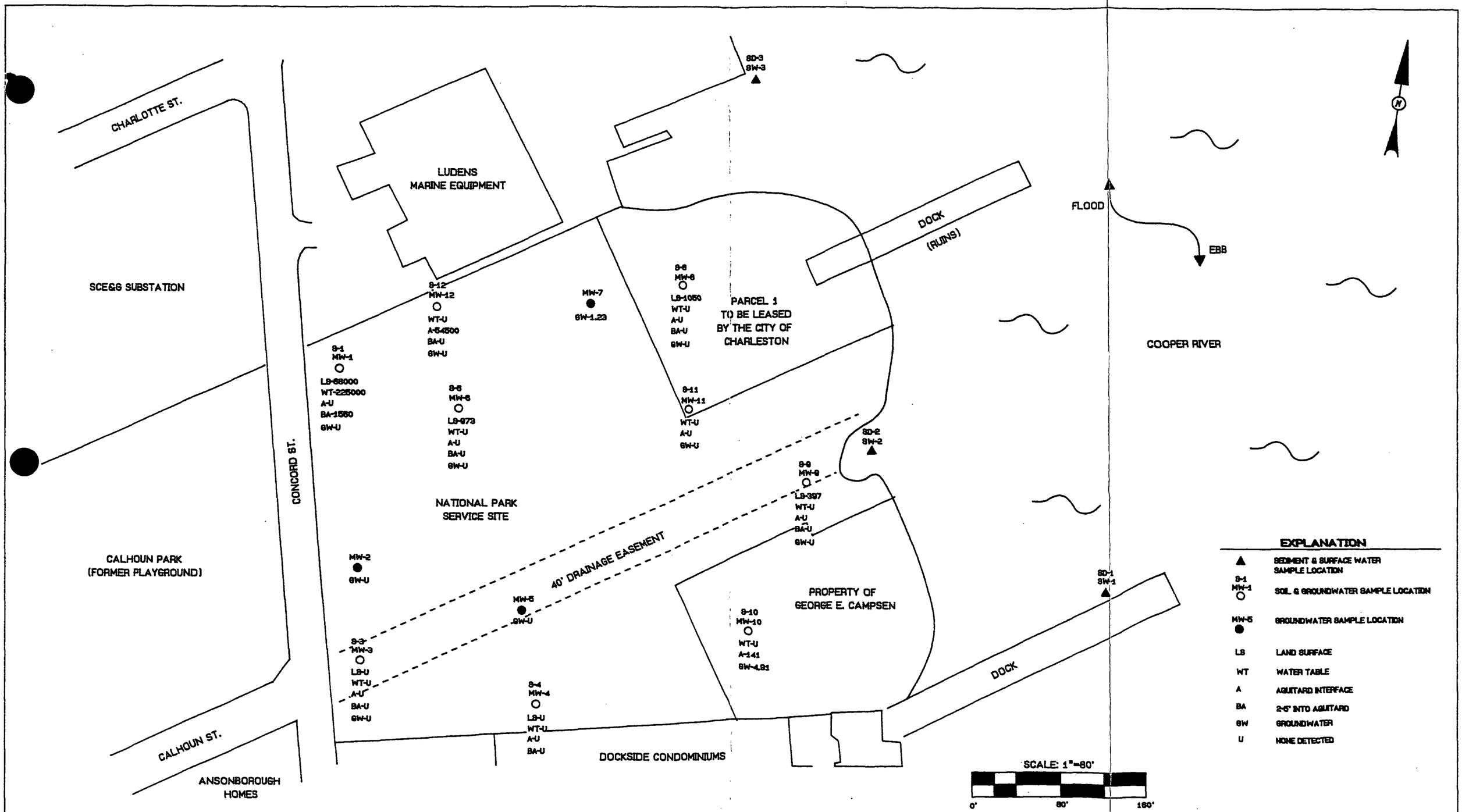
NATIONAL PARK SERVICE CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	TOTAL TARGET COMPOUND LIST POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL AND GROUNDWATER (CONCENTRATIONS IN ug/kg-ug/l)	FIGURE 7
DATE June 15, 1992	DRAWN BY JAM / APPRV. BY TH	Of



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NATIONAL PARK SERVICE CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	DISTRIBUTION OF PCBS IN SOIL AND GROUNDWATER	FIGURE 8
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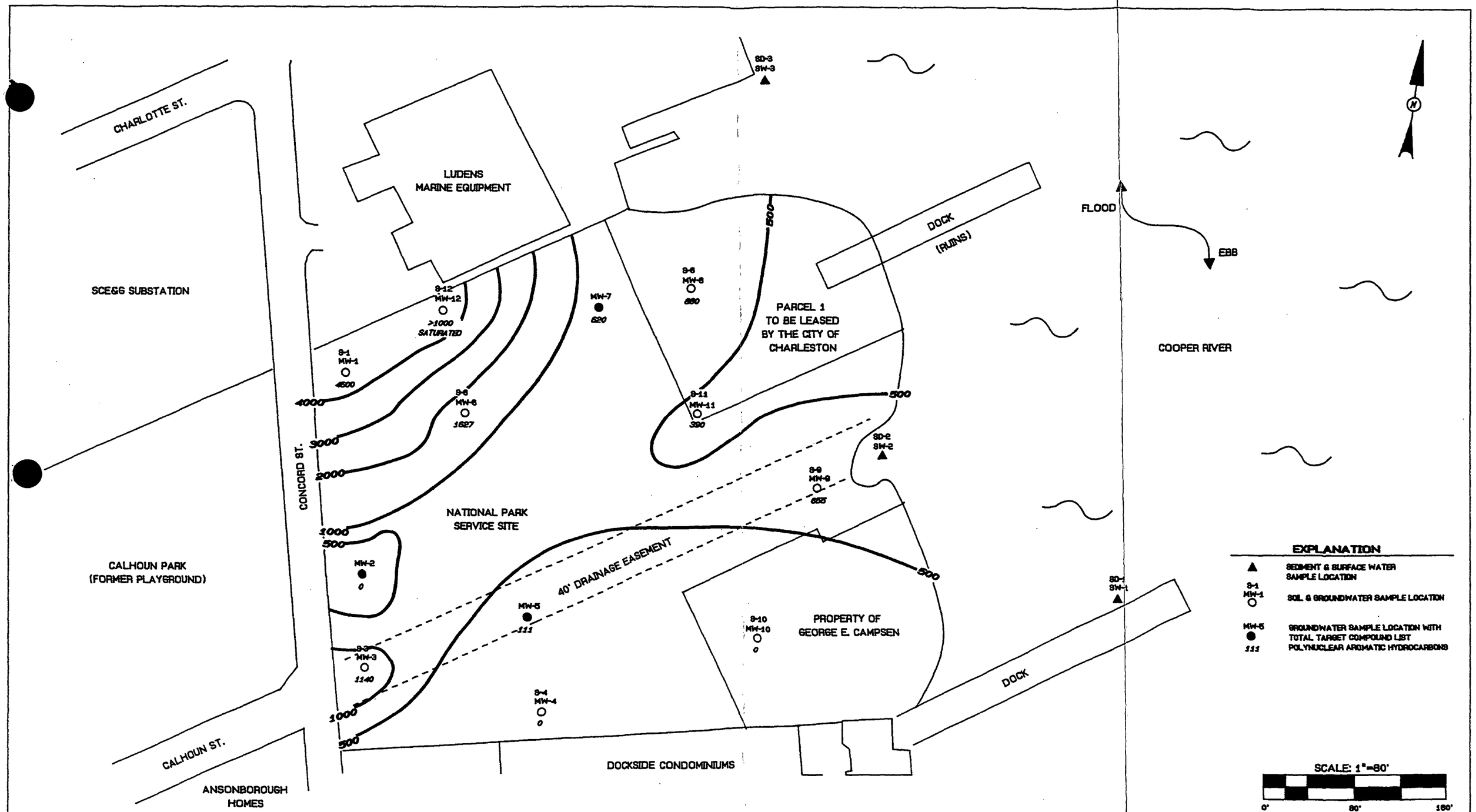

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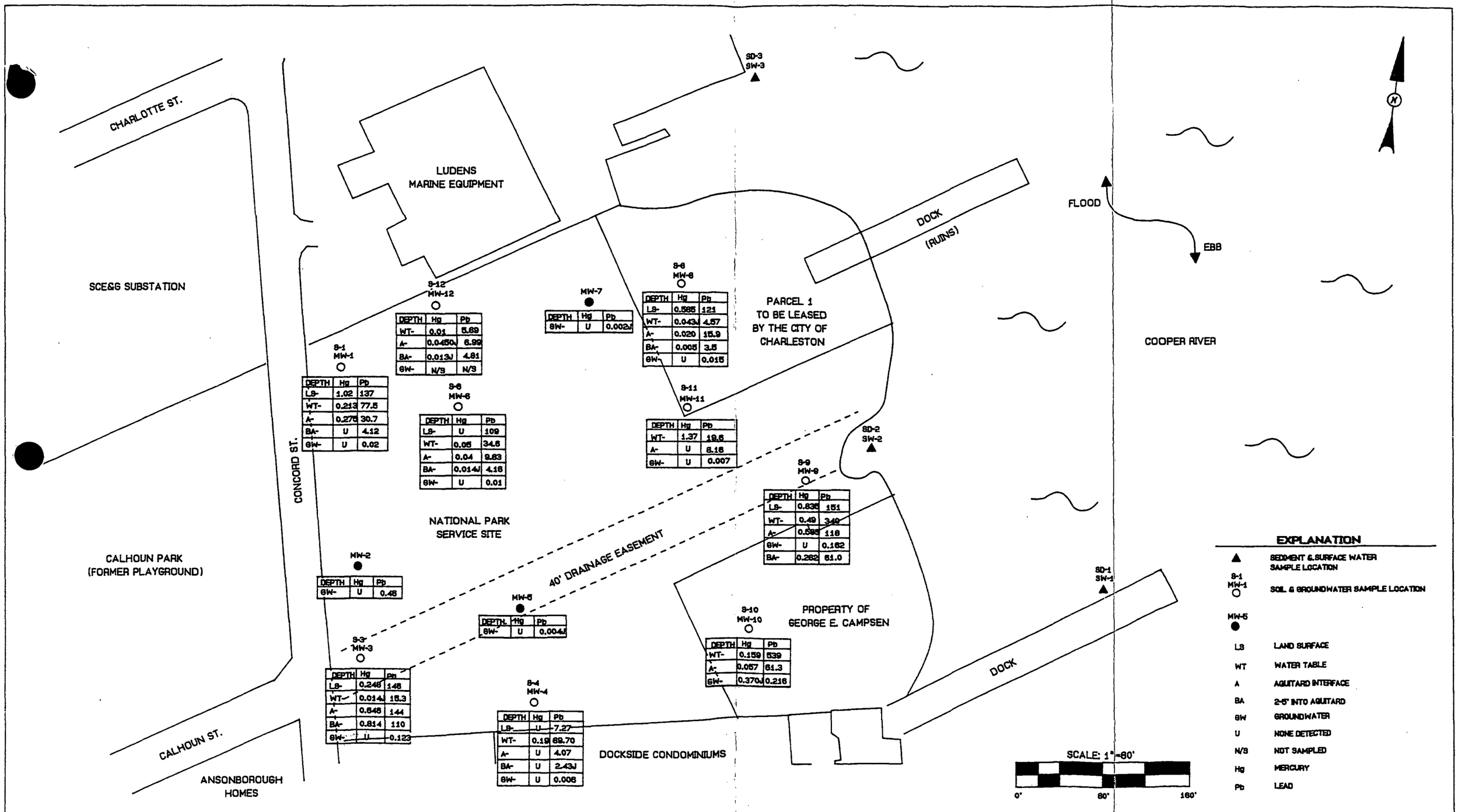
NATIONAL PARK SERVICE CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	ISOCONCENTRATION MAP TOTAL TARGET COMPOUND LIST POLYNUCLEAR AROMATIC HYDROCARBONS	FIGURE 9
DATE June 15, 1992	DRAWN BY JAM / APPRV. BY TH	Of



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NATIONAL PARK SERVICE CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	DISTRIBUTION OF LEAD AND MERCURY IN SOIL AND GROUNDWATER (CONCENTRATIONS IN mg/kg-mg/l)	FIGURE 10
DATE June 15, 1992	DRAWN BY JAM / APPRV. BY TH	Of

APPENDIX I

"HISTORICAL STUDY, FORT SUMTER NATIONAL MONUMENT, DOCKSIDE II"

HISTORICAL STUDY

FORT SUMTER NATIONAL MONUMENT "DOCKSIDE II"

CHARLESTON, SOUTH CAROLINA

by

Clark G. Reynolds

December 1987

HISTORICAL STUDY

FORT SUMTER NATIONAL MONUMENT "DOCKSIDE II"

CHARLESTON, SOUTH CAROLINA

by

Clark G. Reynolds

Property tracts 01-114 and 01-115--hereinafter referred to as "the site"--at the foot of Calhoun Street (Boundary Street until 1850) were both undeveloped until 1767, after which they took on two distinctive "chains" of ownership and character. They did not merge again until brought under common ownership in 1920. In the interim the "south side" (01-114) of the site was filled in for permanent wharves, while the "north side" (01-115) remained generally aquatic--marsh and/or dredged water--though with occasional piers and temporary buildings. This remained the case down to 1938, the end of the purview of this historical study.

In general, the site was used for docking merchant ships and occasionally warships, though the records rarely separate the activities of the wharves which ran from the south side into the adjacent property south of that. Usually, that whole waterfront was simply "Gadsden's Wharf" or "Marshall's Wharf." By 1938, therefore, the site may well have contained archeological items from ships and wharves which utilized it. How greatly any such items were disturbed or destroyed by the adding of fill or by dredging is unknown.

The City Engineer map of 1946 and Alfred O. Halsey map of 1949, both identical (Maps 1, 2), show the east side of the

city with the prehistoric coastline configuration superimposed. At that time the shoreline fronted present Washington Street, with a tidal inlet penetrating to the center of the peninsula along what is now Calhoun Street. The site was located well out in the harbor and thus unconducive to human settlement. In any case, no archeological studies have been made of the waterfront of the east side of the city, and thus no prehistoric settlements are known.[1]

The Maurice Mathews map (Map 3) from about 1685, though crude, shows the old Indian Broad Path along the center of the peninsula and affirms the basically aquatic nature of the site.[2] The Grand Model map by Edward Crisp of about 1704 (Maps 4, 5), though varying over the shape of the 'Calhoun Street inlet,' shows the site to be well outside the first city walls and still underwater.[3]

As the city expanded northward, the shoreline was gradually filled in and plans laid for more streets. The 1739 Ichnography ("ground plan") (Map 6) shows Boundary Street laid out and adjacent areas becoming marshlands, although the site was still inundated. The "Plan of Charleston" (Map 7) probably dates from the 1760s, when Christopher Gadsden began to develop Middlesex

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1. Steven D. Smith, Deputy State Archeologist, to the author, December 10, 1987; conversation with Martha Zierden, Charleston Museum, one of the coauthors of the first east side study: Dale Rosengarten, et al, Between the Tracks: Charleston's East Side During the Nineteenth Century (The Charleston Museum Archeological Contributions 17, Sept. 1987).
2. Library of Congress, reproduced from Isabella G. Leland, Charleston: Crossroads of History (Woodland Hills, Calif.: Windsor, 1980), p. 3.
3. Library of Congress, in ibid., p. 7.

on newly-filled land, and Boundary Street formed the northern terminus of that district and the city. The site was probably becoming marshy at this time and was bordered on the waterfront to the south by Anson's Landing.[4]

In 1767 Gadsden began construction of his famous wharf, by his own claim the largest in North America and certainly true for the Southern colonies. In that year he advertised for pine logs to be used as pilings. The work consumed seven years and included as its northern end the south side of the site. In 1768 he made an agreement with his neighbor, Alexander Mazyck, to establish not only what became the east end of Boundary Street but a canal extending from it between their properties. Gadsden's plan for Middlesex and his Wharf (Map 8) reveals the canal which would eventually become the lower part of Boundary Street. This canal was therefore to bisect the site, but subsequent evidence differs over the completion date of the canal.[5]

Gadsden advertised in the South Carolina Gazette on March 8, 1773 that the entire front of his Wharf was completed and ready for business, the rest (warehouses, buildings) nearly done, and that two ships had already been completely loaded with wares at the "North End." This was the section of the

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4. Ibid., p. 23; Agreement between Christopher Gadsden and Alexander Mazyck, 1768 (CCRMC I#3, p. 4).
5. Gadsden-Mazyck agreement; E. Stanley Godbold and Robert Woody, Christopher Gadsden and the American Revolution Knoxville: University of Tennessee Press, 1982), p. 73; "Plan of Lands Belonging to Christ. Gadsden, Esq." (CCRMC, McCrady Plat #624, c. 1770).

Wharf bordering on the canal to the north and sheltered waters of the dock to the south. By 1774 barrels of rice were being stored on the Wharf. This period represents the lowest level of historical-archeological activity on the site. Contrary to P. C. Coker's interpretation, there appears to have been no "lock" at the Wharf; he apparently misread "dock" for "lock" for point "B" on the "references" key. The docking inlet is shown on Edmund Petrie's fire insurance survey of 1788 (Map 9) and on the city plan of 1802 (Map 10). It was apparently wharfed in immediately thereafter (see Map 18, from 1807).[6]

During the American Revolution the north side of the site remained undeveloped marshland (see Map 16, dated 1795), owned by Gadsden, unlike his Wharf, which played a major role in that struggle. On the night of September 14, 1775, Colonel William Moultrie and the 2nd South Carolina Regiment of Foot left from the Wharf to ride the ebb tide to James Island, where they occupied Fort Johnson. A battery of seven guns was erected on Gadsden's Wharf, and the storage buildings of the Wharf were converted into barracks. The Wharf is shown on British General Sir Henry Clinton's 1780 maps during the siege of Charleston and a postwar map (Maps 11, 12, 13). An 1883 map of the city (Map 14) shows the defensive works north of Boundary (Calhoun) Street and the canal; these works also faced the site. It is inaccurate

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6. South Carolina Gazette (Mar. 8, Oct. 11, 1773); Godbold and Woody, pp. 73-74; P. C. Coker, III, Charleston's Maritime Heritage, 1670-1865 (Charleston: CokerCraft Press, 1987), p. 42; Edmund Petrie fire insurance Ithnography, Aug. 2, 1788 (South Carolina Historical Society, SCHS); City Plan of 1802 (SCHS).

in that it does not include Gadsden's Wharf, as Clinton's maps do. Given the crucial position of the Wharf in the American defenses, it probably saw a great deal of activity and may well have provided refuge for defending ships as they were stripped of their guns to aid in the fortifications ashore.[7]

Upon the British occupation in 1780, the British forces utilized Gadsden's Wharf as a forage yard and anchorage. During a storm in August 1782, the 5th-rate man of war HMS Thetis, 32 guns, sank somewhere along the Wharf. Even though it was presumably salvaged, debris from the vessel and other American and British military equipment and stores may remain on the bottom of the site. When the British evacuated Charleston on December 14, 1782, they departed from Gadsden's Wharf. Then, on September 20, 1783, a fire occurred at one of the warehouses there, adding to other damage the Wharf suffered during the war.[8]

The only other notable naval activity at the Wharf for the next several decades occurred in 1799 when the newly-launched U. S. Navy frigate John Adams was tied up there to receive her masts and rigging. One may assume, though, that numerous other

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7. Godbold and Woody, p. 157; Coker, pp. 103, 107.
8. Harriette Kershaw Leiding, Charleston: Historic and Romantic (Philadelphia: Lippincott, 1931), pp. 140-141; Coker, pp. 106, 110, 114, 125; Jamie W. Moore, The Lowcountry Engineers: Military Missions and Economic Development in the Charleston District, U. S. Army Corps of Engineers (Charleston: U. S. Army Corps of Engineers, 1981), p. 10; Godbold and Woody, pp. 224, 228, 239.

warships as well as the usual merchantmen utilized the Wharf continually down to and including the Civil War, and some were no doubt damaged during sudden storms.[9]

During or immediately after the Revolutionary War, Alexander Masyck leased from Gadsden the north side of the site as part of his plan to extend Mazyckborough to the east of Washington Street. Although this area was still marsh, he laid out five lots and a "Channel lot" on the site. In 1784 Gadsden demanded that the state legislature extend Boundary Street to his Wharf, though at considerable expense to the state. A survey was undertaken by Joseph Purcell (Map 15) in February 1786 on which the proposed lots were laid out. Gadsden and Mazyck agreed to extend the 70-foot-wide Boundary Street as a 35-foot "half street" and a 35-foot canal to the end of Gadsden's Wharf, which was then completed by 1795 (Maps 16, 17). By this time, "Gadsden's Canal" was utilized for loading lumber. But Mazyck's lots were never developed, and the north side of the site remained marsh. (What appears to be a coastal structure on Map 16 is actually a hole in the old map.)[10]

The passing of both men led to an apparent dispute between their heirs over ownership of the north half of the

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9. Coker, p. 143 and passim.
10. Rosengarten, p. 14; Godbold and Woody, pp. 234-235; Samuel Gaillard Stoney, This is Charleston (Charleston: Carolina Art Association, 1944), p. 127; Joseph Purcell survey, Feb. 1786 (McCrady Plat #479, CCRMC); two Goddard and Sturges surveys, July 1795 (McCrady Plats #449, #545, CCRMC).

site. In 1807 Elizabeth Mazyck leased it from Rev. Christopher Edwards Gadsden and had a fresh survey done by Purcell which reaffirmed the projected Mazyck lots, Gadsden's Canal, and Gadsden's Wharf along the south side (Maps 18, 19). The lease was renewable on a yearly basis, but no development occurred, and in 1817 Rev. Gadsden was awarded title to the disputed marshland. He did nothing with it, however, as a City Council map of 1836 (Map 20) suggests, as do City Neck plans of 1842 and 1844 (Maps 21, 22). About 1846 a railroad depot was proposed for the north part of the site (Plan 23), but was rejected.[11]

In 1850 (when the name of Boundary Street was changed to Calhoun) the Mazyck heirs renounced any claim to the north side, enabling Bishop Gadsden to sell it to Richard Furman Smith the same year. In 1851 Smith leased the property to B. F. Smith and Nelson B. Prothro for development as a lumbering business. The lease stipulated that a wharf should be built from Washington Street to the site, of wooden construction to a height above highest water, and filled in underneath with mud. The canal on the north side of this wharf was to be

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11. Mazyck lease from C. E. Gadsden, Nov. 25, 1807 (U7-461 CCRMC); Purcell surveys 1807 (McCrady Plat #543 CCRMC; City Archives); Master in Equity to C. E. Gadsden, Jan. 22, 1817 (P8-430 CCRMC). Four other, sketchy 1807 Purcell plats exist but are redundant. City Council map 1832 (R31-32); Plan of the City of Charleston 1842 (Carolina Art Association); Plan of the City Neck of Charleston 1844 (SCHS); Plan of Proposed Depots for the So. Carolina Rail Road, c. 1846 (SCHS).

"of sufficient depth to float his rafts at ordinary tides [and] to be provided with a gate to keep in the tide." This would have been a lock. The canal on the south side of the wharf was to allow lumber to be hauled up onto the wharf, the vessels passing through a "bridge wharf," the planking of which could be moved for easy access. Smith laid out the plan on a plat in 1852 (Map 25), showing in addition four piers between the bridge wharf and the low water mark of the Cooper River. Gadsden's Canal and "margins" are also shown adjacent to the bridge wharf.[12]

Dredging certainly occurred for these "canals" alongside the new wharf and piers, but whether a lock gate was installed is not known. An 1852 Bridgens and Allen map of Charleston (Map 24) shows a building inside the site, but this is probably an error, for Smith's plan (Map 25) places the "wooden building" just west of the site. In 1854 Smith sold out to Nelson Prothro, whose entire operation came to be known as "Prothro's Mill," although the steam sawmill itself was located at the foot of the wharf, on Washington Street.[13]

Meanwhile, the south side of the site, Gadsden sold his Wharf and Canal to Joseph S. Addison and David W. McIntosh in 1846 for a shipyard and the adjacent lot in 1847 to Jonah M.

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12. Mazycks' release of claim to C. E. Gadsden, June 11, 1850, and Gadsden sale to R. F. Smith, Sept. 12, 1850 (F12-252, Z-12-33, CCRMC); R. F. Smith lease to R. B. Smith and N. B. Prothro, Oct. 1, 1851 (R12-186); Plat A120 of 1852.
13. Bridgens and Allen Map of Charleston 1852 (Charleston Museum); Smith sale to Prothro, Mar. 11, 1854 (A13-605, CCRMC).

Venning (Map 24, in 1852). Venning in turn leased portions of his property to others in 1849 and 1860. The Venning portion some time later (the title chain is broken) returned to the owner of the Wharf. In 1852 Addison sold his half-interest in the south side property to McIntosh. By this time Calhoun Street extended along the canal from Concord almost to Wharf Street. This east end of Calhoun was covered with wooden planks over the fill. McIntosh then died, and the Wharf was purchased in 1859 by John Marshall (Map 25).[14]

One may assume that the canal on the site was kept dredged, as Colton's 1855 Map of Charleston (Map 26) indicates. This map is completely inaccurate by omitting Prothro's lumber wharf on the north side, but it does suggest that the site was kept dredged for vessels utilizing the wharf and piers and their canals. A newspaper account in the Charleston Daily Courier of September 3, 1860 recounts the construction of a new wharf for the Charleston Gas Company as an extension of Charlotte Street. For comparison purposes with the site, which it borders, the story notes how piles were driven "only to the depth of 48 feet" where they struck "a firm bottom." There, on the bottom, "Palmetto logs and live oak butts, in a perfect state of preservation, were found in considerable number."[15]

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14. Gadsden sale to Addison and McIntosh, Jan. 1, 1846 (Y10-907 CCRMC); Gadsden to Jonah M. Venning, Jan. 20, 1847 (411-41); Addison to McIntosh, Feb. 23, 1852 (Q12-197); Master to Marshall, Apr. 7, 1859 (A14-231); Rosengarten, pp. 113-114.
15. Colton's Map of Charleston 1855 (SCHS); Charleston Daily Courier, Sept. 3, 1860; Rosengarten, p. 119.

The site did not figure in the Confederate defenses of the city until the middle of the Civil War when a Union penetration of the harbor seemed possible. At the end of September 1863, Major General J. F. Gilmer of the Confederate Army's Engineer Corps reported that construction of a battery had just commenced at the foot of Calhoun Street. This could mean at Concord Street or the end of the Wharf (see Map 25). Lieutenant John Johnson's November 28, 1863 map of Charleston's defenses (Map 27) notes the presence of the battery. The following May Gilmer reported that it was comprised of one 8-inch rifled Columbiad. The battery was the same when the city fell in February 1865. A photograph (Plate 1) at that time shows the Calhoun Street battery, including parapet, gun, and bombproof mound behind. That the battery was located on the street itself is strongly indicated by its great weight in dirt, the wooden dock in the foreground, and the angle of the photograph. Taken by a camera that required a steady base on the wharf, the photo shows the 650-foot Gas Company Wharf beyond, over which ran a 15-foot high railroad trestle for transferring coal. The battery was surely not built over new fill in the marsh. The 1865 C. O. Boutelle map for the occupying forces (Map 28) adds no details. In any case, the battery obviously played a negligible role in the defense of the city.[16]

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16. Charleston Daily Courier, Sept. 3, 1860; Official Records. . ., 28, Pt. 2, 381-382, Sept. 28, 1863 and 35, Pt. 2, 465, May 3, 1864; Supplementary Report to [Q. A.] Gillmore's Defenses of Charleston (c. 1867); Arthur M. Wilcox and Warren Ripley, The Civil War at Charleston (Charleston: The News and Courier and The Evening Post, 1966), pp. 41, 84; conversation with Ripley in 1987.

Apparently, three of the four ironclads of the Confederate Charleston Squadron, blockaded in port, remained moored at or near Marshall's Wharf during the final months of the war. In 1866 J. N. Cardozo reminisced about the day that Charleston was evacuated in the face of the advancing Union forces, February 18, 1865: ". . . at about 11 o'clock, A. M., an explosion took place on the river, at the foot of Calhoun Street. The Confederate iron-clad steamer Palmetto was blown up." Debris flew in all directions as the Palmetto State sank, followed by the ironclads Charleston and Chicora, also given the torch. Debris may survive, also from wreckers who blasted all three hulks during 1865-1870. The Corps of Engineers in 1871 pinpointed the wreck of the Palmetto State "in the mouth of Town Creek," probably north of the site, but the other two hulks lay "nearly together in the Cooper River below Drum Island, off Marshall's Wharf," perhaps at the eastern edge of the site. But one may assume surviving remains were obliterated when the Town Creek channel was dredged in later years.[17]

Marshall's Wharf resumed normal commercial operations following the war, John Marshall operating it until 1881 and his heir Edward C. Marshall thereafter. Calhoun Street was apparently extended its full width to the end of the Wharf. This is shown in the 1869-70 City Directory map by Thaddeus C. Jowitt (Map 29) and suggested in the highly-stylized Drie "aerial view" of the city in 1872 (Map 30). Both suggest that the north side of the site remained dredged and functional for shipping, though the ownership of this property passed from Prothro, who foreclosed, to Charles H. Simonton in

17. J. N. Cardozo, Reminiscences of Charleston (Charleston: Joseph Walker, 1866), pp. 136-137; Capt. William Ludlow to Maj. Q. A. Gillmore, Apr. 20, 1871. E. Milby Burton, The Siege of Charleston (Columbia: University of South Carolina Press, 1970), p. 321, says the Palmetto State was blown up "at her wharf." My italics.

1867, then to several other owners in quick succession, sometimes with the property divided into separate parcels.

Because of these many ownerships, mapmakers retained some of the names after ownership had changed. In particular, the Carolina Lumber Manufacturing Company owned the north side of the site during 1875-76 and John C. Mallonee from 1877 to 1884. The 1882 plat of Mallonee's Mills (Map 31) shows a sawmill straddling the western edge of the site in addition to the former wharf. In 1883 the City Yearbook (Map 31), City Map (Map 32), and News and Courier Map (Map 33) retain the name of Carolina Lumber.[18]

The May 1884 Sanborn fire insurance maps (Maps 35, 36) show the installations of both sides of the site. On the north, Mallonee's Saw Mill and Lumber Yard still straddled the western

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18. Sarah D. Wilden to Edward Carew Marshall, Sept. 1, 1881 (D18-254 CCRMC); Samuel R. Marshall to E. C. Marshall, Sept. 3, 1881 (U18-267); Thaddeus C. Jowitt map, Charleston City Directory 1869-70; C. Drie, "Bird's Eye View of the City of Charleston," 1872 (Library of Congress); City Engineer Block Plat 1882 (City Archives); Charleston Yearbook 1883; Map of Charleston 1883 (SCHS); News and Courier Map, Sept. 10, 1883. The somewhat confused deeding of the north side, due to broken parcels of land (CCRMC), included the following changes of ownership: Master to Charles H. Simonton, Feb. 5, 1867 (A14-789); Simonton to People's Bank of South Carolina, Aug. 22, 1870 (S15-31); Bank to Robert Hunter, Apr. 1874 (Q16-142); James T. Welsman to South Carolina Railroad Company, July 1, 1871 (W15-507); Railroad company to Carolina Lumber Manufacturing Company, Jan. 1875 (P16-307); Carolina Lumber to George S. Brown, Dec. 1, 1876 (E17-20); Brown to John C. Mallonee, Feb. 10, 1877 (Y16-601); Hunter to Mallonee___1876 (P15-433).

edge, its wharf protruding into the water. On the south, Marshall's Wharf is seen as producing naval stores, notably rosin and spirits of turpentine. A lattice type storage shed for turpentine touches the south edge of the site. The actual wharf of Marshall's company was renamed "Gadson's," an apparent misspelling of the traditional Gadsden name (see Map 38).[19]

In July 1884 Mallonee sold the north side of the site to the Berkeley County Railway and Lumber Company, which in turn sold it to the Fernoline Chemical Company of Hempstead (Long Island), New York, in 1887. The Sanborn maps of 1888 (Maps 37, 38, 39) show the "old log slide" from the mill no longer in use, the mill itself converted into a storage building for oils. A steam pump and tool repair shop were situated at the foot of the wharf, on which had been installed a tramway for transporting cord wood. An 1890 plat "of Mallonee Mills and Fernoline Works" by Charleston City Engineer Louis J. Barbot (Map 40) reveals that the steam pump had been removed, leaving the building exclusively as a machine shop. Also, a boiler house was added on the south side of the pier tramway. The Fernoline Chemical Company sold out to Frederick Ayer in 1892. The north half of the site was therefore a chemical industry operation for five years (1887-92), meaning that potentially hazardous materials could be deposited there.[20]

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19. Sanborne fire insurance maps, May 1884 (Library of Congress).
20. Mallonee sale to Berkeley County Railway and Lumber Company, July 1, 1884 (Z19-427 CCRMC); Railway to George G. Moore, Apr. 15, 1887 (K20-519); Moore to Fernoline Chemical Company, May 8, 1887 (X20-763); Fernoline to Frederick Ayer, Mar. 3, 1892 (Z21-319); Sanborn insurance maps 1888; City Engineer Louis J. Barbot plat, May 24, 1890 (City Archives).

An 1890 City Engineer's map (Map 41) of the proposed Concord Street Extension (also shown on Map 40) retains the older name of the Carolina Lumber Company, with "Fernoline Works" written in. A "Quaint Scene from Marshall's Wharf" in the 1890s (Plate 2) is contrasted with the same area in the 1970s (Plate 3). It appears to be just beyond the southern boundary of the site but is indicative of the activities there in the 1890s.[21]

The north side of the site remained under the ownership of Frederick Ayer, whose use of it is unknown, from 1892 until 1917, when he sold it to the Interstate Land Holding Company. The south side of the site passed from the Marshall family to the Charleston Basket and Veneer Manufacturing Company in 1897, then in 1911 to William H. Mixson, president of the Southern Fruit Company. In 1914 the Valk and Murdoch Iron Works Company purchased the south side and operated it through World War I. The general U. S. Coast and Geodetic Survey map of 1918 (Map 42) gives no details of the site, except to suggest that the tramway wharf of the north side no longer existed or had been abandoned.[22]

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21. James Moore Rhett, III, and John Carson Hay Steele, Charleston Then and Now (Columbia: R. L. Bryan, 1974), pp. 80-81.
22. Frederick Ayer sale to The Interstate Land Holding Company, May 24, 1917 (W27-577 CCRMC); Master to The Charleston Basket and Veneer Manufacturing Company, Dec. 7, 1897 (F23-79); Basket company to William H. Mixson, May 15, 1911 (Y25-111); Mixson to Charles V. Boykin, Jan. 19, 1914 (Y25-420);Boykin to Valk and Murdoch Company, Apr. 23, 1914 (Y25-617); U. S. Coast and Geodetic Survey map by R. B. Marshall 1918 (SCHS); Charleston City Directory 1912. A search of the City Directory between 1892 and 1917 failed to identify Frederick Ayer, who evidently was an out-of-state owner.

The Charleston Dry Dock and Machine Company purchased the south side of the site in October 1919 and the north side in July 1920, thus assuming complete ownership over the entire site. A 1938 page was added to the 1902 Sanborn fire insurance map (Map 43), showing no details of the site except a loft for wooden posts along Concord Street and a general storage ("No.9") building near the southern edge of the site. This map was incorporated in the 1944 edition, hence the annotation "Uncorrected Since Mar. 1942."[23]

An aerial photograph by the Aero Service Corporation of Philadelphia in 1939 (Plate 4) clearly shows the site in its final form at the date which terminates this study. The Charleston Shipbuilding and Dry Dock Company and the Marine Contracting and Towing Company--the latter perhaps using the site on a rental basis, for no ownership was involved--are shown at the foot of Calhoun Street. The site had clearly been dredged, the former tramway-wharf eliminated, and the section adjacent to Concord Street filled in, probably during the 1920s and 1930s. Faintly visible is undeveloped filled land on the northwest corner, which, judging by the 1944 general Sanborn map (Map 44), was developed straight across the site during World War II for wartime shipbuilding operations.[24]

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23. Valk and Murdoch sale to Charleston Dry Dock and Machine Company, Oct. 22, 1919 (R29-72 CCRMC); Interstate company to Charleston Dry Dock and Machine Company, July 12, 1920 (C29-449). Both deeds were reaffirmed by Master of Equity to the Company, Aug. 7, 1934 (C38-15). Also, amended 1902 Sanborne insurance map of 1944, new sheet added in Feb. 1938 (Library of Congress).
24. Amended 1902 Sanborne insurance guide map of 1944; aerial photo by Aero Service Corporation of Philadelphia, 1939 (Charleston City Archives).

Inasmuch as all vessels constructed partly of steel between the 1880s and 1940s required red lead as a sealant and for painting, the Charleston Dry Dock company no doubt used this potentially hazardous material at the site from 1920s through the 1940s, as may have the Valk and Murdock Iron Works during 1914-1919. Deposits or traces of red lead may therefore lie buried at the site. About 1940-41 the Dry Dock company built a shipway extending straight from the end of Calhoun Street into the site in order to construct steel seagoing tugboats for the Navy for World War II service. The only suspected hazardous material these craft would have required was red lead.[25]

On the basis of the evidence, one may conclude that the site is theoretically rich in archeological deposits from shipping operations dating from 1773. However, the continual requirements for dredging to keep the wharves accessible for docking merchant ships and naval vessels in all likelihood disturbed or destroyed whatever has lain on the bottom of the site. Major machinery was probably removed from the wooden buildings on the site (one deed of sale even stipulated it be done),[26] so that permanent structures certainly do not exist underwater or within the current fill. One exception may be the foundations and related debris of Gadsden's Wharf (and its successors) along the southern edge of the site. No shipwrecks are known to exist at the site, although debris from the Palmetto State, Charleston, and Chicora may survive somewhere along the eastern edge.

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25. Conversations with Palmer Olliff, Charleston Naval Shipyard, and Bonnell Black, employed at the Charleston Shipbuilding and Dry Dock Company during 1940-42.

26. George C. Moore to Fernoline Chemical Company, May 8, 1887 (X20-763 CCRMC).

Maps

1. City Engineer Map of 1846 (SCHS).
2. Alfred O. Halsey Map of 1949 (SCHS).
3. Maurice Mathews Map, c. 1685 (Library of Congress).
4.-5. Edward Crisp Grand Model Map, c. 1704 (Library of Congress).
6. Ichnography of 1739 (SCHS).
7. Plan of Charleston, c. 1760s (SCHS).
8. Plan of Lands Belonging to Christ. Gadsden, c. 1770 (McCrady Plat #624, CCRMC).
9. Fire Insurance Ithnography of Charleston, Aug. 2, 1788, by Edmund Petrie (SCHS).
10. Plan of the City of Charleston [1802] (SCHS).
11. General Sir Henry Clinton map, 1780 (National Maritime Museum, Greenwich, England).
12. Clinton map, 1780 (SCHS).
13. Plan of the Siege of Charleston, 1780 (Carolina Art Association/Gibbs Art Gallery).
14. Map of Charleston, 1883 (SCHS).
15. Joseph Purcell survey, Feb. 1786 (McCrady Plat #479, CCRMC).
16. Goddard and Sturges survey, July 1795 (McCrady Plat #545, CCRMC).
17. Ibid. (McCrady Plat #449 CCRMC) (Rough sketch).
18. Purcell survey 1807 (McCrady Plat #543 CCRMC).
19. Ibid. (Charleston City Archives).
20. City Council map, 1832 (B31-32 CCRMC).
21. Plan of the City of Charleston 1842 (Carolina Art Association).
22. Plan of the City Neck of Charleston 1844 (SCHS).
23. Plan of Proposed Depots for the So. Carolina Rail Road, c. 1846 (SCHS).
24. Bridgens and Allen Map of Charleston 1852 (Charleston Museum).
25. Charles Parker Plat A120 of 1852 (CCRMC).
26. Colton's Map of Charleston 1855 (SCHS).
27. Lieutenant John Johnson, CSA Engineer Corps, map of Charleston's Defenses, Nov. 28, 1863 (SCHS).
28. C. O. Boutelle map of Charleston harbor for Rear Admiral J. A. B. Dahlgren, USN, 1865 (Government Printing Office).
29. Thaddeus C. Jouitt map, Charleston City Directory, 1869-70 (SCHS).

30. C. Drie, "Bird's Eye View of the City of Charleston," 1872 (Library of Congress).
31. City Engineer Block Plat 1882 (Charleston City Archives).
32. Charleston Yearbook 1883.
33. Map of Charleston 1883 (SCHS).
34. Charleston News and Courier map, Sept. 10, 1883.
35. Sanborn insurance map, guide, May 1884 (Library of Congress).
36. Ibid., #18, May 1884 (LC).
37. Ibid., guide, 1888 (LC).
38. Ibid., #18, 1888 (LC).
39. Ibid., #47, 1888 (LC).
40. Charleston City Engineer Louis J. Barbot plat of lot and buildings of Mallonee Mills and Fernoline Works, May 24, 1890 (Plat Book of City of Charleston, 1671-1951, Charleston City Archives).
41. City Engineer's Office, Concord Street Extension, Apr. 3, 1890 (Charleston City Archives).
42. U. S. Coast and Geodetic Survey map by R. B. Marshall 1918 (SCHS).
43. Amended 1902 Sanborn insurance map of 1944, new sheet added in Feb. 1938 (Library of Congress).
44. Guide to ibid.

Plates

1. Calhoun Street Battery (Wilcox and Ripley, The Civil War at Charleston, p. 84).
2.-3. Marshall's Wharf, 1890s and 1970s (Rhett and Steele, Charleston Then and Now, pp. 80-81).
4. Aerial photograph by Aero Service Corporation, 236 E. Courtland Street, Philadelphia, 1939 (Charleston City Archives).

List of Owners

North Side

1760s? Christopher Gadsden
1807 Elizabeth Mazyck (lease)
1817 C. E. Gadsden
1850 Richard F. Smith
1851 B. F. Smith and Nelson B. Prothro (lease)
1867 Charles H. Simonton
1870 Bank of Charleston (half-interest with Simonton)
1871 James T. Welsman (?) to South Carolina Railroad Co. (parcels)
1874 Bank of Charleston to Robert Hunter
1875 South Carolina Railroad Co. to Carolina Lumber Manufacturing Co. (parcels)
1876 Robert Hunter to John C. Mallonee (parcel)
1876 Carolina Lumber to George S. Brown
1877 Brown to Mallonee
1884 Berkeley County Railway and Lumber Company
1887 George G. Moore
1887 Fernoline Chemical Company
1892 Frederick Ayer
1917 Interstate Land Holding Co.
1920 Charleston Dry Dock and Machine Company
1934 Reaffirmed

South Side

1760s? Christopher Gadsden
1817 Christopher E. Gadsden
1846 Joseph S. Addison and David W. McIntosh
1852 David W. McIntosh
1859 John Marshall
1881 Edward C. Marshall
1897 Charleston Basket and Veneer Manufacturing Company
1911 William H. Mixson
1914 Charles V. Boykin
1914 Valk and Murdock Iron Works
1919 Charleston Dry Dock and Machine Company
1934 Reaffirmed

List of Structures

No significant historic structures were erected on the site, except for a portion of Gadsden's Wharf. The minor buildings that did exist are dated by the maps.

Building & Use	Construction	Owner	Location	Map	Dates
Commercial wharf	wood	Chris.Gadsden C.E. Gadsden J.S. Addison & D.W. McIntosh John Marshall E.C. Marshall Chas. Basket Co. W.H. Mixson	south side	#8	1767-1914
same; industry; shipbuilding	wood?	Valk & Murdock Iron Works Chas.Shipbuilding		#43	1914-1919 1920-1940s
Lumbering wharf; tram roadway added 1880s	wood	R.F. Smith Nelson Prothro C.H.Simonton Carolina Lumber Co. John C. Mallonee Berkeley Railway & Lumber Co.	west side	#25	1850-1920
same; chemical manufactures? shipbuilding	wood?	Fernoline Chemical Co. Charleston Shpbldg		#39	1887-1892 1920-1940s
Calhoun St.Battery	wood/Earth	Confederate Army	SW corner	#25	1863-65
Saw mill log slide	wood?	J.C.Mallonee	west side	#31	1870s-80s
Saw mill steam pump and repair shop	wood?	Fernoline Chem. Company	west side, foot of wharf	#39,#40	1887-92
Storage cooper shed	wood?	"	SW corner	#39	"
Boiler house	wood?	"	west side	#40	1890s
Loft	wood	Chas.Shpbldg Co.	west edge	#43	1930s
Storage shack	wood?	"	west side	#43	1930s
Shipfitter's shop (partial)	steel frame; concrete floor	"	SW corner	#43	1930s

List of Shipwrecks

No shipwrecks or other historic marine structures have been located within the boundaries of the site, although three Civil War ironclads--the Palmetto State, Charleston, and Chicora--are known to have been sunk near the site and later (c. 1865-70) demolished by wreckers.

HMS Thetis, a 32-gun 5th rate British man-of-war, sank somewhere along Gadsden's Wharf during a storm in 1782, but this could have been located well to the south of the site. It was in all probability salvaged the same year before the British evacuated the city.

Bibliography

Primary Sources

The bulk of primary materials for this study were deeds found in the Charleston County Register of Mesne Conveyances (CCRMC), along with plats there and maps (or copies) found in the following archives (with acknowledgements to the appropriate archivists):

Carolina Art Association/Gibbs Art Gallery
Charleston City Archives (thanks to Ernestine Fellers)
CCRMC, especially the McCrady collection of early plats (thanks to Sallie Doscher, title searcher, Abstracts, Inc.)
Charleston Museum (thanks to Martha Zierden)
Charleston News and Courier
Library of Congress, including the Sanborn Map Company fire insurance maps (copies at SCHS)
National Maritime Museum, Greenwich, England (copies SCHS)
South Carolina Historical Society (thanks to Cam Alexander)
U. S. Coast and Geodetic Survey

Thanks are also due Brien Vernado, David Ruth, Elias Bull, Warren Ripley, P. C. Coker, III, Palmer Olliff, and Bonnell Black.

The primary maps from the Library of Congress and National Maritime Museum were taken from copies at the SCHS, Carolina Art Association, and books. John A. Wolter, Chief, Geography and Map Division, LC, states (letter of December 11, 1987) that the earliest very large scale map of the city dates from 1852 (#24 of this study). Mary Hilton, Librarian of the Corps of Engineers in Charleston, informed me that no records exist in its files relating to the subject of this survey. But the Fort Sumter National Monument library has a copy of Captain William Ludlow's Corps of Engineers report on Charleston harbor and the sunken Confederate ironclads to Major Q. A. Gillmore, April 20, 1871. The wealth of data in local repositories made up for no known materials at the National Archive

Newspapers consulted were the Charleston Daily Courier, Charleston News and Courier, and the South Carolina Gazette. A perusal of the John Johnson papers at the SCHS added nothing to the question of the Calhoun Street Battery.

Books

Burton, E. Milby. The Siege of Charleston, 1861-1865. Columbia: University of South Carolina Press, 1970. The standard work on the Civil War defenses of Charleston.

Cardozo, J. N. Reminiscences of Charleston. Charleston: Joseph Walker, 1866. Useful memoirs of the Civil War in the city, especially on the destruction of the Confederate ironclads.

Charleston City Directories, 1875-1916. Important reference work for identifying property owners, but not always revealing.

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Coker, P. C., III. Charleston's Maritime Heritage, 1670-1865. Charleston: CokerCraft, 1987. The key work on the subject, especially in its treatment of Gadsden's Wharf during the major wars.

Davis, Ralph. The Rise of the Atlantic Economies. Ithaca, New York: Cornell University Press, 1973. A standard treatment of Atlantic shipping during the colonial period, placing the Charleston rice trade in context of the larger commercial picture.

Dictionary of American Naval Fighting Ships, 8 vols. Washington: Naval History Division/Center, 1959-1983. The standard reference work on American warships; Vol. II contains an appendix on all Confederate vessels.

Gillmore, Q. A. Defenses of Charleston, Supplementary Report, c. 1867.

Godbold, E. Stanley, and Robert Woody. Christopher Gadsden and the American Revolution. Knoxville: University of Tennessee Press, 1982. The standard biography, especially full in its coverage of Gadsden's Wharf in the Revolutionary period.

Jones, Gen. Samuel. The Siege of Charleston. New York: Neale, 1911. Autobiographical account by the Confederate department commander in the Southeast, but added little to this study.

Leiding, Harriette Kershaw. Charleston: Historic and Romantic. Philadelphia: Lippincott, 1931. Brief treatment of Gadsden's Wharf during the Revolution.

Leland, Isabella G. Charleston: Crossroads of History. Woodland Hills, Calif.: Windsor, for the Charleston Chamber of Commerce, 1980. An excellent overview of the city's history and replete with several historic Library of Congress maps.

Malloy, Robert. Charleston: A Gracious Heritage. New York: D. Appleton-Century, 1947. A marginally useful overview.

Moore, Jamie W. The Lowcountry Engineers: Military Missions and Economic Development in the Charleston District, U. S. Army Corps of Engineers. Charleston: U. S. Army Corps of Engineers, 1981. A fine study but too little detail for the purposes of this study.

Official Records of the Union and Confederate Armies in the War of the Rebellion, 70 vols. Washington: Government Printing Office, 1880-1901. Volumes XXVIII, Pt. 2, and XXXV, Pt. 2 were consulted for the only references to the Calhoun Street Battery.

Rhett, James Moore, III, and John Carson Hay Steele. Charleston Then and Now. Columbia: R. L. Bryan, 1974. Utilized only for the two photographs of Marshall's Wharf.

Rosengarten, Dale, et al. Between the Tracks: Charleston's

East Side During the Nineteenth Century. Charleston Museum Archeological Contributions 17; Charleston: Charleston Museum and Avery Research Center, September 1987. The only archeological study of the east side of the city, and while not dealing in any detail with the site it provides excellent background to an overall understanding of the area.

Stoney, Samuel Gaillard. This is Charleston. Charleston: Carolina Art Association, 1944. A few nuggets of information were utilized.

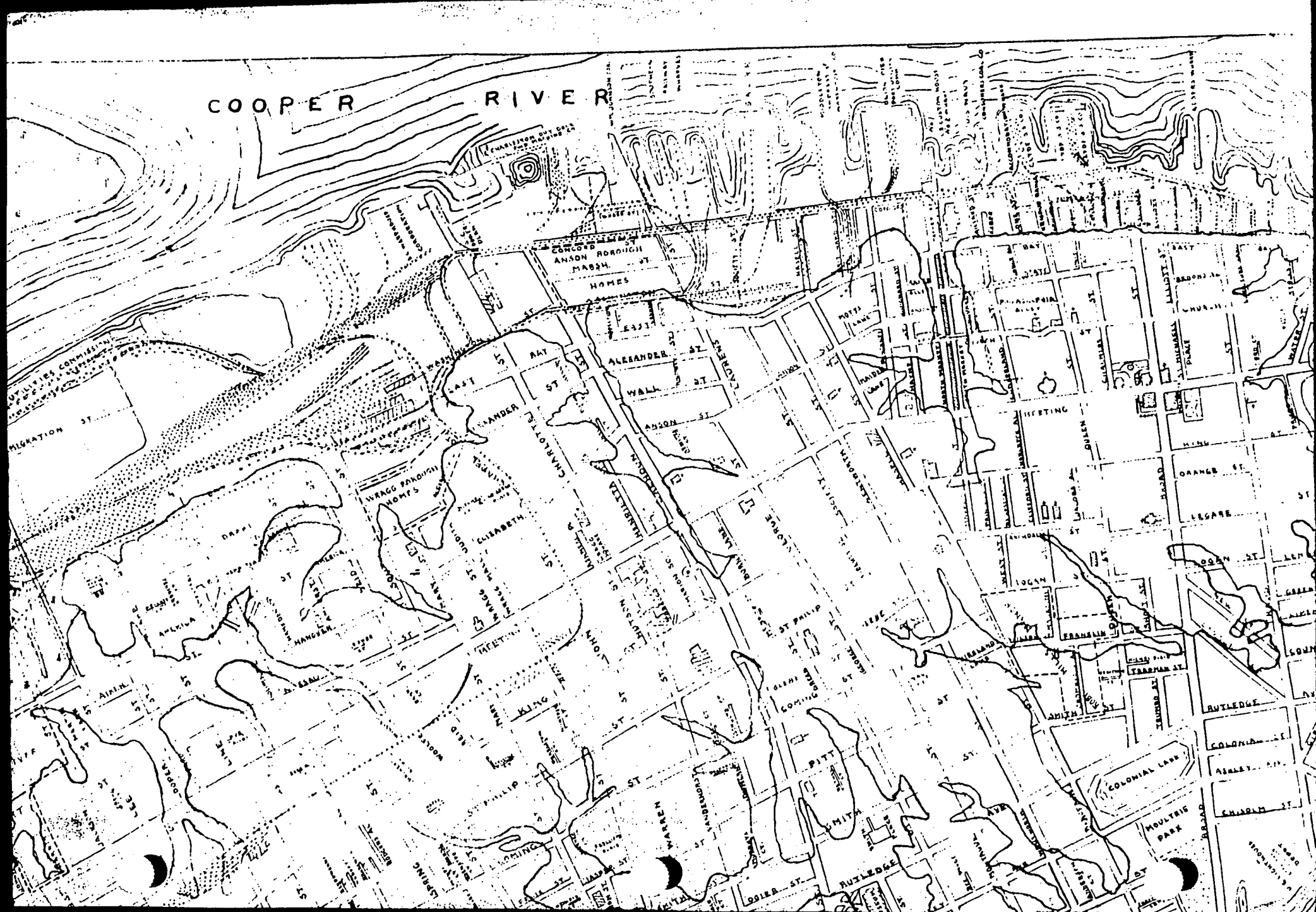
Wilcox, Arthur M., and Warren Ripley. The Civil War at Charleston. Charleston: The News and Courier and The Evening Post, 1966. An excellent series of newspaper histories of the war, based on solid research, and therefore important to pinpointing the Calhoun Street Battery.

The Author

Clark G. Reynolds received his Ph.D. from Duke University in 1964 and has taught American history at the U. S. Naval Academy, University of Maine, and U. S. Merchant Marine Academy; he is presently an adjunct professor of history at the College of Charleston and consultant to a number of governmental agency in this country and Canada. His books include The Fast Carriers, Command of the Sea: The History and Strategy of Maritime Empires, and The Fighting Lady. He resides in Mt. Pleasant, South Carolina.

Maps and Plates

Arranged chronologically, with the plates integrated with the maps.


COOPER RIVER
CONCORD
ANSON
MABEN
HOMES
ALEXANDER ST
WALL ST
ANSON ST
EAST BAY ST
CHARLOTTE ST
ELIZABETH ST
MEETING
KING ST
COMING ST
PITT ST
SMITH ST
RUTLEDGE
COLONIAL LANE
MOULTRIE PARK
LEGARE
ORANGE ST
FRANKLIN
TRADD ST
MIGRATION ST
WRAGG PARQUISH HOMES
ST PHILIP
ST MICHAEL
GLEBE ST
WARREN
SPRING
DOCKER
LEE
ANELINA
HANDEL
ALBERT
ROGERS
DOGER ST
COLONIA
ASHLEY AVE
CHUBLIN ST
QUEEN
LOCKE
LOGAN
BROAD
CHURCH
WATER
HAYNE
LAMBOLL
ELLIOTT
MARGARET
MARKET
LOUGHERAND
MOTTS LANE
HAYNE
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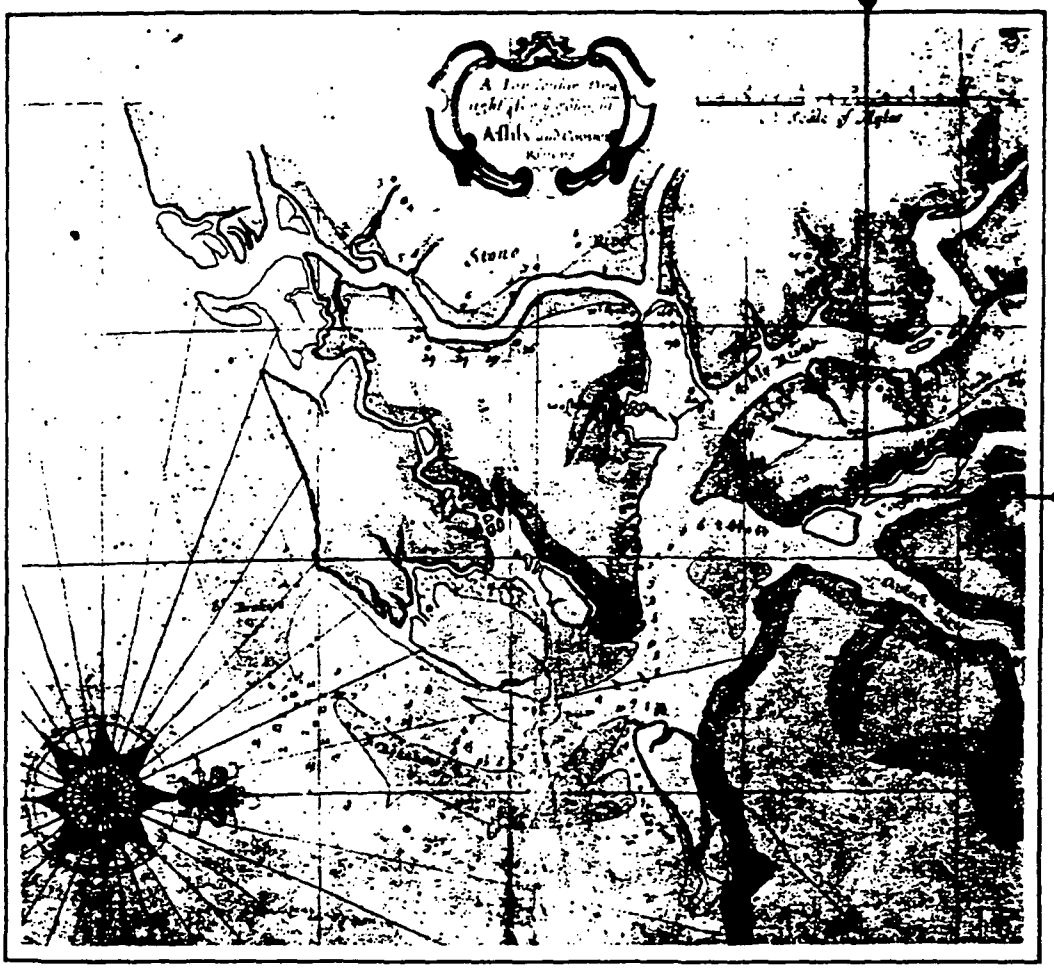
MOTTS LANE

Prehistoric

Alfred O. Halsey 1949

3

A burial shows the typical flexed position of the bodies placed inside the ceremonial compound by the Indians who used the area near Albermarle Point as a sacred center. Courtesy of Institute of Archeology & Anthropology, University of South Carolina



At Kiawah village site this smooth water jar was found inside a complicated stamped bowl. The bowl may have held leaves of the yaupon plant from which Black Drink, used in ceremonies of many Southeastern Indians, was derived. Courtesy of Institute of Archeology & Anthropology, University of South Carolina

This map inset by Maurice Mathews c. 1685 shows "Ye Roade," the Indian Broad Path winding through the peninsula Charles Towne and branching approximately where present-day Broad and King Streets intersect. One branch went to Landgrave Joseph West's property on the Ashley River between today's King and Legare Street, the other towards Mathew's lot, about where Granville Bastion later stood. Courtesy of Library of Congress

1685

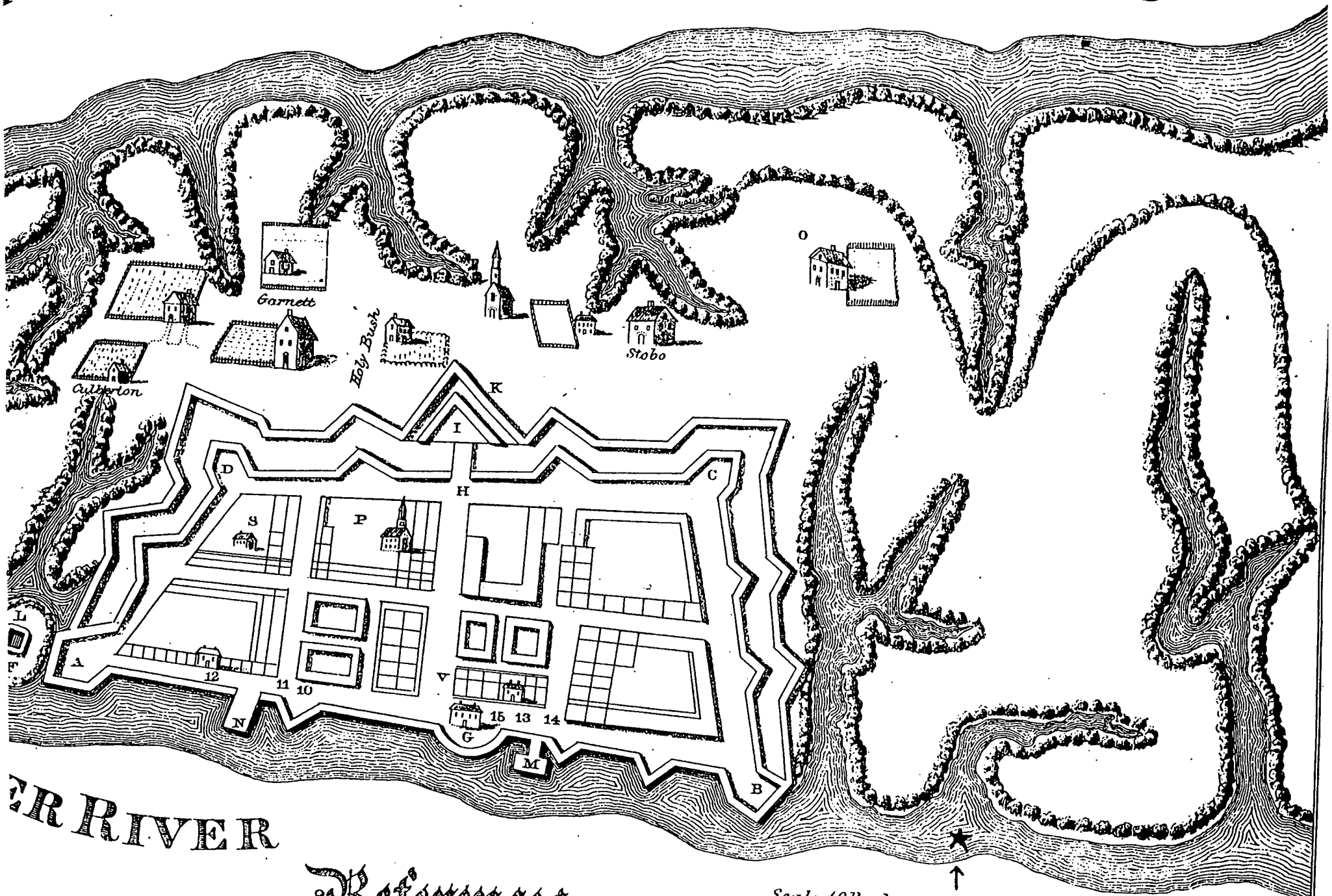
Aerial view of posthole outline of Kiawah ceremonial area is revealed by excavation. In center are postholes of rectangular, square and round sheds, and open burial pits. An excavated posthole pattern shows a smaller compound area to the north, an outer palisade ditch outline that is not excavated, and a circular posthole pattern of a corner bastion at the west corner. The square grid is a pile of construction materials for the Tri-Centennial Commission's Pavilion constructed on top of the ceremonial center. Courtesy of Institute of Archeology & Anthropology, University of South Carolina

This first real map of Charles Town was drawn by Edward Crisp about 1704 and probably published c. 1711 when the town fortifications and Fort Johnson were completed. It shows a walled city, with creeks to the north and south, a few houses outside the walls, including a Quaker Meeting House, four houses of worship and residences within the fortifications, and a lively trade represented by shipping in the harbor. Courtesy of Library of Congress

1704

4

R 1704 5



ER RIVER

References.

Scale 40 Perches or 60 Feet an Inch.

10 20 30 40 50 60 70 80

'ridge in the Line | P | English Church | 1 | Pasquero Garretts House | 9 | Starling H

'e covered half Moon | O |

down the King's Highway from Georgetown with the news of fighting in Massachusetts, that gun salutes announced the arrival of the man-of-war *Scorpion*, bringing Lord William Campbell, newly appointed Royal Governor, and his wife. There were no welcoming crowds, no parade, no loud acclaim when his commission was proclaimed from the portico of the Exchange—only ominous silence. It was a cold welcome for the young couple, even though Lord Campbell's wife Sally and Arthur Middleton's wife Polly were sisters. Until the house of her cousin Mrs. Daniel Blake, at 34 Meeting was ready for them, they were temporarily housed at Miles Brewton's, the brother-in-law of Mrs. Blake. Though friends called and the new arrivals were handsomely entertained, their being closely related to revolutionary leaders made for strained situations.

Lord William found his residence at 34 Meeting very convenient, since he could communicate by small boat from the rear of the house on Vanderhorst Creek with British ships in the harbor. This fact did not go unnoticed, however, and before he had been in Charlestown three months, he was charged with attempting to arouse the frontier settlements against the colonists. He was himself forced to escape by way of this backdoor route to the British sloop-of-war *Tamar*, taking with him the great seal of the province. So ended Royal Government in Carolina.

When Gadsden returned from Philadelphia with a copy of Thomas Paine's *Common Sense*, and declared himself in favor of the absolute independence of America, he horrified the Provincial Congress. John Rutledge said he would ride post by day and night to Philadelphia to prevent the disaster of separation from England. Armed forces were organized and Gadsden was chosen Colonel of the First Regiment, Moultrie of the Second, and William Thomson Lt. Colonel of the Third. Gadsden was needed in Charlestown to attend to his military duties, and fifty-eight-year-old Henry Middleton, newly married to his third wife, said "infirmities of age that were creeping on" kept him from serving as he had previously done, and requested that he not be reappointed delegate to Congress.

The Provincial Congress re-elected John Rutledge, Thomas Lynch, and Edward Rutledge, and elected new delegates Thomas Heyward Jr. and Arthur Middleton, the latter "considered 'warm' even by New Englanders." When Gadsden refused leave for twenty-seven-year-old Thomas Lynch Jr. to attend his father, who suffered a stroke while in Philadelphia, Congress made young Lynch a sixth delegate, and he replaced his father.

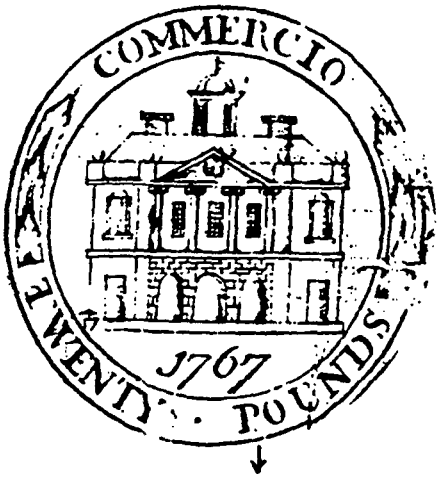
On March 26, 1776, South Carolina seceded from Great Britain, setting up an independent government, and electing John Rutledge President. Addressing both houses of the legislature, Rutledge told them: "The eyes of Europe, nay of the whole world, are on America...the eyes of every other Colony are on this...a Colony, whose reputation for generosity and magnanimity is universally acknowledged. I trust, therefore, that there will be no civil discord here, and that the only strife amongst brethren will be, who shall do most to serve, and to save, an oppressed and injured country."

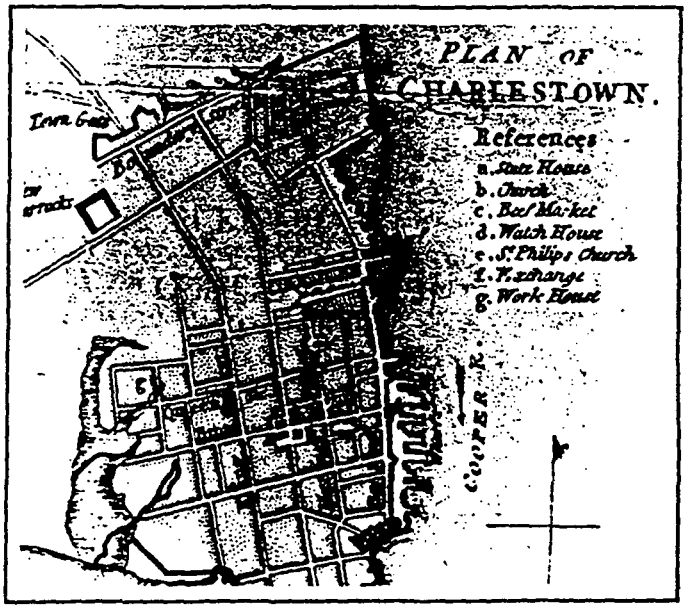
Moultrie combined the blue of his soldiers' uniforms with the silver crescents on their caps to design the first South Carolina flag. This flag was flying over little unfinished Fort Moultrie on June first, when fifty British ships under the command of Admiral Sir Peter Parker appeared off the bar. Only the front and one side of the fort were completed and the small open, square fort had walls of two rows of palmetto logs sixteen feet apart, with beach sand between, and boasted thirty-one cannon to oppose the fleet's two hundred seventy. Commanding General Charles Lee thought "it could not hold out half an hour, and that the platform was but a slaughtering stage," and suggested to Rutledge it be abandoned, but Rutledge indignantly refused, saying he would cut off his right hand before writing such an order.

Lee then had half the powder and a large number of the troops removed, since he considered the fort doomed, and Moultrie was ordered to spike his guns and retreat if his powder gave out. As a result of this action, Moultrie slowed down his fire so much during the battle that at one point the British thought the fort was out of commission. Captain Lempriere informed Moul-

7

1760s





Top:
Detail from note issued Sept. 1767 by act of the General Assembly which "entitles the bearer to a credit equal to twenty pounds in the current money of this Province and shall be received by the Public Treasurer in payment of all duties and taxes whatsoever until the 29th day of September, 1772." The building is thought to be the first South Carolina State House. Courtesy of Carolina Art Association

Below:
This plan of Charleston shows the four corners of the law, the New Barracks, Gadsden's Middlesex, and the town gate. Courtesy of Sourth Carolina Historical Society

c. 1770

8

PLAN OF LANDS

BELONGING TO

CHRIST.r GADSDEN ESQ.r

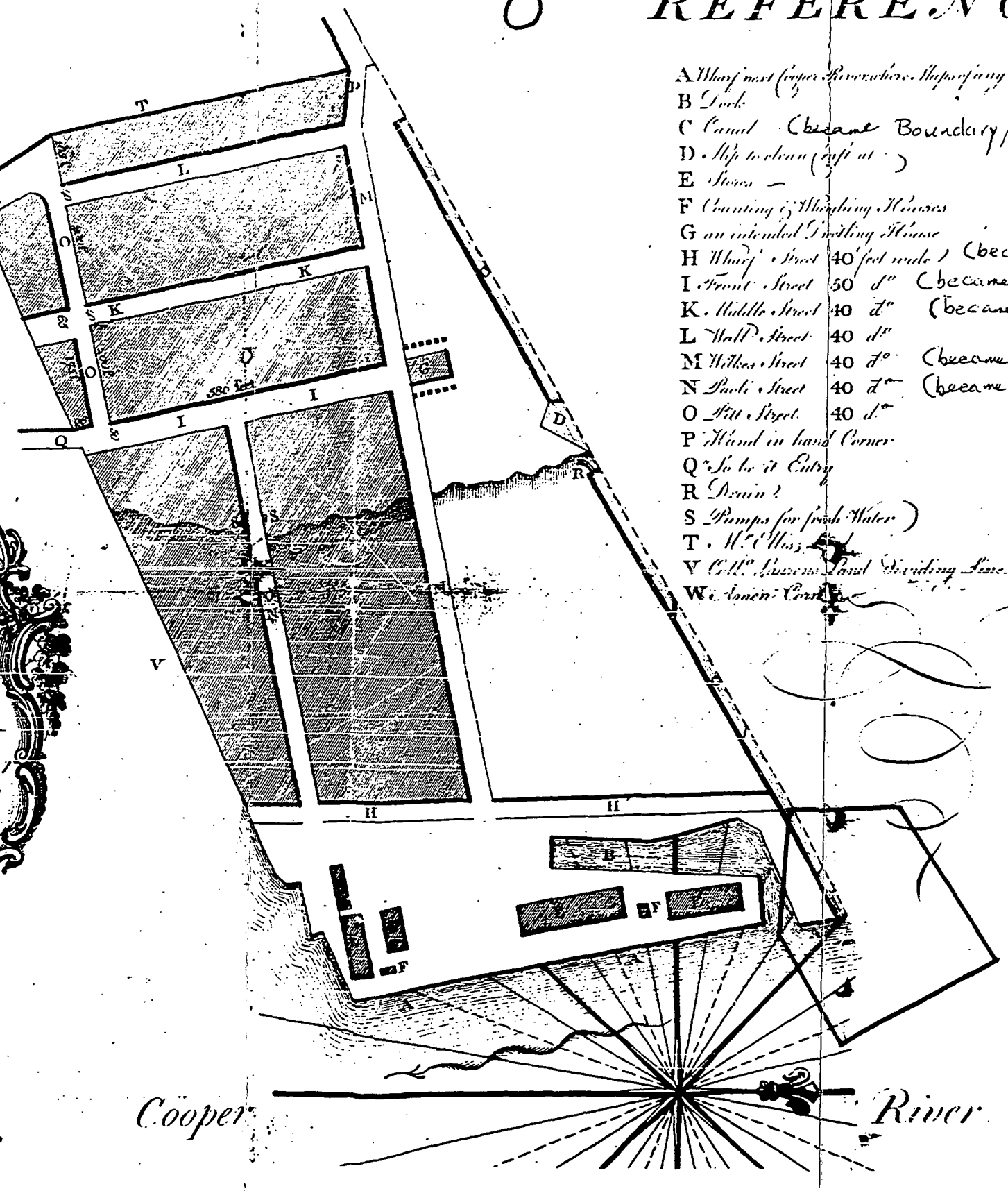
at the North end of Charlestown

SOUTH-CAROLINA

with all the Wharfs Docks Stores

and other

IMPROVEMENTS



REFERENCES

A Wharf next Cooper River where Ships of any burthen may Load at low Water
B Dock
C Canal (became Boundary/Calhoun St.)
D Slip to clean (raft at)
E Stores —
F Counting & Weighing Houses
G an intended Dwelling House
H Wharf Street 40 feet wide (became Concord St.)
I Front Street 50 d.o (became East Bay St.)
K Middle Street 40 d.o (became Alexander St.)
L Wall Street 40 d.o
M Wilkes Street 40 d.o (became Inspection St.)
N Paoli Street 40 d.o (became Vernon St.)
O Pitt Street 40 d.o
P Hand in hand Corner
Q So be it Entry
R Drain
S Pumps for fresh Water
T M.r Ellis
V Coll.o Laurens Land Dividing Line (Pitt St.)
W Amen Corn

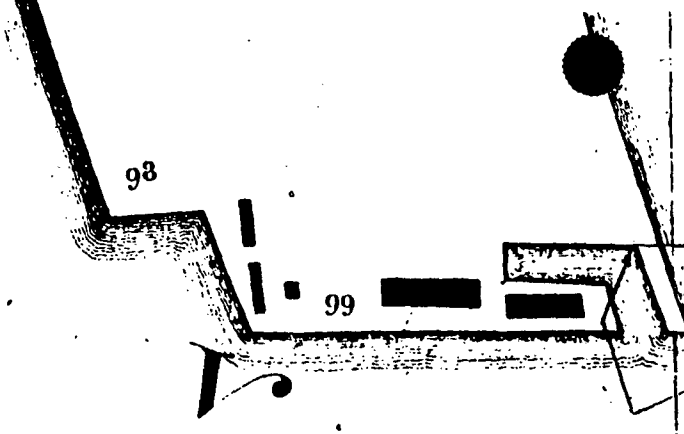
R I

LESTON,

'for the use of the'

'LONDON'

'Edmund Petrie'



E

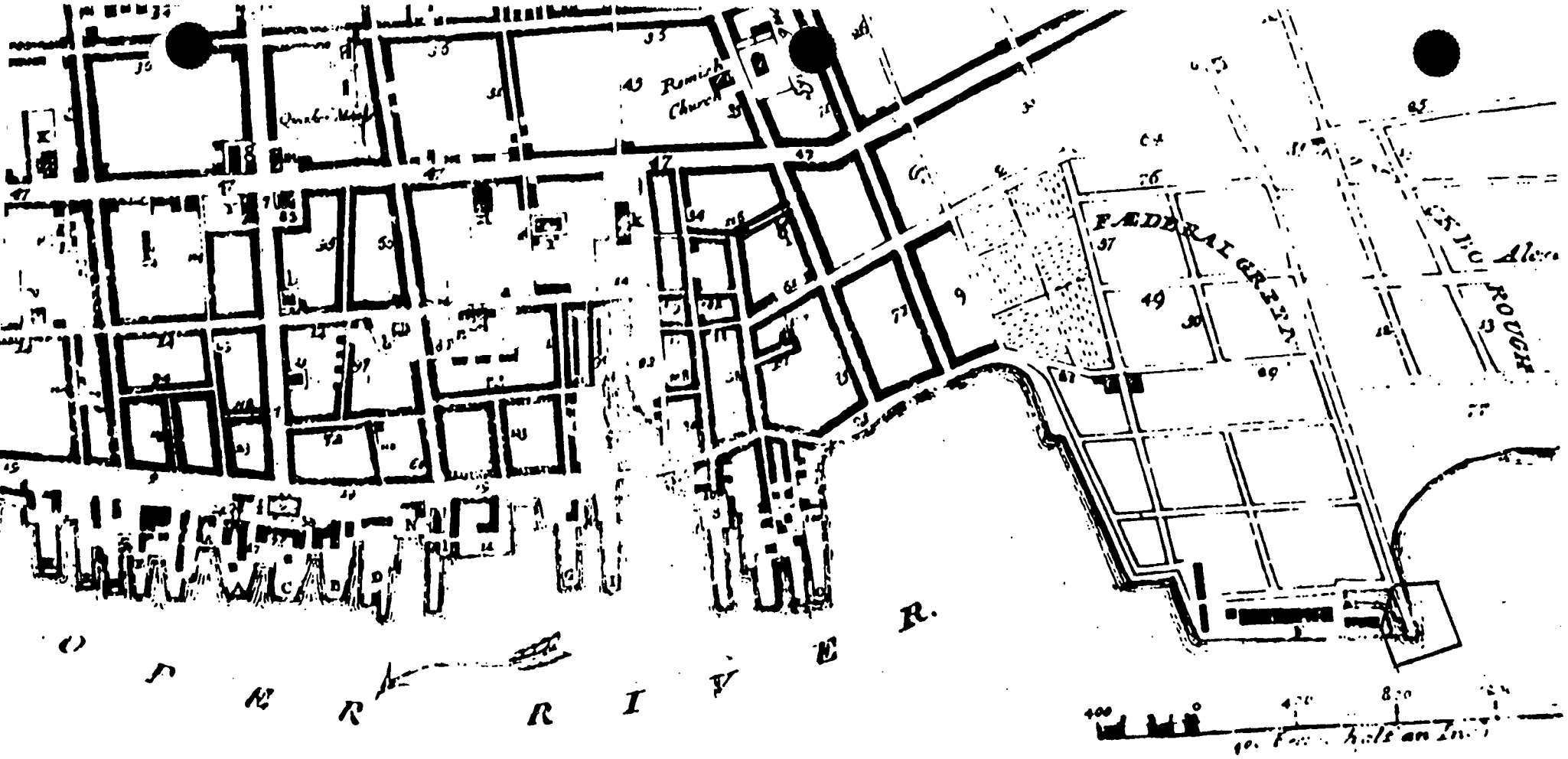
O Old Independent ..... D°
P Methodist ..... D°
Q Quaker ..... D°
R New Independent ..... D°
S German ..... D°
T Jews Synagogue
V Distilleryes
U Cravens Bastion
W Romish Church
X Brew House
NB: the Brick Houses colored thus .....
the Wood D° ..... D° .....

R

35 Public Wells marked thus .....•
9 Fire Engine belonging to the City
NB: There are private Wells in general throughout the City

9

1788



CITY OF CHARLESTON SOUTH CAROLINA.

10

1802

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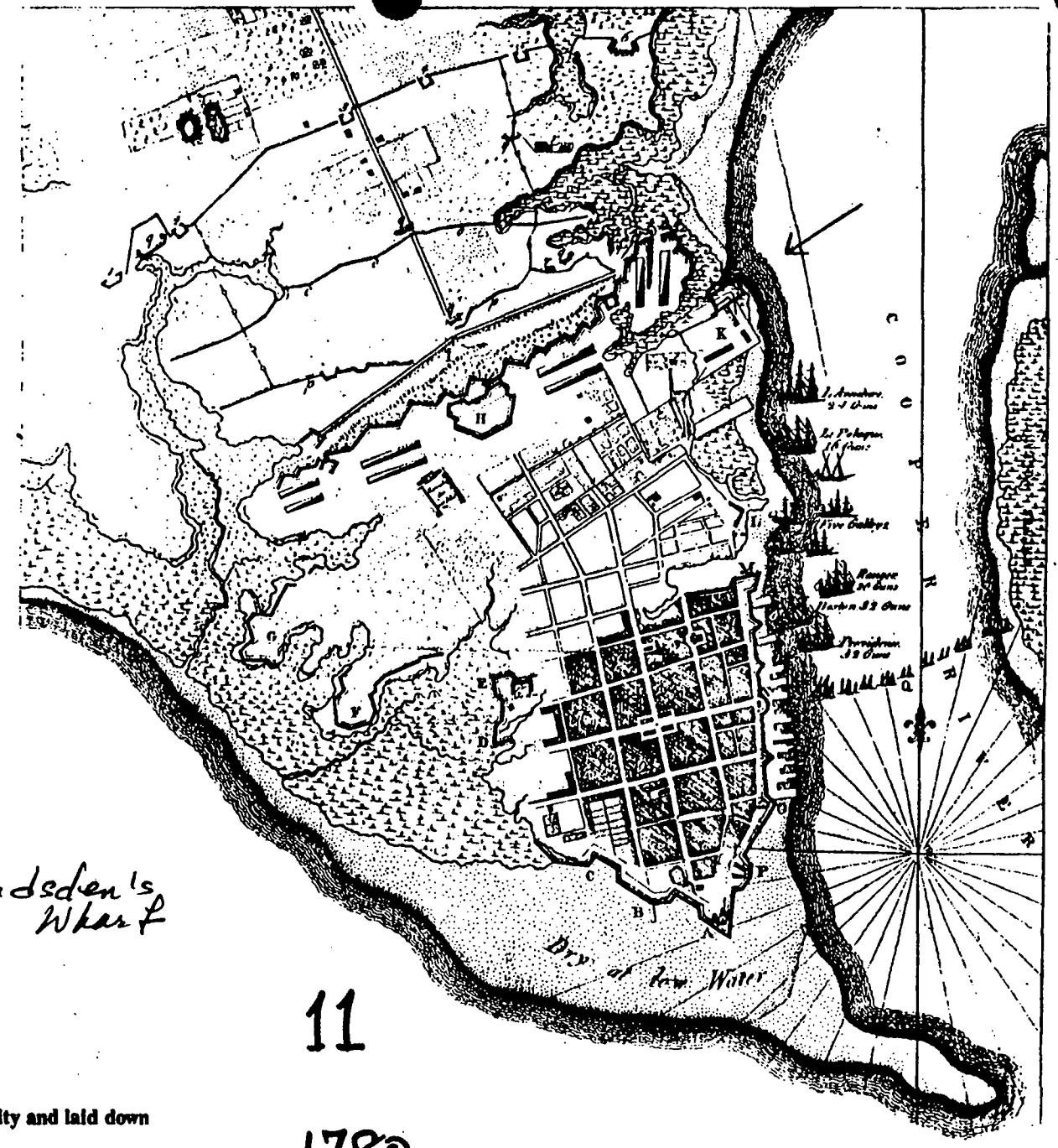
K = Gadsden's Wharf

the British Army

h 6 begun on April 1 for the First Parallel.
ted April 19.
d May 6.

erican forces, the garrison marched out of the city and laid down
Hornwork.



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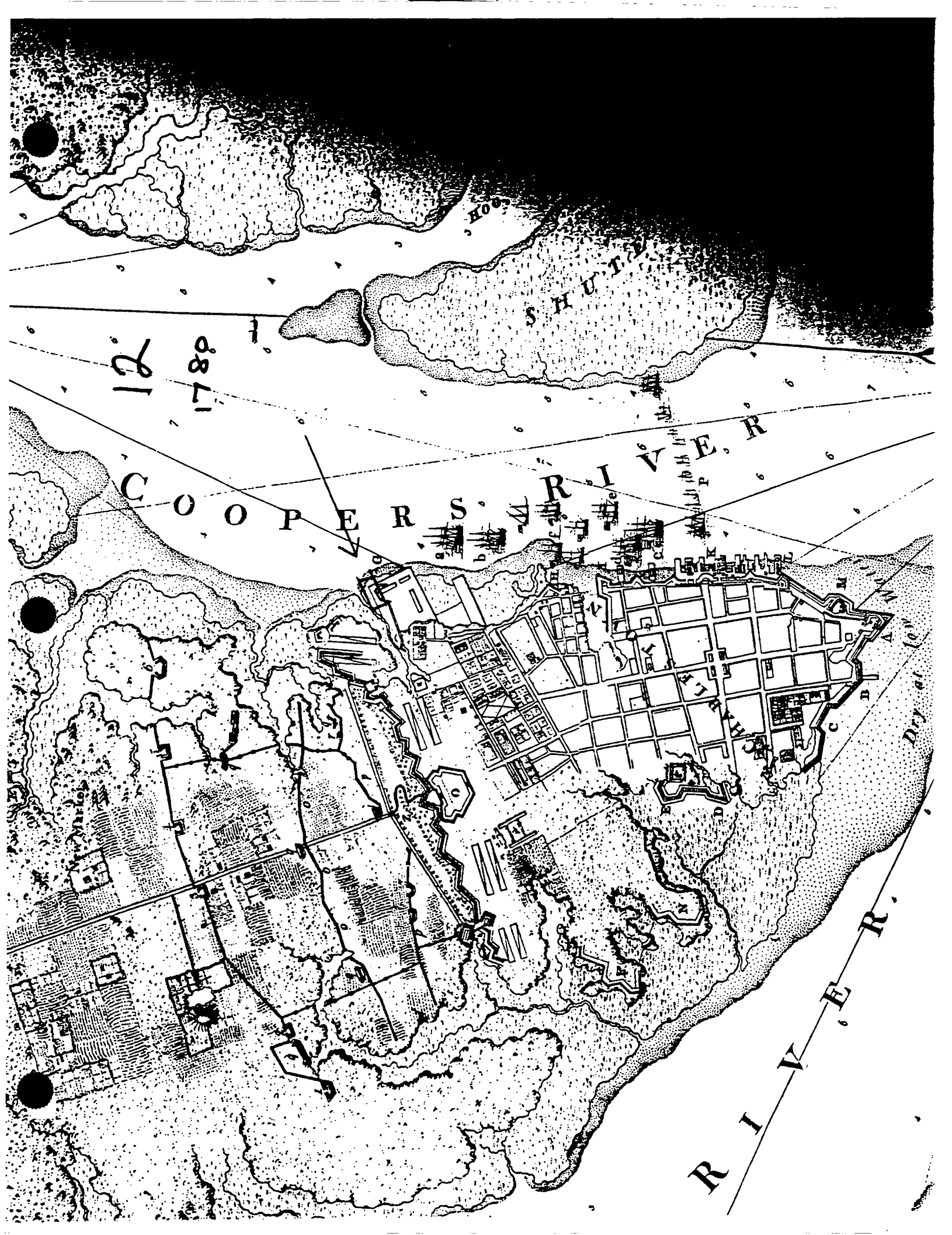
1780



12
1780
SHUTE
COOPERS RIVER
RIVER
Dry at low

to the French by providing ship-to-shore communications ...

ill-prepared a... umbered by the Franco-American forces, the British land
ı excellent defense. The allies now paid for the failure to capture Maitland's
'erry; they had successfully reached Savannah through the coastal creeks on
'he British were also helped by
r Moncrief, who completed the
.; because of them, the allies
ıvesting the city and preparing

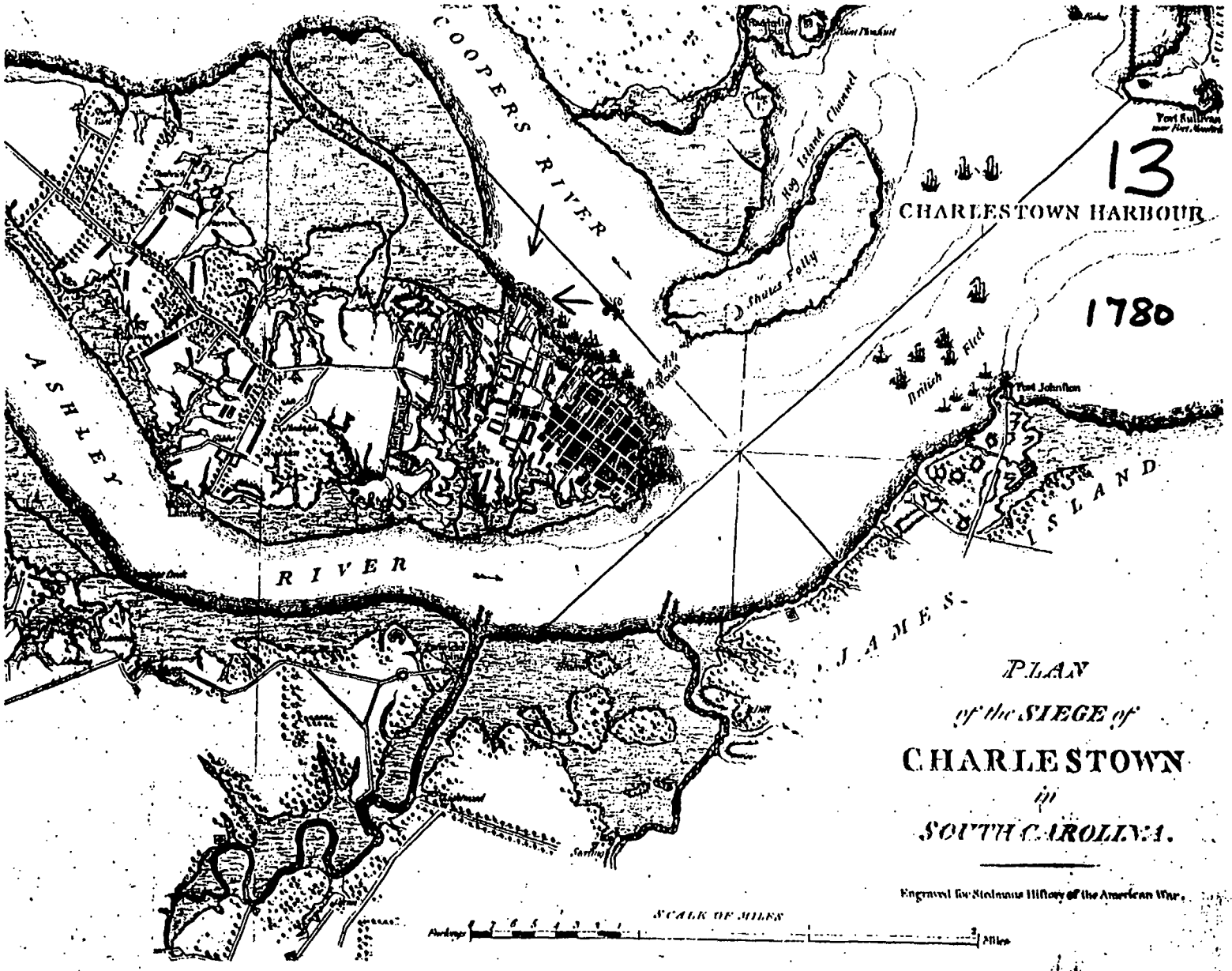
was unable to mount a pro-
:cause his ships were needed
ēs and he feared the hurricane
re, he decided to force the issue
ıssault on the British lines on
attack was easily repulsed and
ualties, including Polish Count
i, who died of his wounds on
route to Charlestown and was

ıch ships offshore suffered
. gales, and Pritchard's Ship-
own supplied repair timber for
rs. After the French had with-
ining South Carolina warships
her storm on November 4. *Rut-*
ast; with another vessel, she
the Savannah estuary and cap-
became HMS *Viper*, and Cap-
ı his third term of captivity.
icans regrouped at Charlestown
ıe certain British attack. From
nd of the war, South Carolina
:ene of most of the fighting in
er battles would turn the tide of
merican side. Yorktown would
'inal blow to the disintegrating
:e. This fact is lost upon many
e American Revolution.

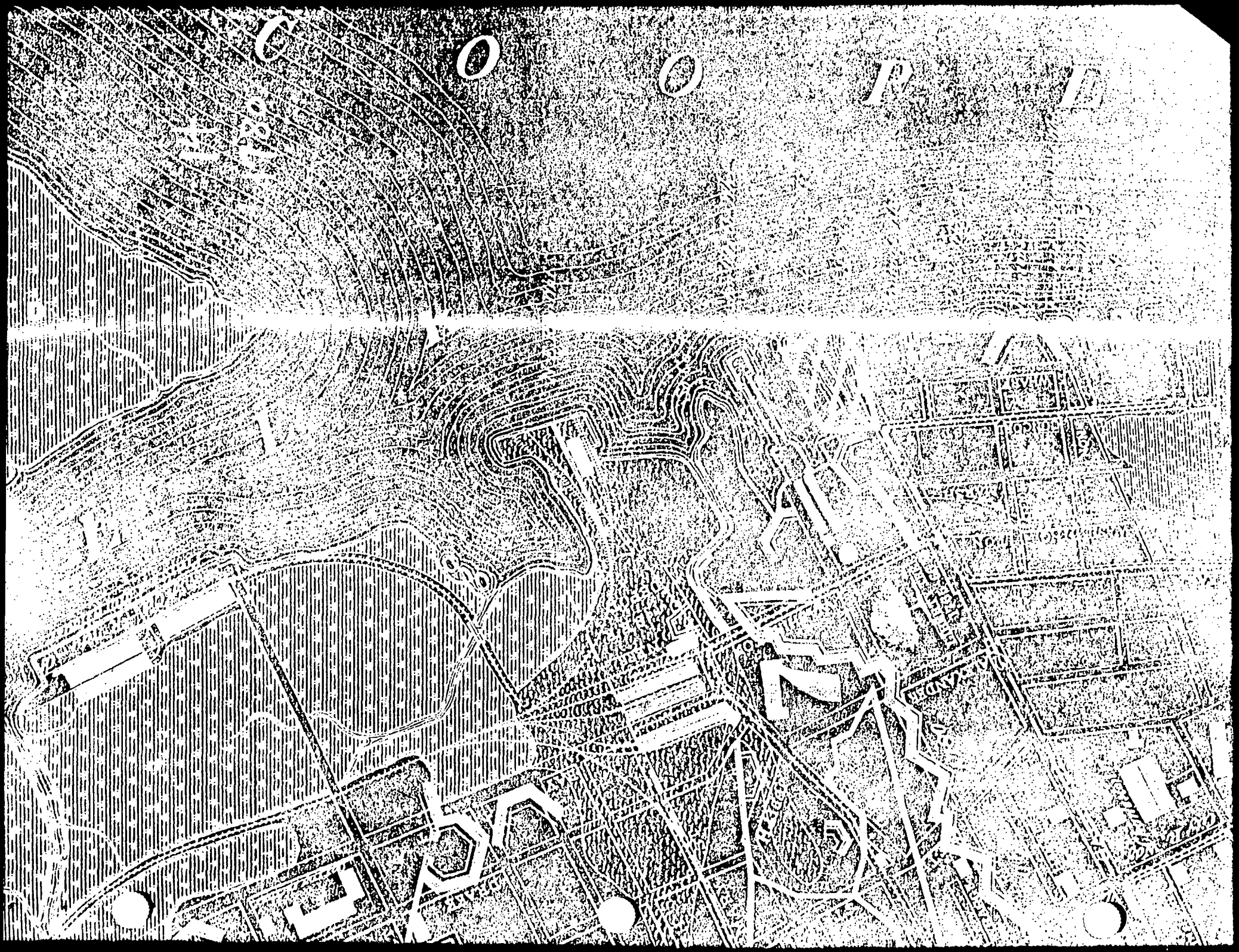
lt on Charlestown

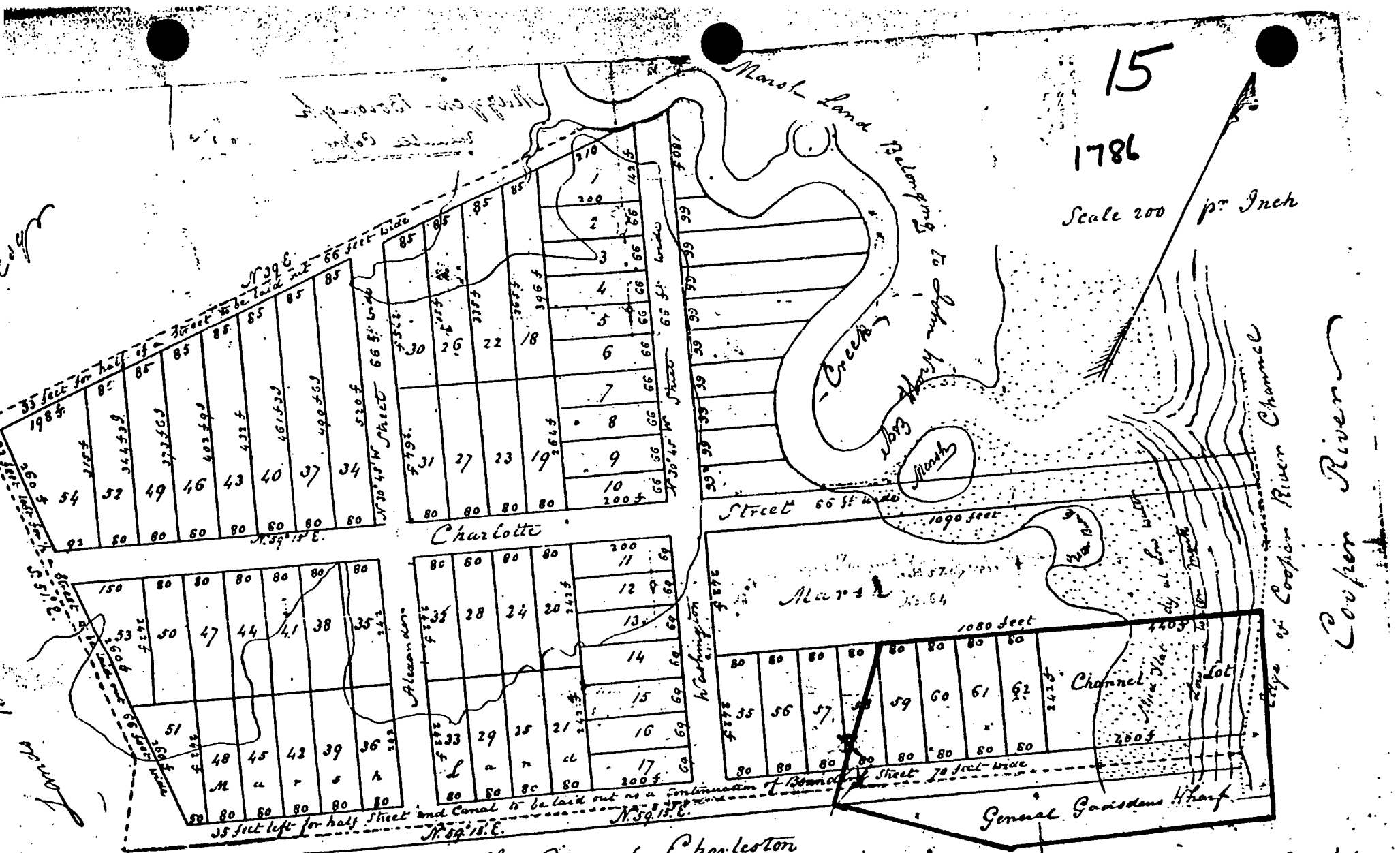
:neral Clinton learned of the
at Savannah, he immediately
his plans for an all-out attack
ı. He left New York at the end

Marriot Arbuthnot. After riding out a storm off Hatteras, the fleet of transports, supply ships ... ships-of-the line, and five frigates put into Savannah on February 2 ... But Clinton had stopped only to reassemble his forces after the storm, and quickly n... orth-ward. On February 10 the fleet sounded the North Edisto River and marked the channel.



A plan of the siege of Charlestown by the British Army and Navy in 1780. The British fleet is anchored off Fort Johnson and in Rebellion Road (labeled Charlestown Harbour). At lower left Wappoo Creek leads from the Stono River to the Ashley River. Note the American defenses and British siege works across Charlestown neck (see also page 107).





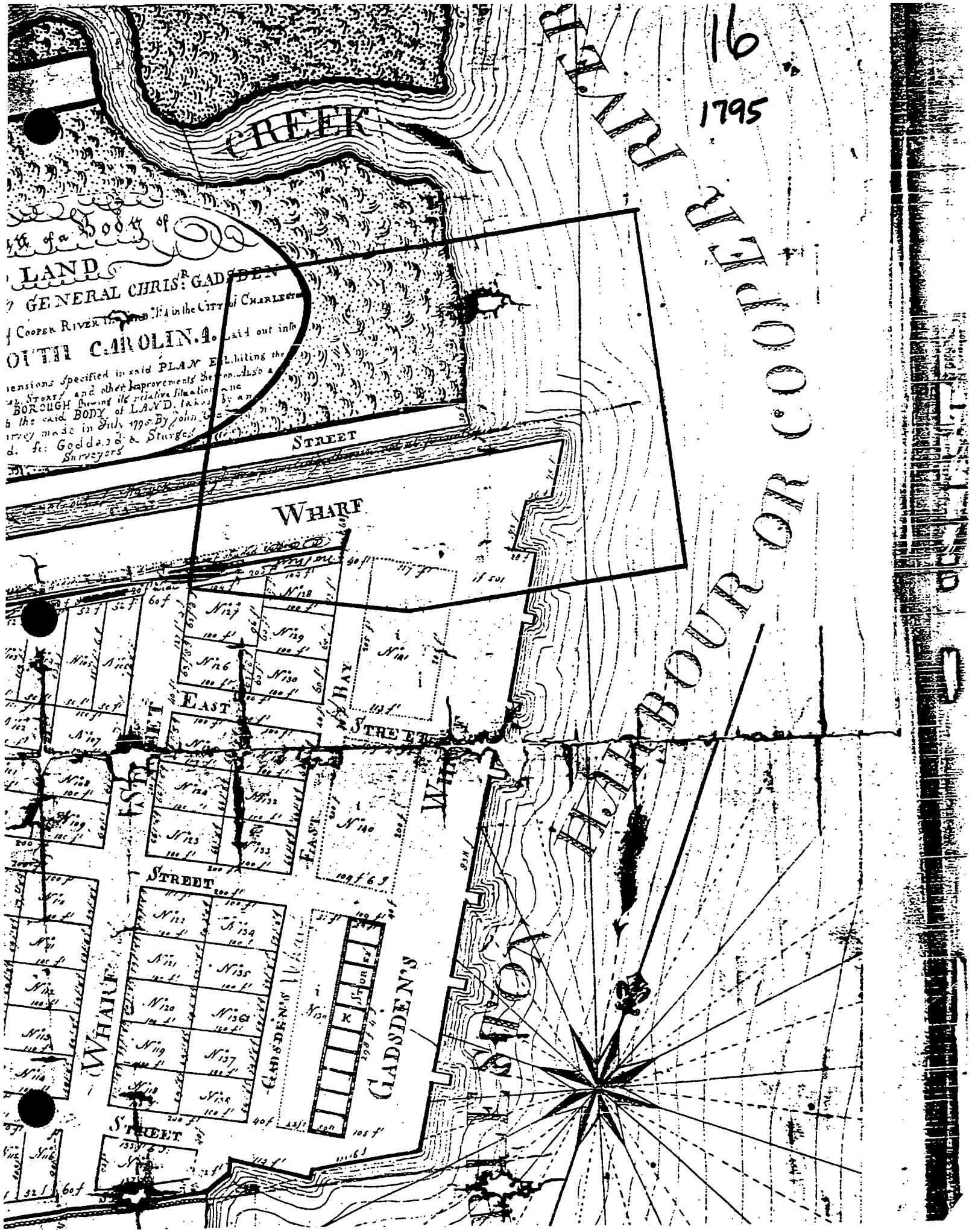
Plan of Mazyck-Borough on Charleston Neck adjoining the City of Charleston, on Cooper River &c — as laid out into Lots, belonging to Alexander Mazyck Esqr. From a Survey & division made, at the request of the proprietor, in February 1786. — By Joseph Purcell Surveyor

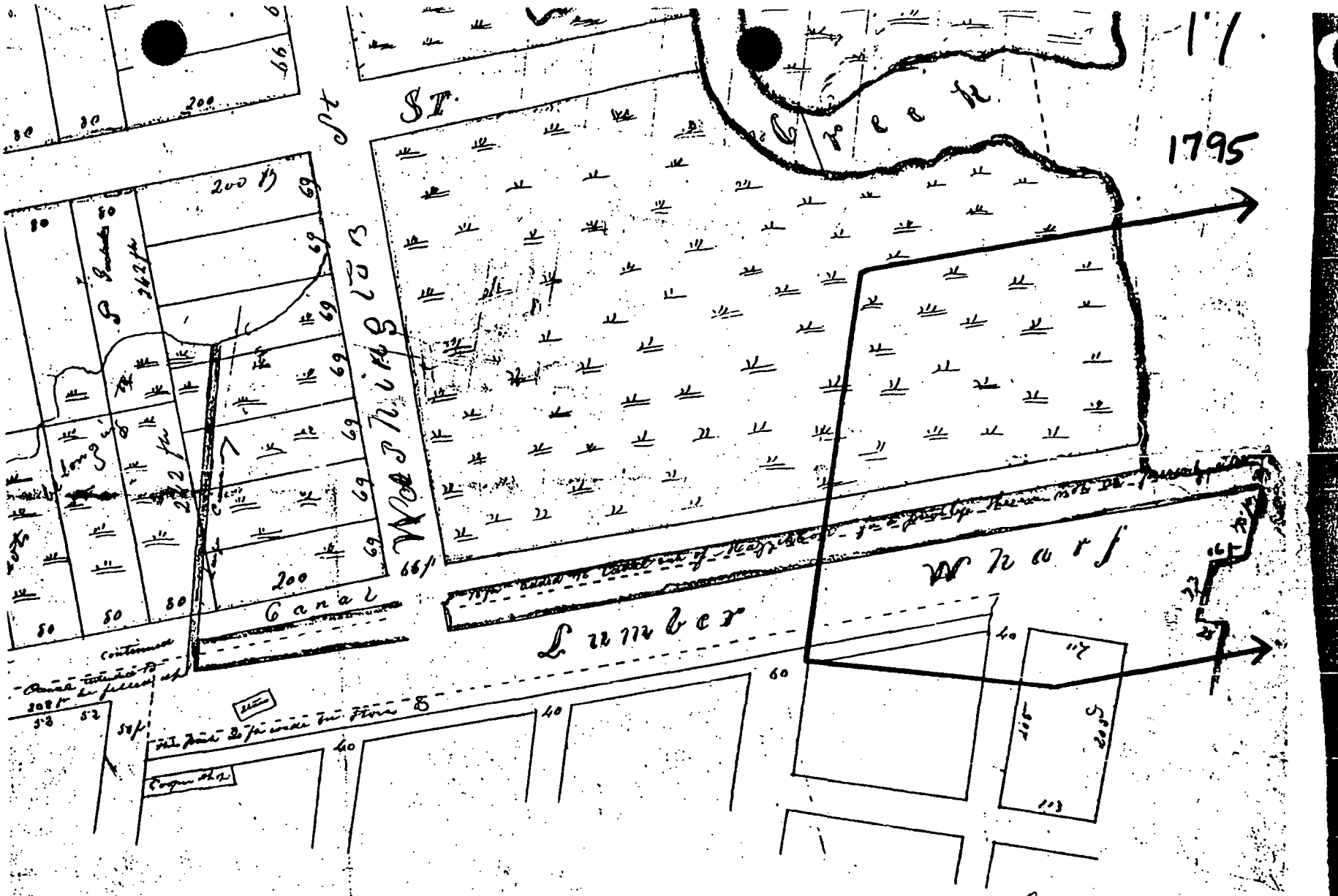
(Signed) Joseph Purcell

Surveyor Gen. Office
Charleston 10 July 1804

Recd the above plan from Joseph Purcell
(Signed) Artimas B. Darby
D. S. G.

Check Copy from the original recorded
... Secretary States

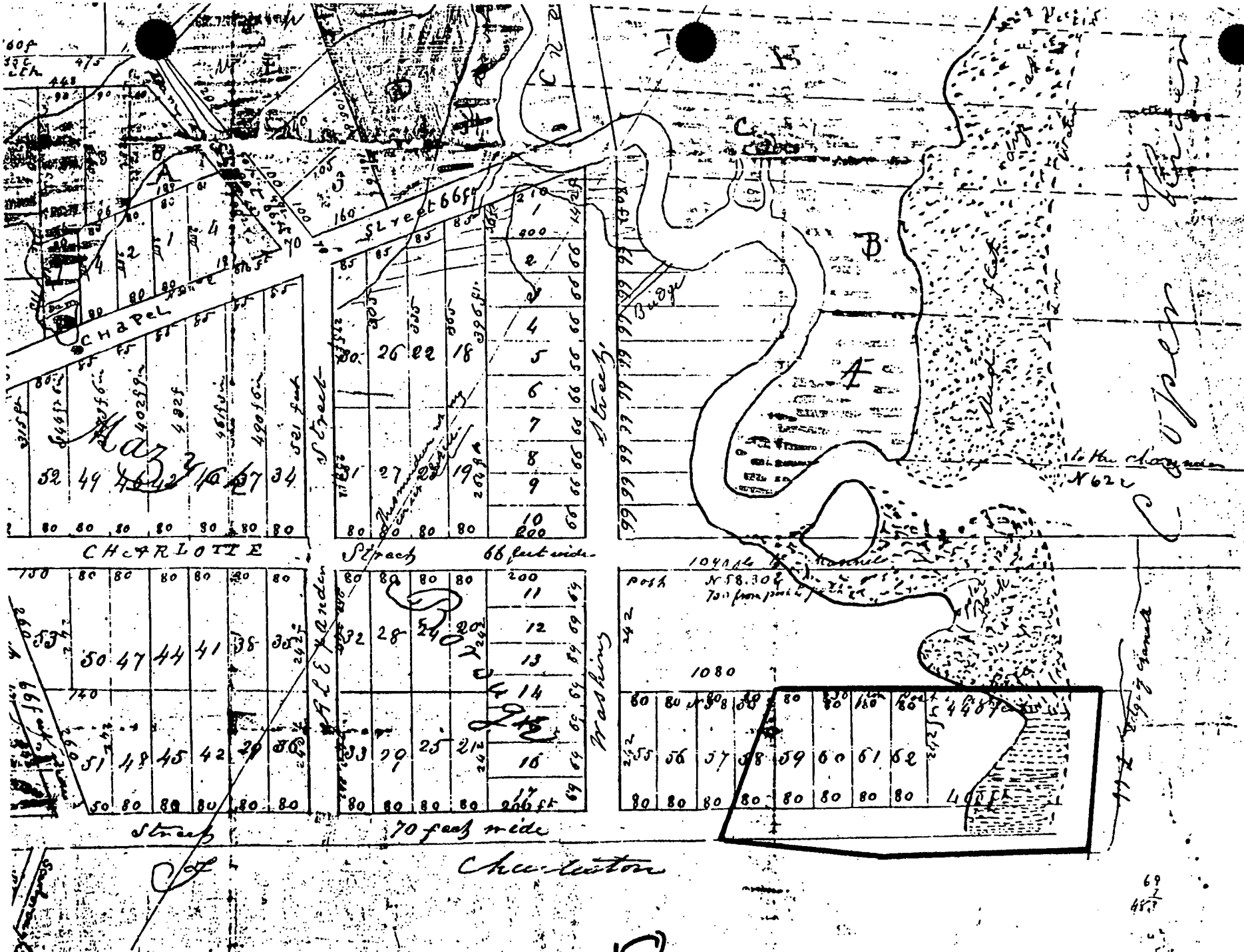

16
1795
CREEK
LAND
GENERAL CHRIS.R GADSDEN
OUTH CAROLINA
STREET
WHARF
EAST
STREET
BAY
STREET
WHARF
STREET
GADSDEN'S
GADSDEN'S
STREET
HARBOUR OR COOPER RIVER



Plan of a body of Land the property of Jen Christopher Gadsden Situated in Mazzachbord, Ward No 5 Charleston So Ca

Surveyed by John Goddard July 1795
for Goddard & Stringer

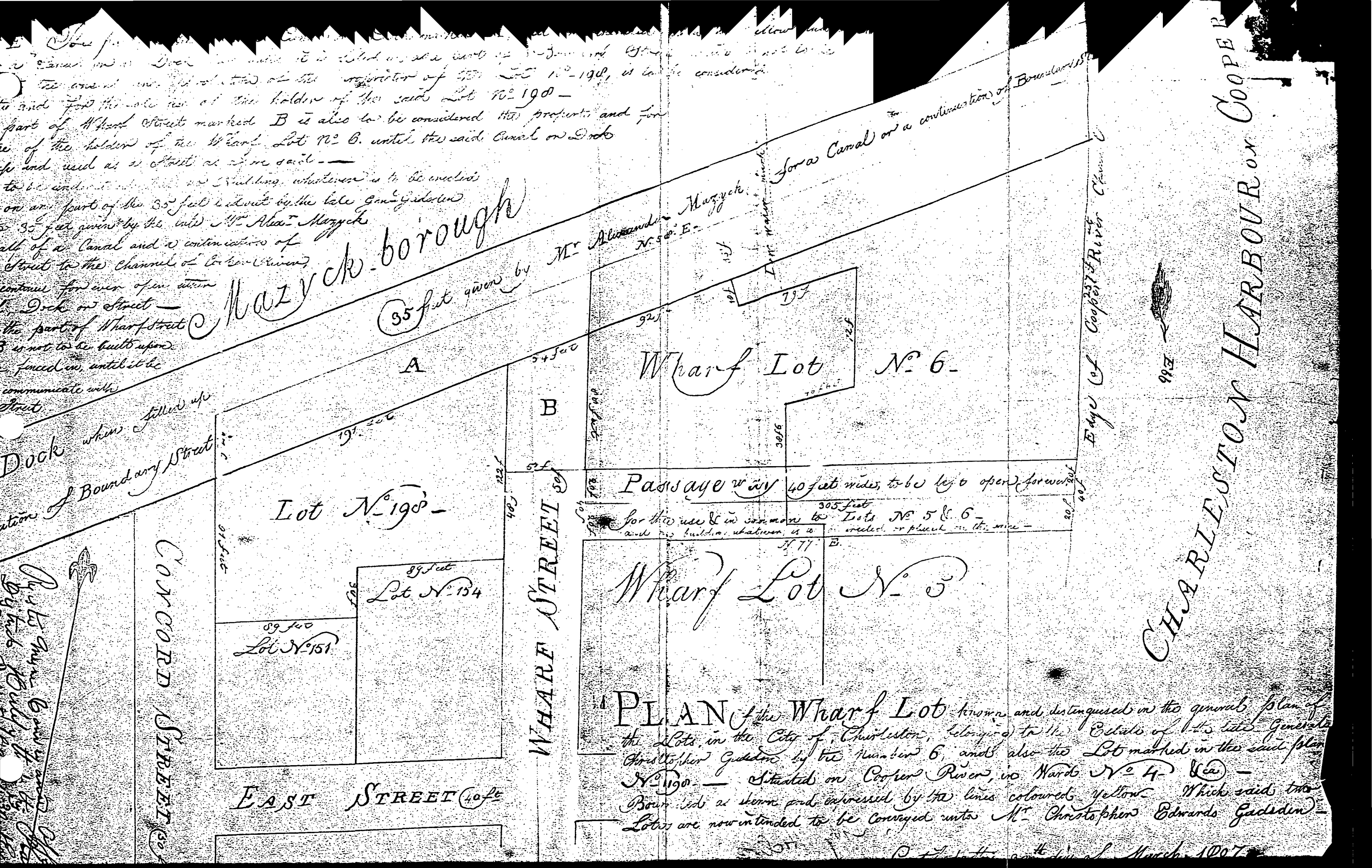
1795



CHAPEL
Street 66 ft
CHARLOTTE
Street
66 feet wide
Street
70 feet wide
Washing
Street
Charleston
Bridge
to the channel
N 62 E
Post
N 58.30 E
1080

18

1795



PLAN of the Wharf Lot known and distinguished in the general plan of the Lots, in the City of Charleston, belonging to the Estate of the late General Christopher Gadsden by the Number 6, and also the Lot marked in the said plan No 198 — Situated on Cooper River, in Ward No 4 &ca — Bounded as shewn and expressed by the lines coloured yellow — Which said two Lots are now intended to be conveyed unto Mr Christopher Edwards Gadsden —

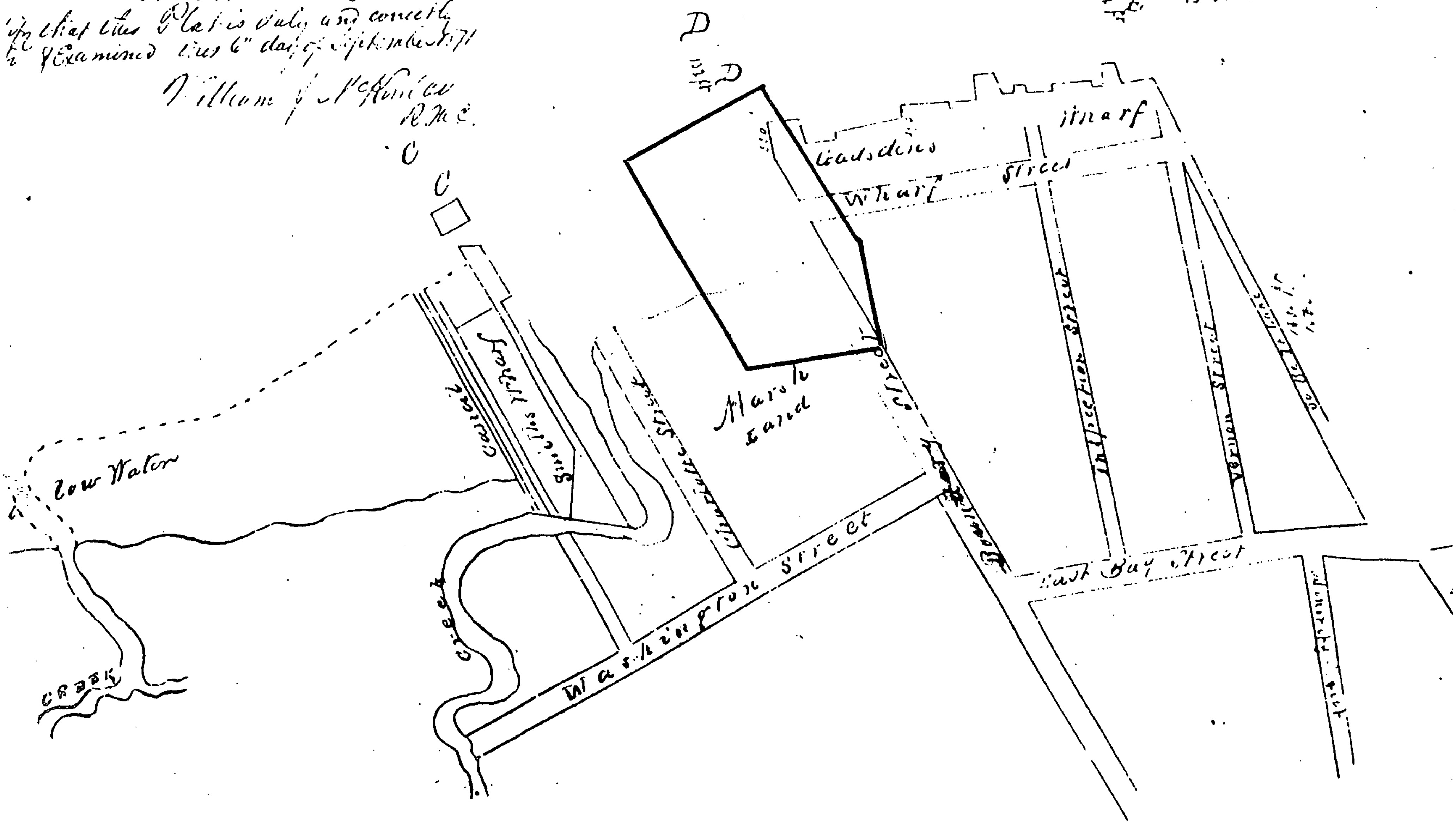
Dated the 20th day of March 1807

J. L. Cardozo
Sec of State
by C. C. McKinney
Deputy

Mesne Conveyance Office
Charleston County
I certify that this Plat is duly and correctly
Examined this 6th day of September 1871
William J. McKinlay
R.M.C.

20

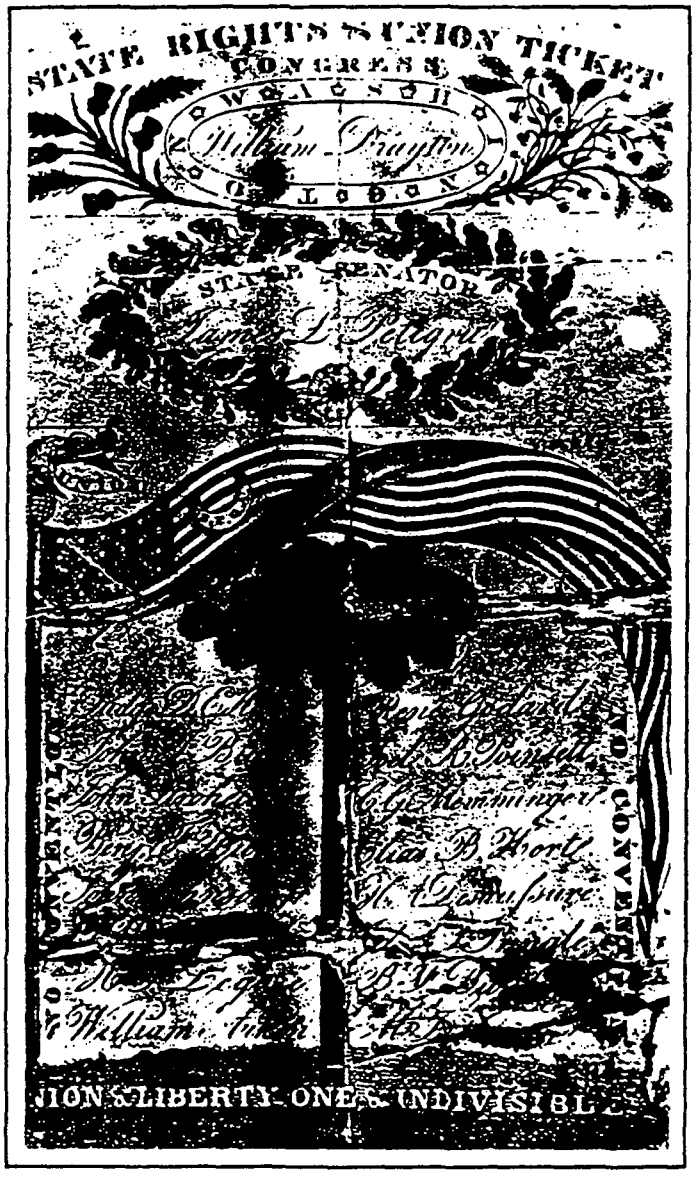
1832



21

1842

Henry Jackson's 1846 view of Charleston is from the site of Calhoun and Rutledge with Bennett's millpond in the foreground. The two large houses on the left still stand on Calhoun St., and near the center is the tower of St. Paul's Church, now the Episcopal Cathedral of St. Luke and St. Paul. The pond was filled in 1875, and for many years was the site of the Charleston Museum. Courtesy of Carolina Art Association



Shown is States Rights and Union ticket broadside of 1832. The Union party was defeated and the Nullifiers got control of South Carolina. Courtesy of South Carolina Historical Society

This 1842 map of the city shows the recently completed United States arsenal, the railroad station on Line Street, the terminal at Mary, and Gadsden's huge wharf, as well as many other buildings, and large ponds. Calhoun Street is still Boundary, Lenwood is Greenhill, and Rutledge still Pinckney. Courtesy of Carolina Art Association

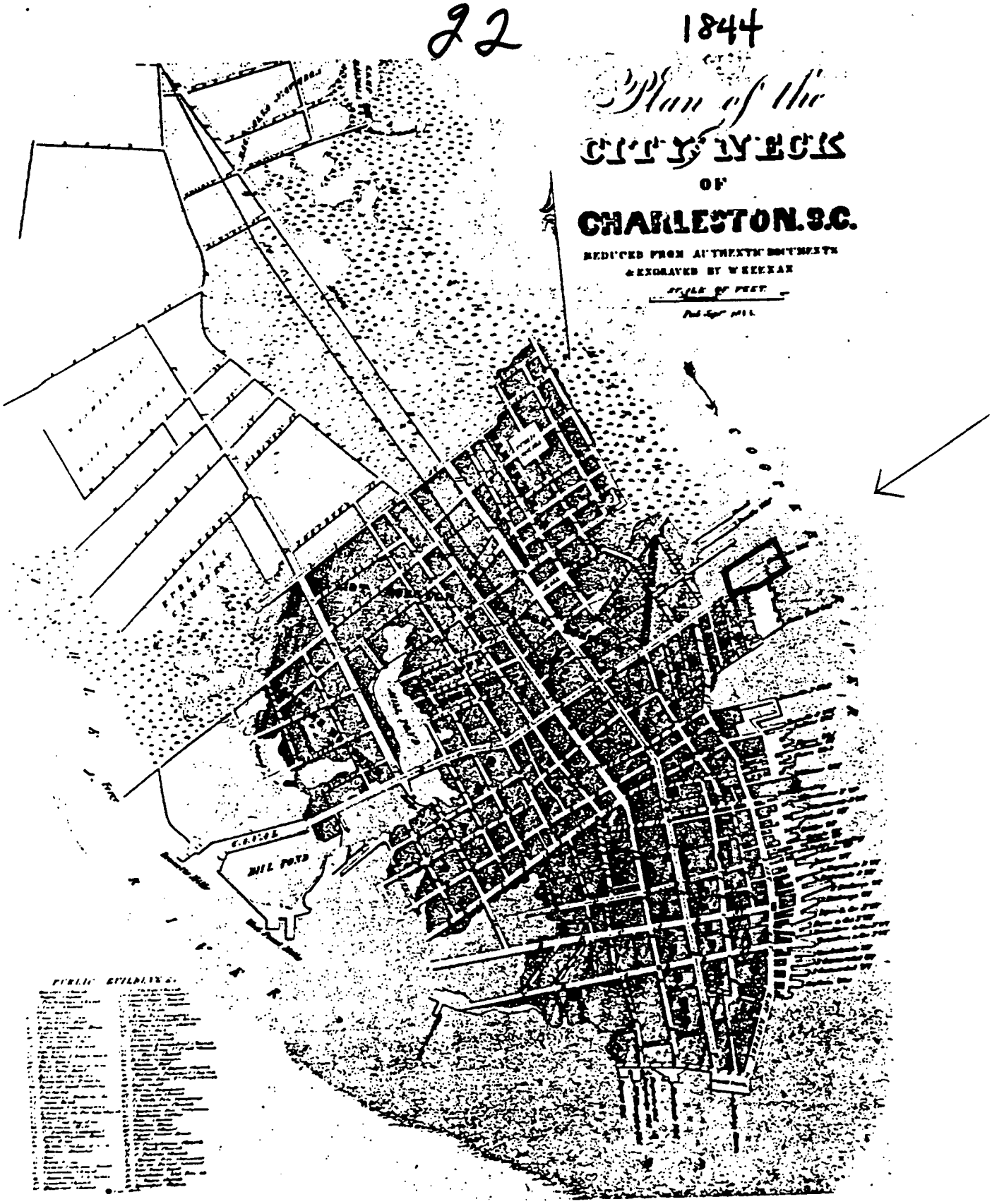
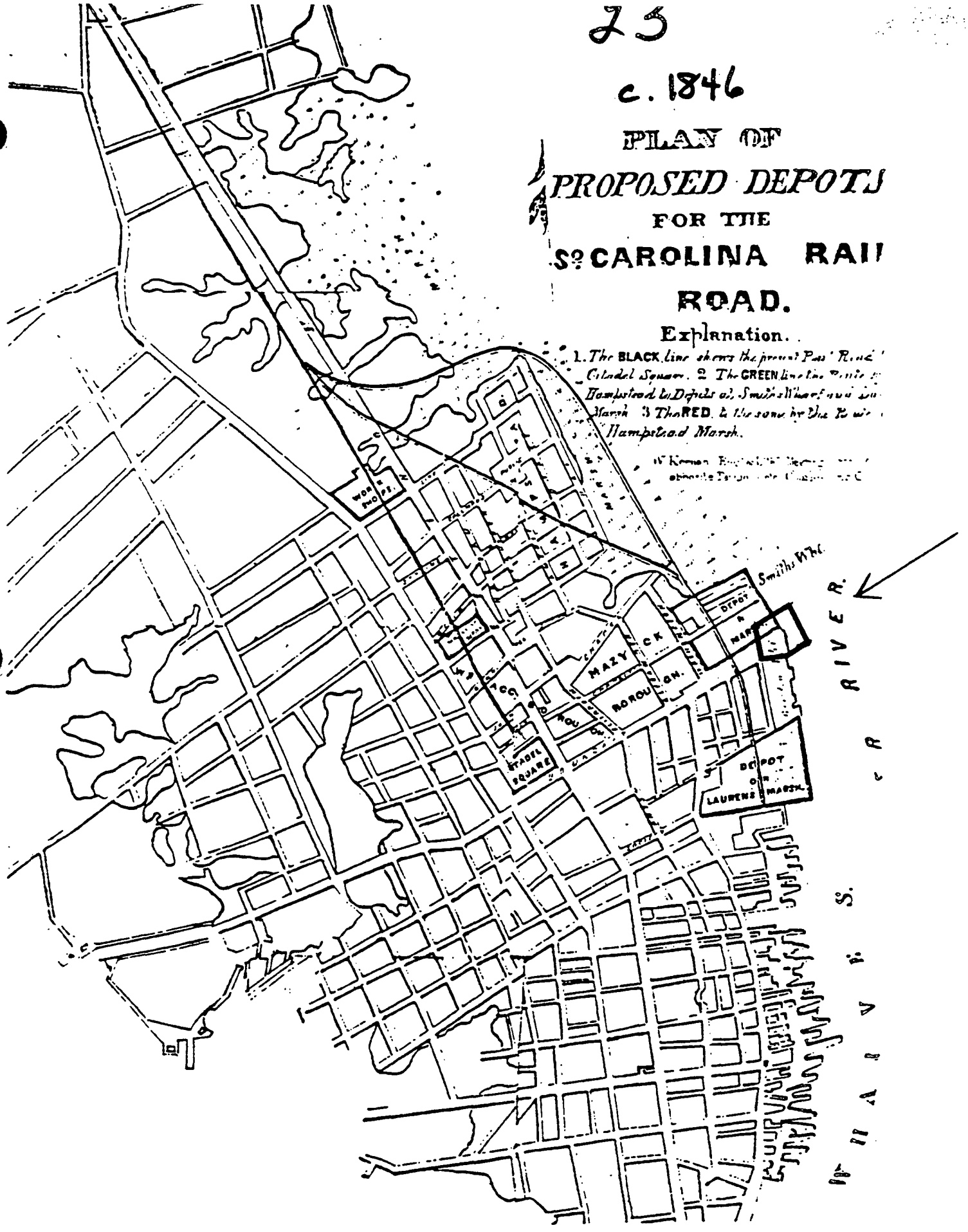


Figure 22: Charleston in 1844. (Courtesy of the South Carolina Historical Society)

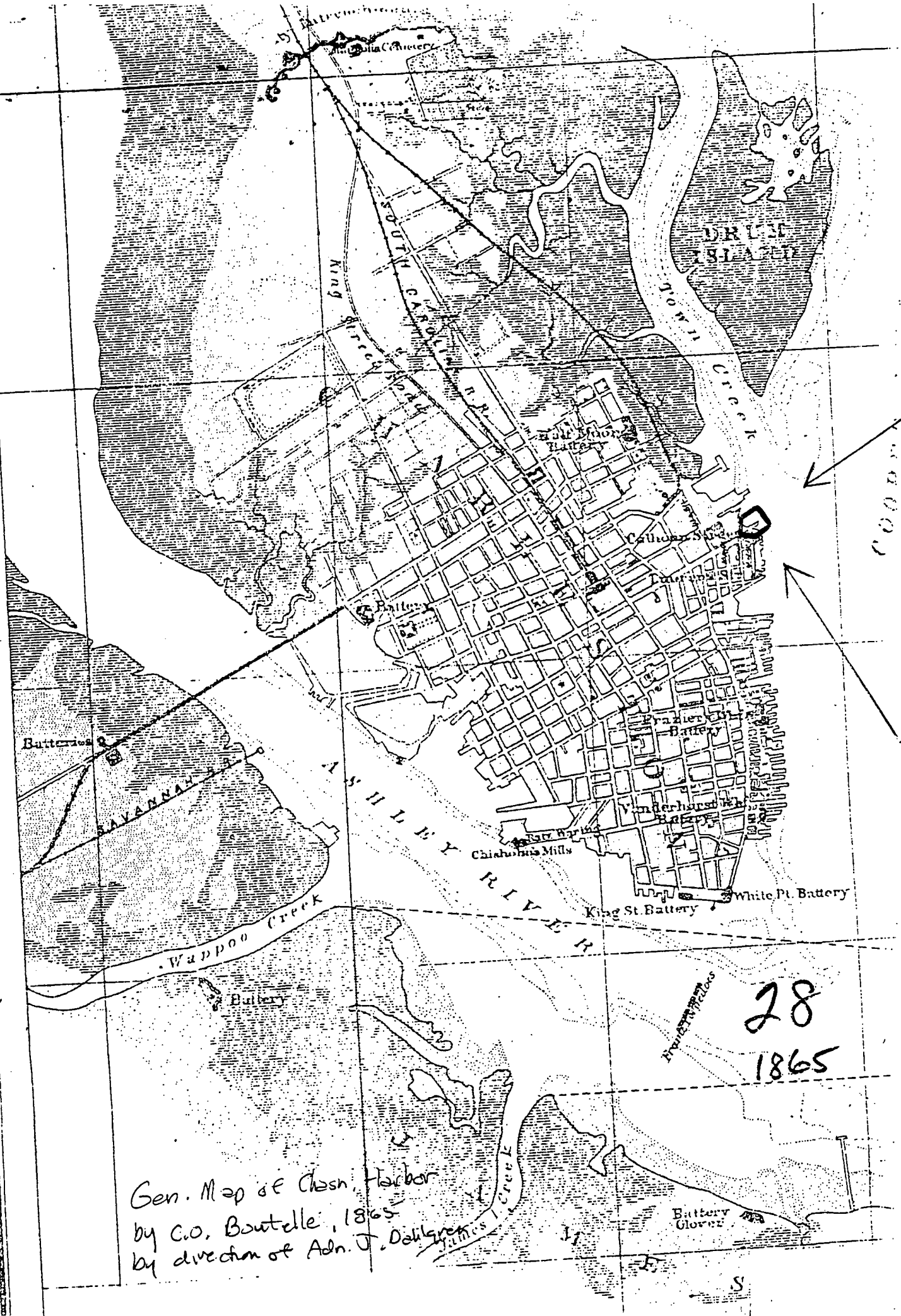


~~Figure 23:~~ Proposed Depots of the South Carolina Railroad Company.

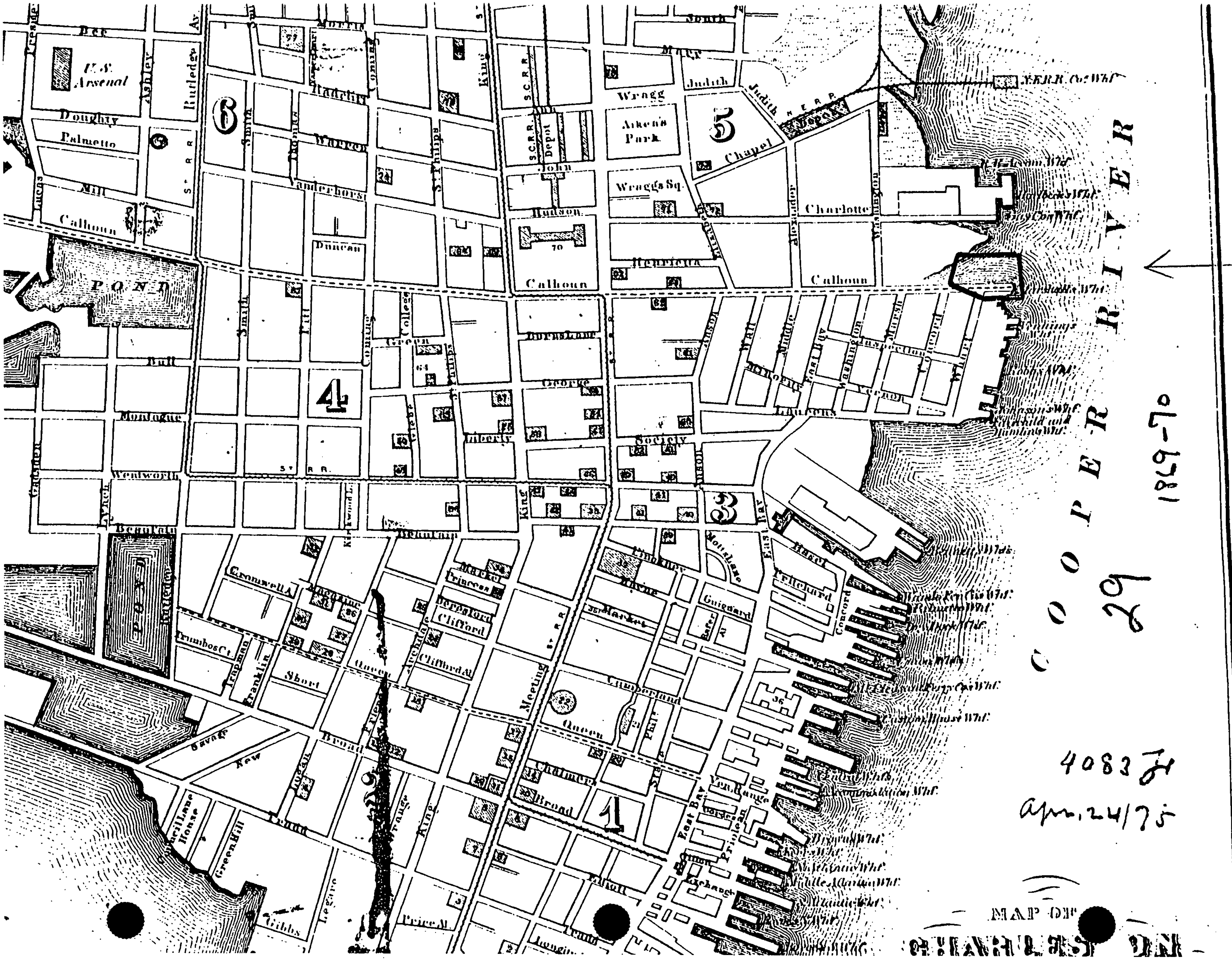
EAST BAY
3
5
ALEXANDER STREET
WASHINGTON STREET
AMERICA
R I V E R
24
1852
Scale 300 feet to one Inch.

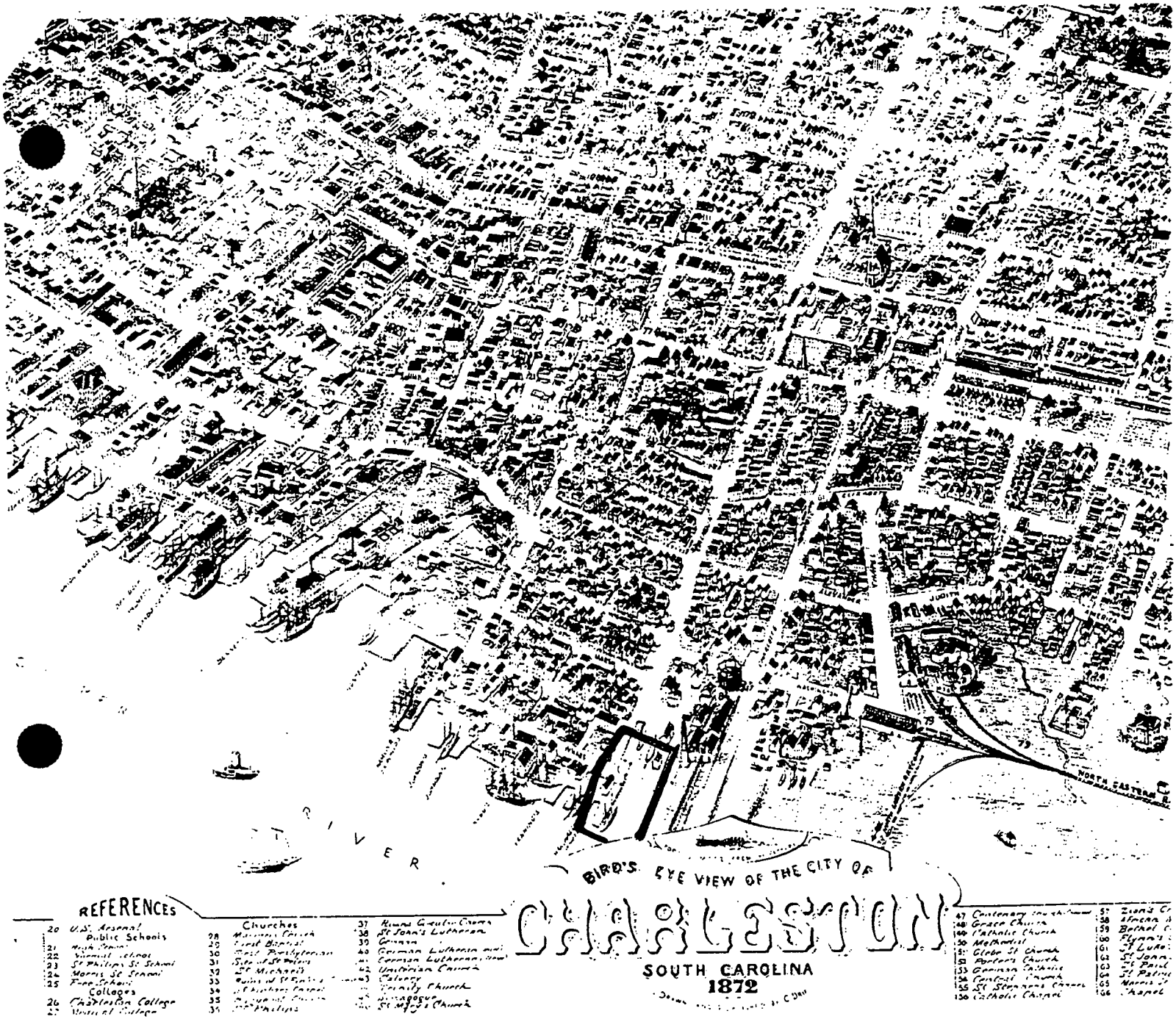
St. Philips St
Liberty
Wentworth St
George St
Burns Lane
Hudson S
R.R. DEPOT
Anna St
MEETING
Reid St
Woolfe St
Society St
Anson St
Henrietta
Elizabeth
John St
THE MALL
Mary St
South St
Nassau St
Columbus St
Line St
Hanover St
Wall St.
Middle
East Bay
Washington
Marsh St
Concord
Wharf
Laurens St
CALHOUN ST
Charlotte St
Alexander St
Chapel
Judith St
America St.
Amherst St
Drake St
Bay St
Blake St
Washington St
R.R. DEPOT
R.R. WHARF
Wharf
Yards
Packets
26
1855
1855

27
1863



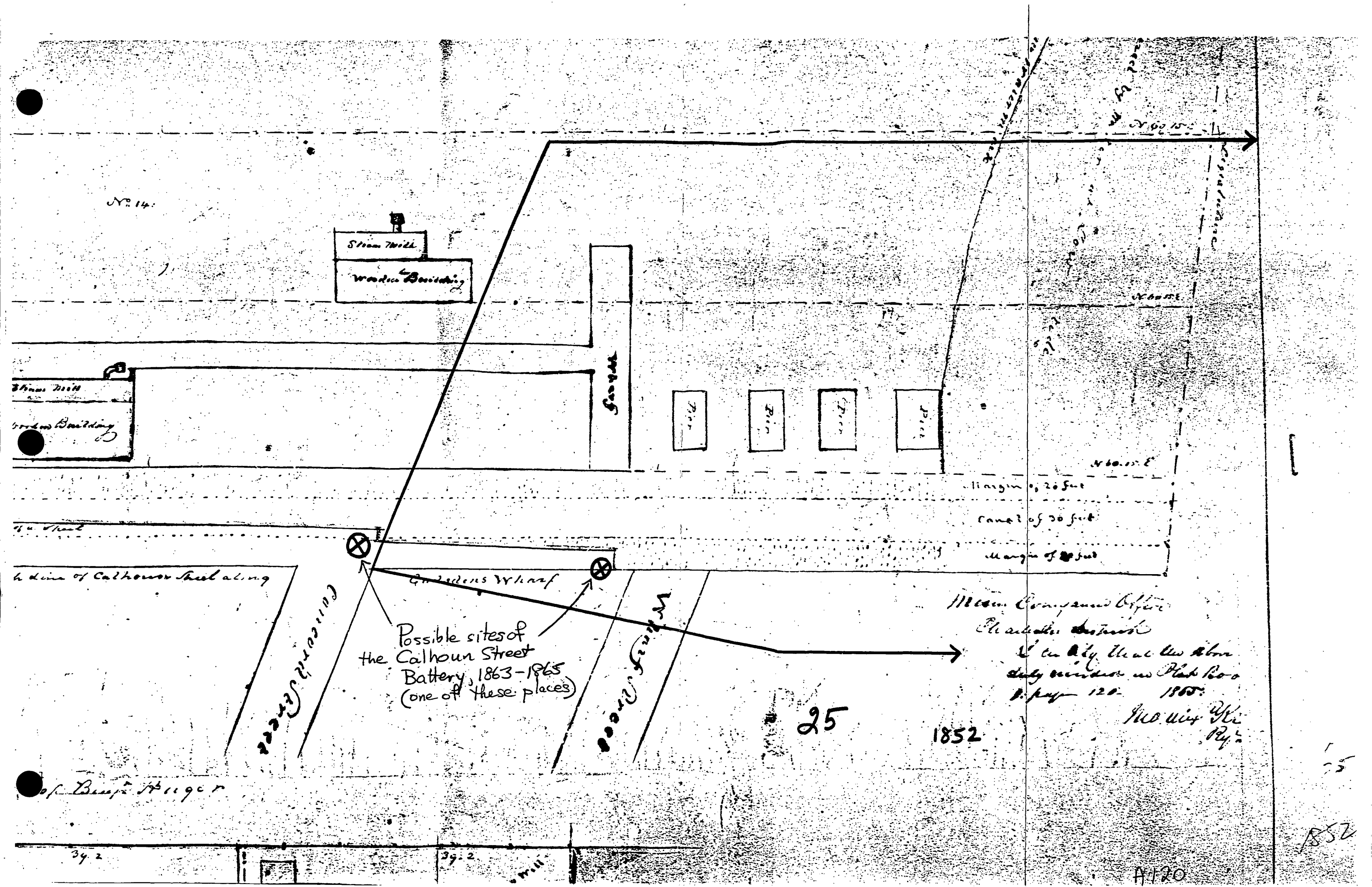
Gen. Map of Charn. Harbor
by C.O. Boutelle, 1865
by direction of Adm. J. Dahlgren

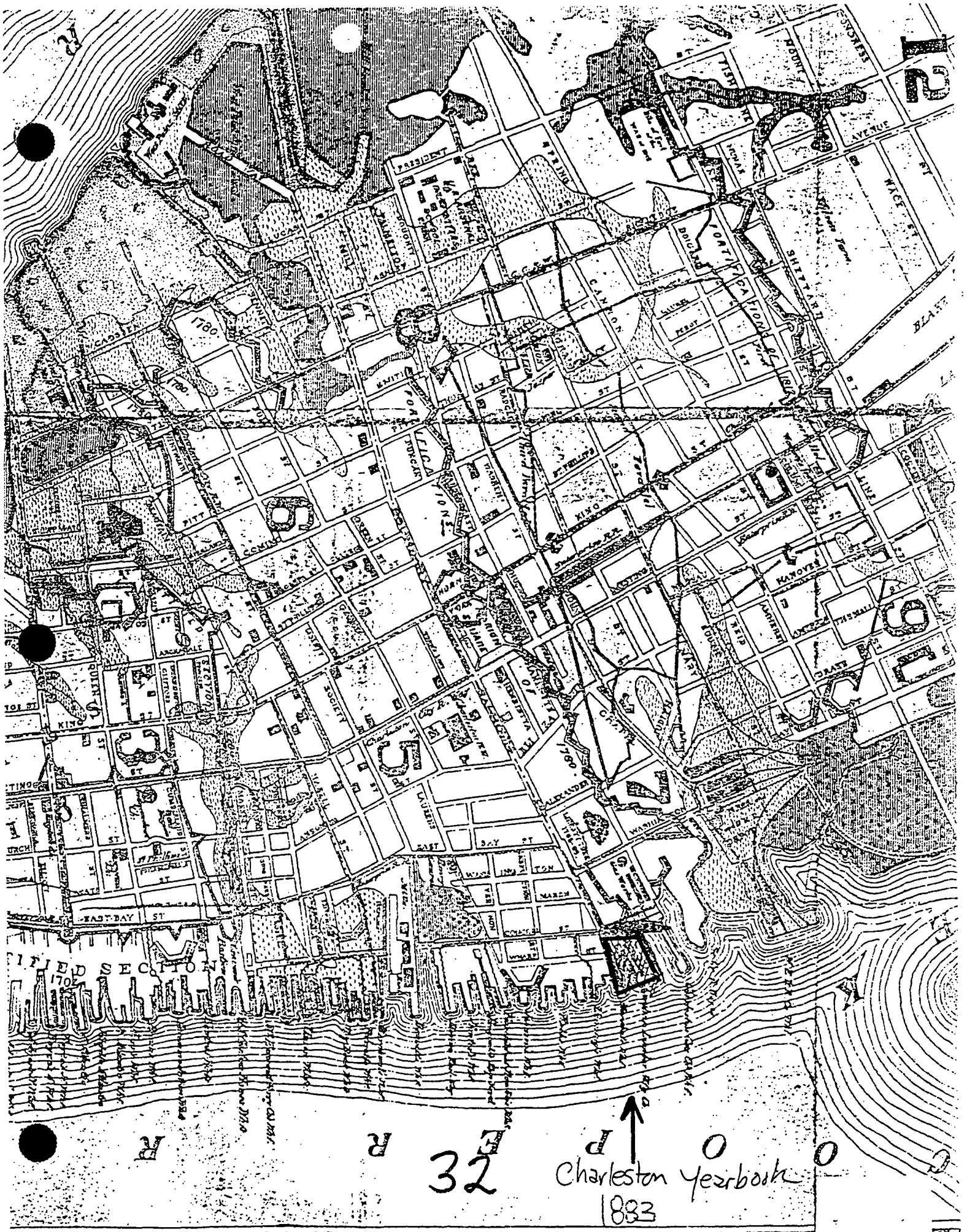

MAP OF
CHARLESTON
COOPER RIVER
29
1869-70
4083 F
Apr. 24/75
U.S. Arsenal
POND
Aiken's Park
Depot
Calhoun
Meeting
King
East Bay
Broad
Queen
Market
Wentworth
Society
Laurens
Charlotte
Wragg Sq.
Hudson
Henrietta
Montague
Bull
Beaufain
Doughty
Palmetto
Mill
Rutledge Av.
Ashley
Smith
St. Philips
Chapel
Judith
John
Vanderhorst
Warren
Radcliffe
Duncan
Green
College
George
Liberty
Cumberland
Chalmers
Tradd
Elliott
Exchange
Legare
Gibbs
Green Hill
New
Savage
Franklin
Short
Clifford
Magazine
Princess
Pritchard
Concord
Guignard
Hasell
Vernon
Washington
Inspection
Wall
Alexander
Church
Archdale
State


BIRD'S EYE VIEW OF THE CITY OF
CHARLESTON
SOUTH CAROLINA
1872
REFERENCES
Public Schools
Colleges
Churches
RIVER

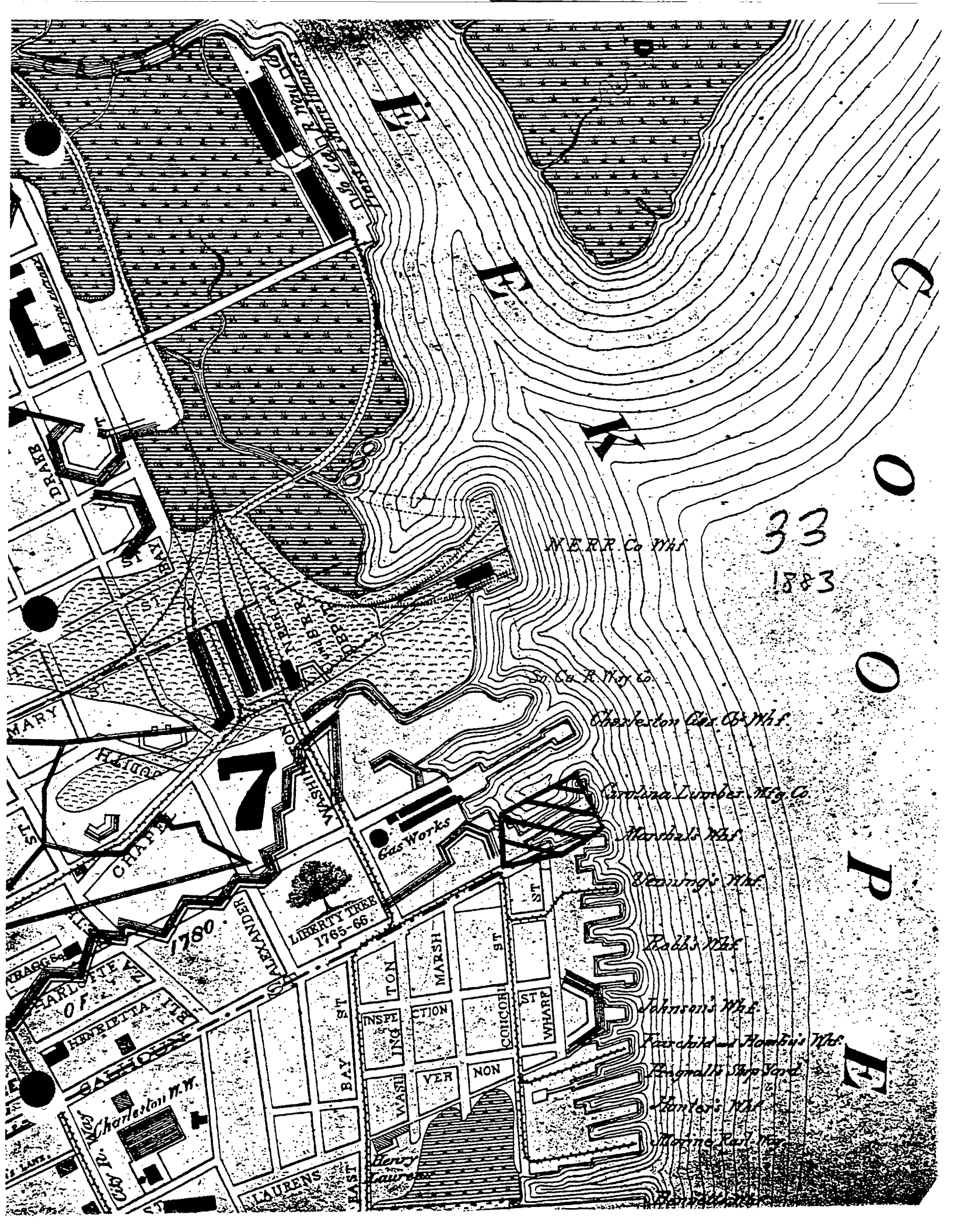
30

1872

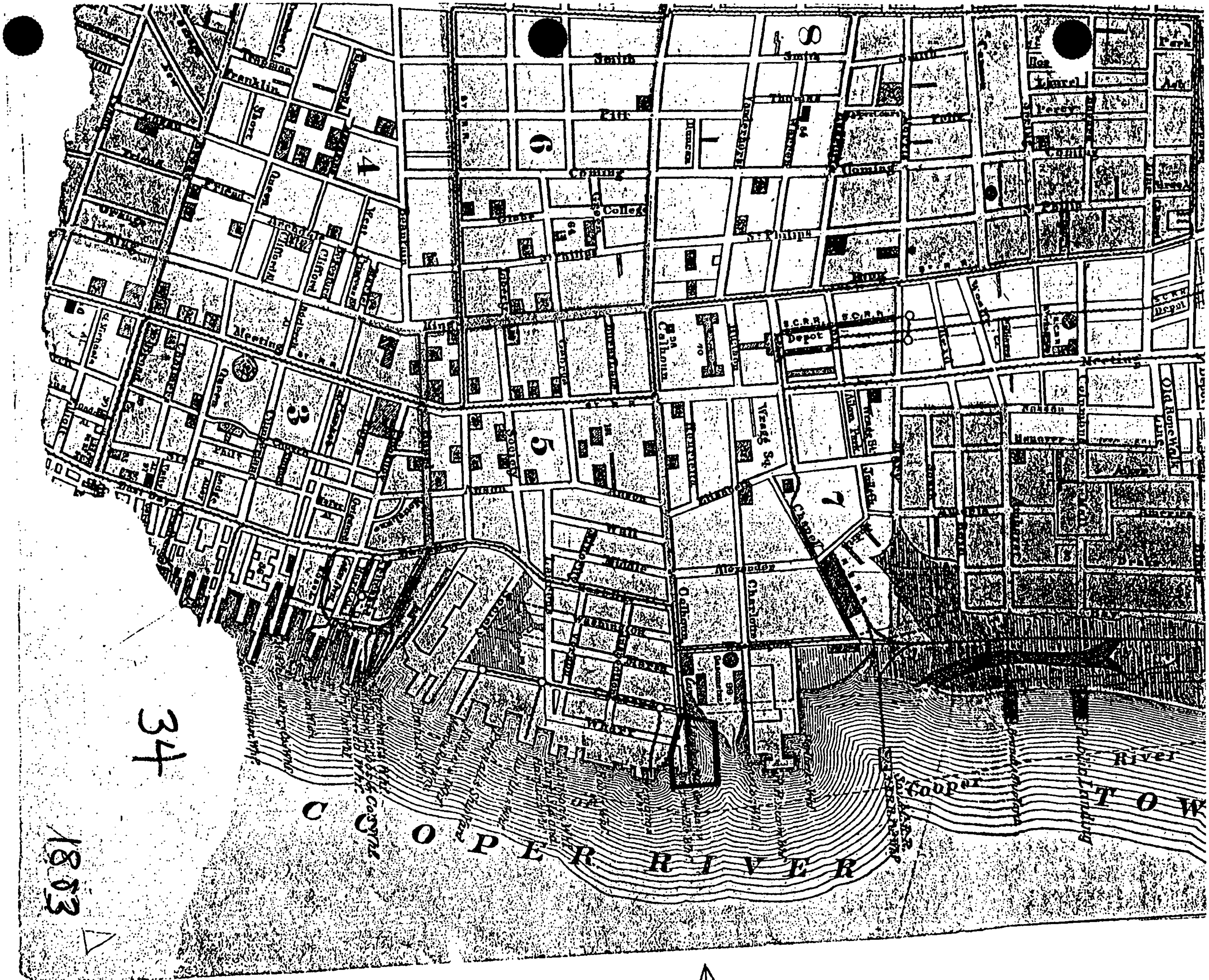

No. 14.
Steam Mill
Wooden Building
Steam Mill
Wooden Building
Wharf
Pier
Pier
Pier
Pier
Margin of 20 feet
Canal of 30 feet
Margin of 20 feet
Gardens Wharf
Concord Street
Wharf Street
Possible sites of the Calhoun Street Battery, 1863-1865 (one of these places)
25
1852
39.2
39.2
A120

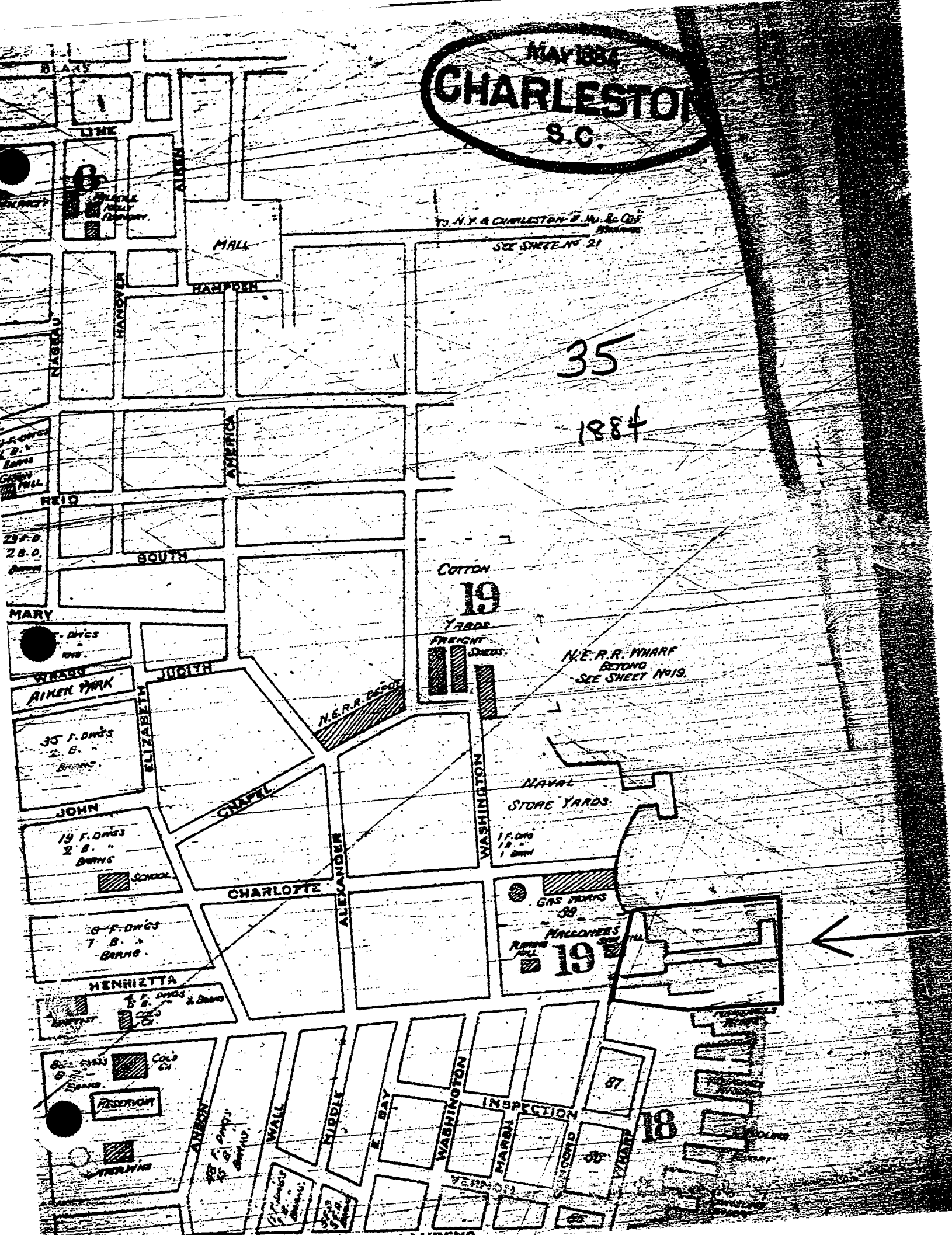


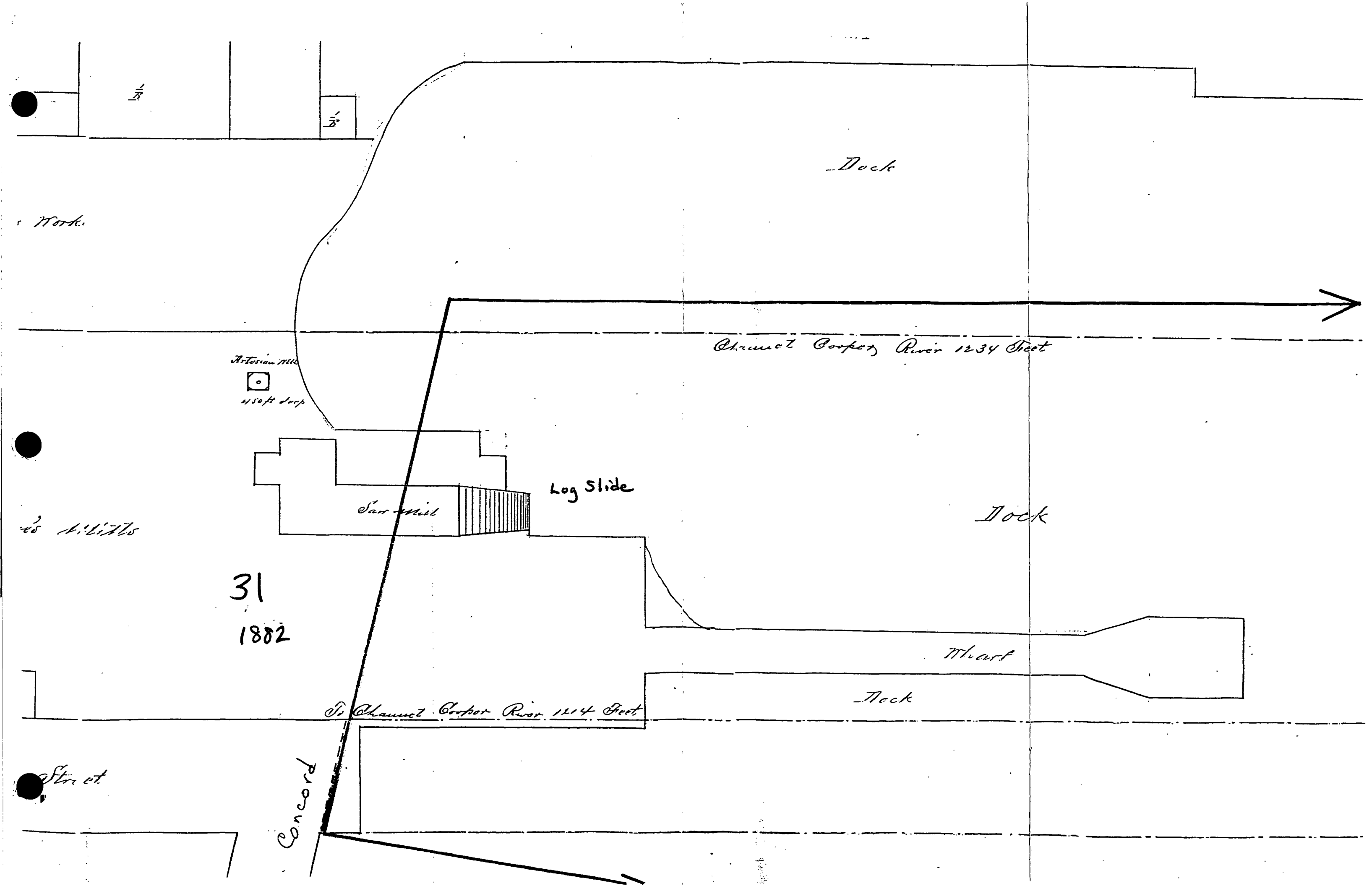
Charleston Yearbook
1883

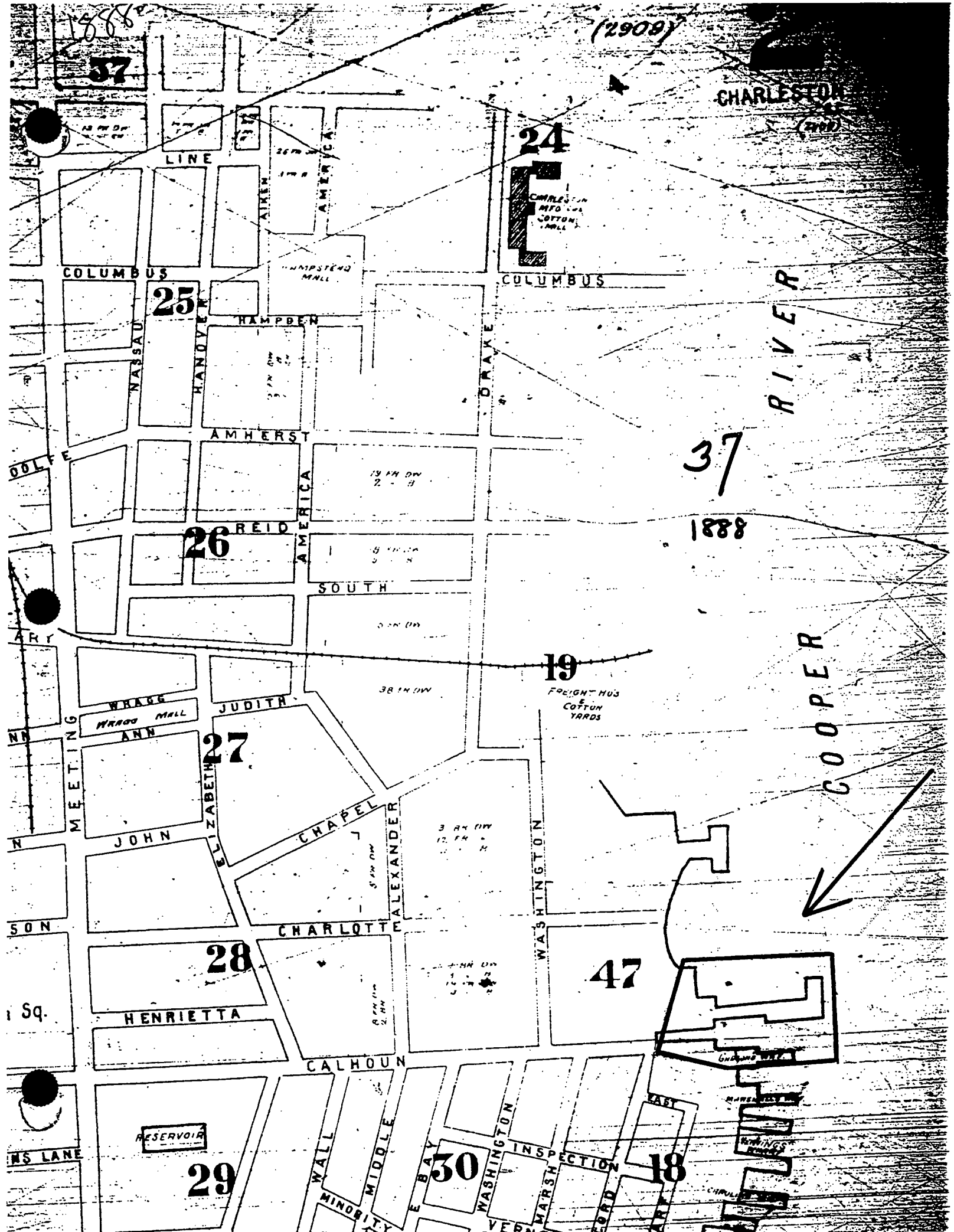


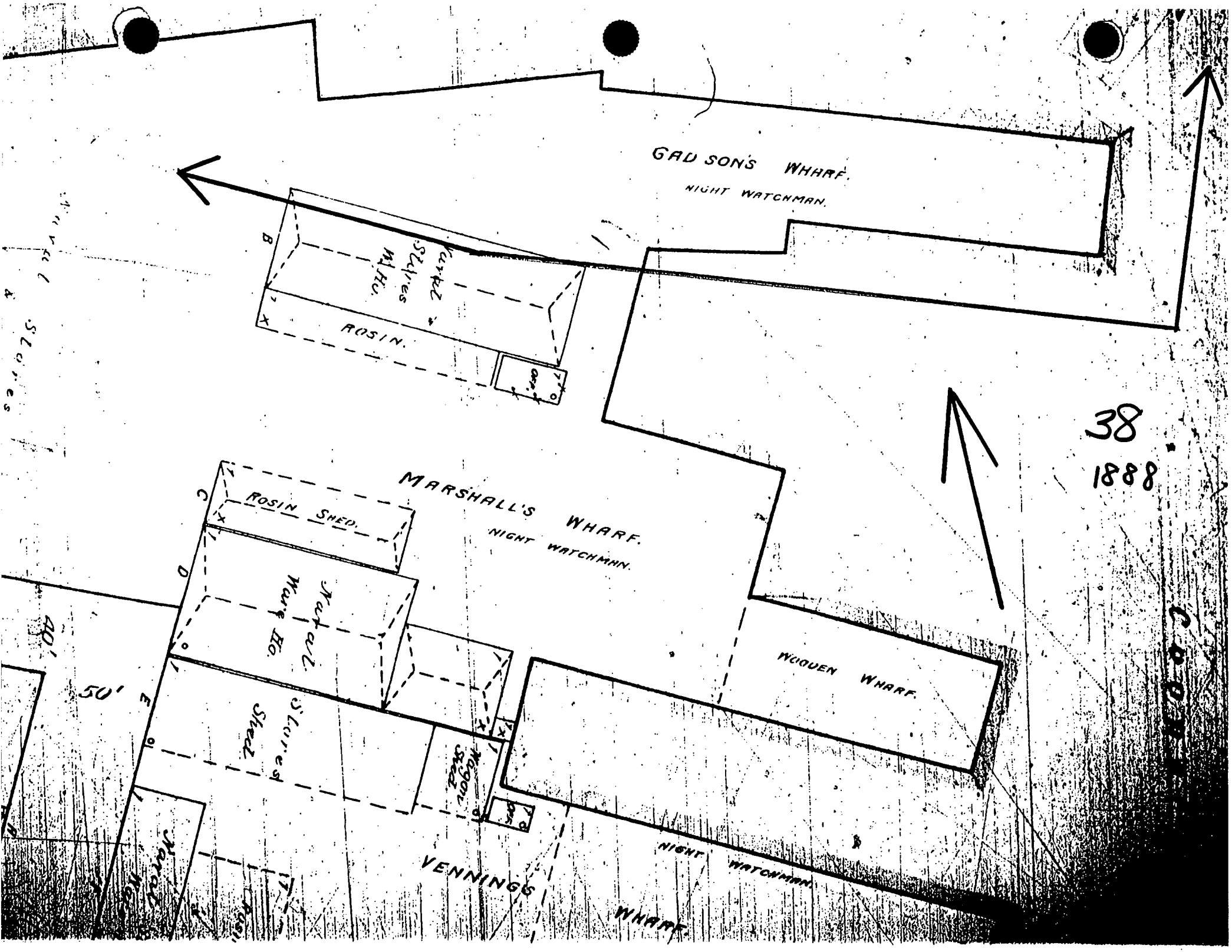
33
1883
N.E.R.R. Co Whf
So. Ca. R. Way Co.
Charleston Gas Co. Whf.
Carolina Lumber Mfg. Co.
Marshal's Whf.
Venning's Whf.
Robb's Whf.
Johnson's Whf.
Fairchild and Hamlin's Whf.
Pragnall's Ship Yard
Hunter's Whf.
Marine Rail Way
Henry Laurens
Gas Works
LIBERTY TREE 1765-66
1780
7
DRAKE
BAY
ST
MARY
CHAPEL
WASHINGTON
ALEXANDER
HENRIETTA
CALHOUN
Charleston W.W.
City R. Way
LAURENS
EAST
BAY ST
WASHINGTON
INSPECTION
MARSH
CONCORD ST
WHARF ST
VERNON


Smith
Pitt
Coming
Franklin
Meeting
Calhoun
Depot
Wragg Sq.
Wall
Middle
Charlotte
Chapel
Laurel
Perry
COOPER RIVER
Cooper River
TOW

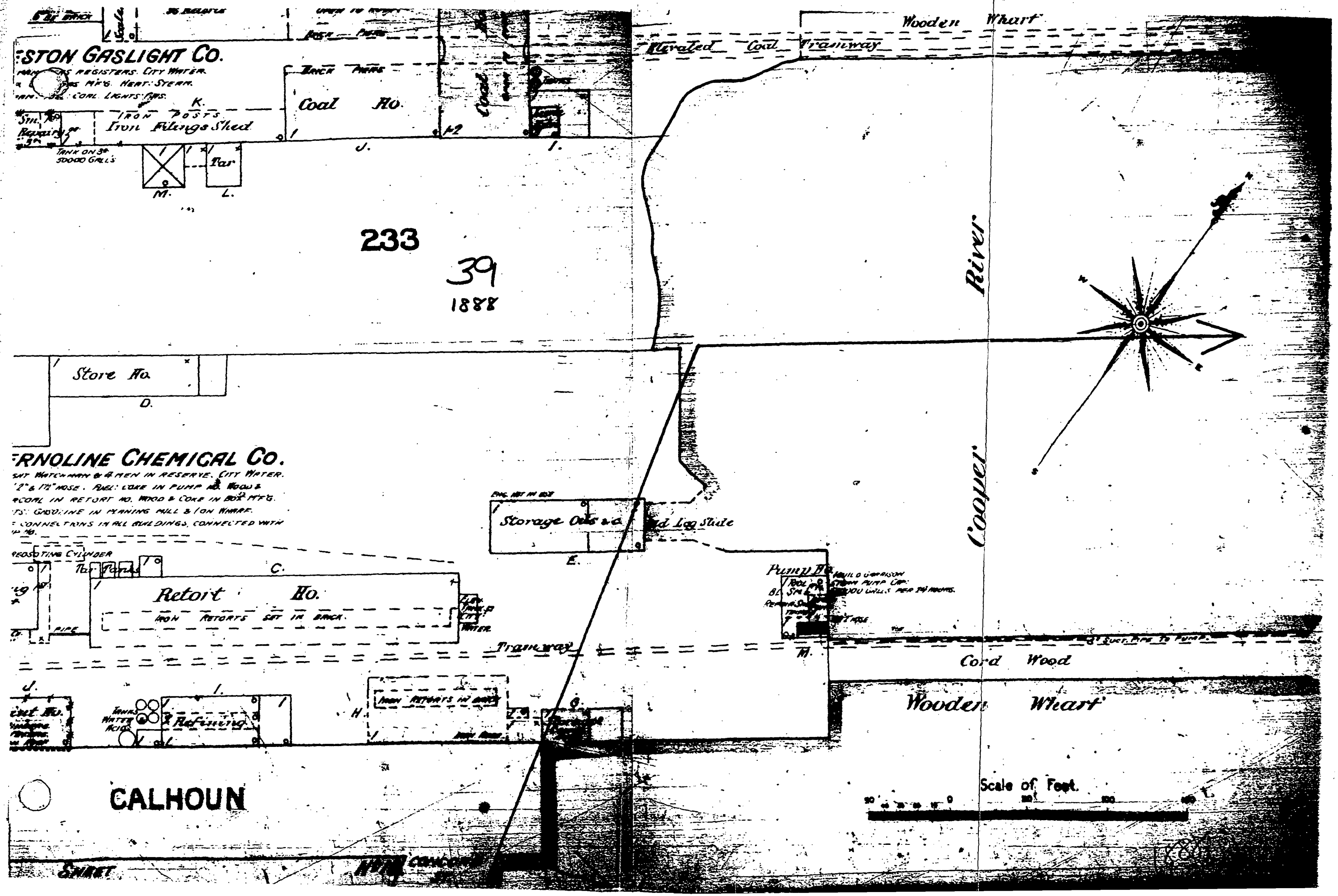

MAY 1884
CHARLESTON
S.C.
35
1884
BLAKE
LINE
AIKEN
MALL
HAMPDEN
HANOVER
NASSAU
AMERICA
REID
SOUTH
MARY
WRAGG
JUDITH
AIKEN PARK
ELIZABETH
JOHN
CHAPEL
CHARLOTTE
ALEXANDER
WASHINGTON
HENRIETTA
RESERVOIR
ANSON
WALL
MIDDLE
E. BAY
INSPECTION
MARSH
VERNON
COTTON
19
YARDS
FREIGHT
SHEDS
N.E.R.R. WHARF
BEYOND
SEE SHEET No 19
N.E.R.R. DEPOT
NAVAL
STORE YARDS
GAS WORKS
MALLONEES
19
18
87
SEE SHEET No 21


Dock
Work
Channel Cooper River 1234 Feet
Artesian well
450 ft deep
Log Slide
Saw mill
Dock
31
1882
Wharf
Dock
To Channel Cooper River 1214 Feet
Concord
Street

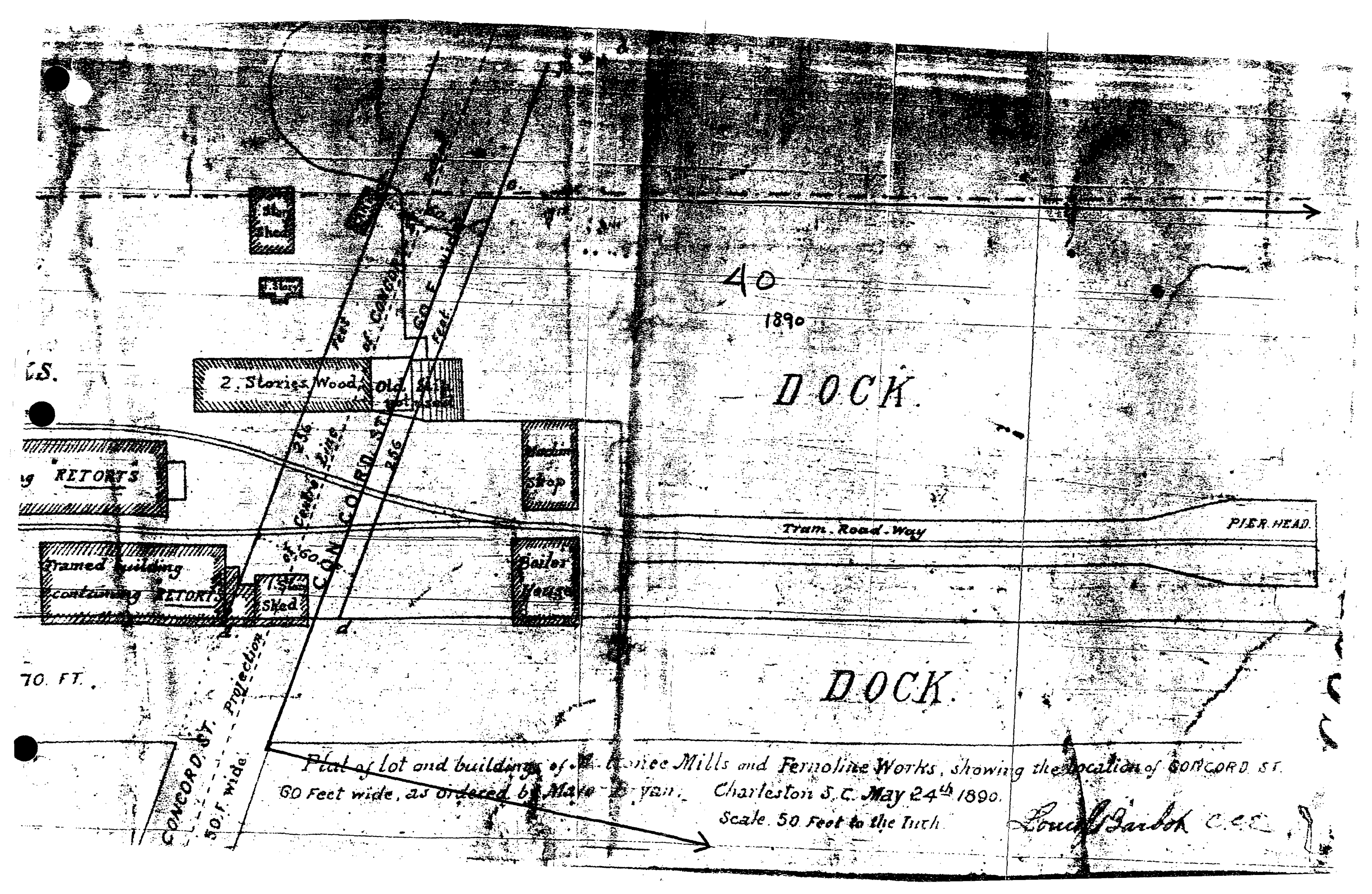

1888
(2909)
37
CHARLESTON
(2910)
24
LINE
AIKEN
AMERICA
COLUMBUS
HAMPSTEAD MALL
COLUMBUS
25
HAMPDEN
NASSAU
HANOVER
DRAKE
RIVER
AMHERST
37
1888
REID
26
AMERICA
SOUTH
19
FREIGHT HOUSE & COTTON YARDS
COOPER
WRAGG
JUDITH
WRAGG MALL
ANN
27
MEETING
ELIZABETH
CHAPEL
ALEXANDER
JOHN
WASHINGTON
CHARLOTTE
28
47
HENRIETTA
CALHOUN
RESERVOIR
29
WALL
MIDDLE
BAY
30
WASHINGTON
INSPECTION
MARSH
18
MINORITY

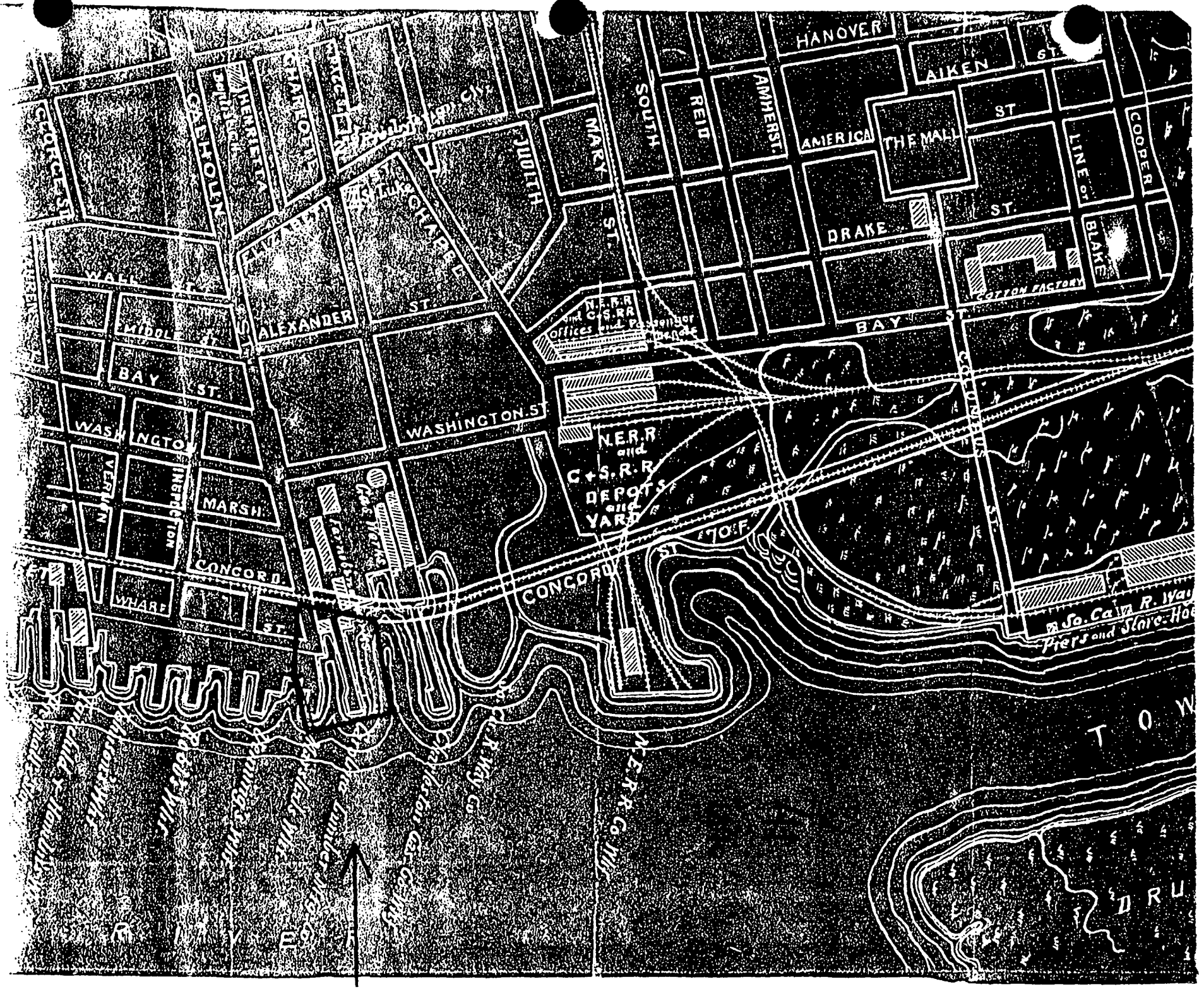

GADSON'S WHARF.
NIGHT WATCHMAN.
Naval Stores W. Ho.
ROSIN.
MARSHALL'S WHARF.
NIGHT WATCHMAN.
ROSIN SHED.
Naval Ware Ho.
Stores Shed
Wagon Shed
WOODEN WHARF.
NIGHT WATCHMAN.
VENNINGS WHARF.
Naval Ware
Naval Stores
50'
40'
38
1888

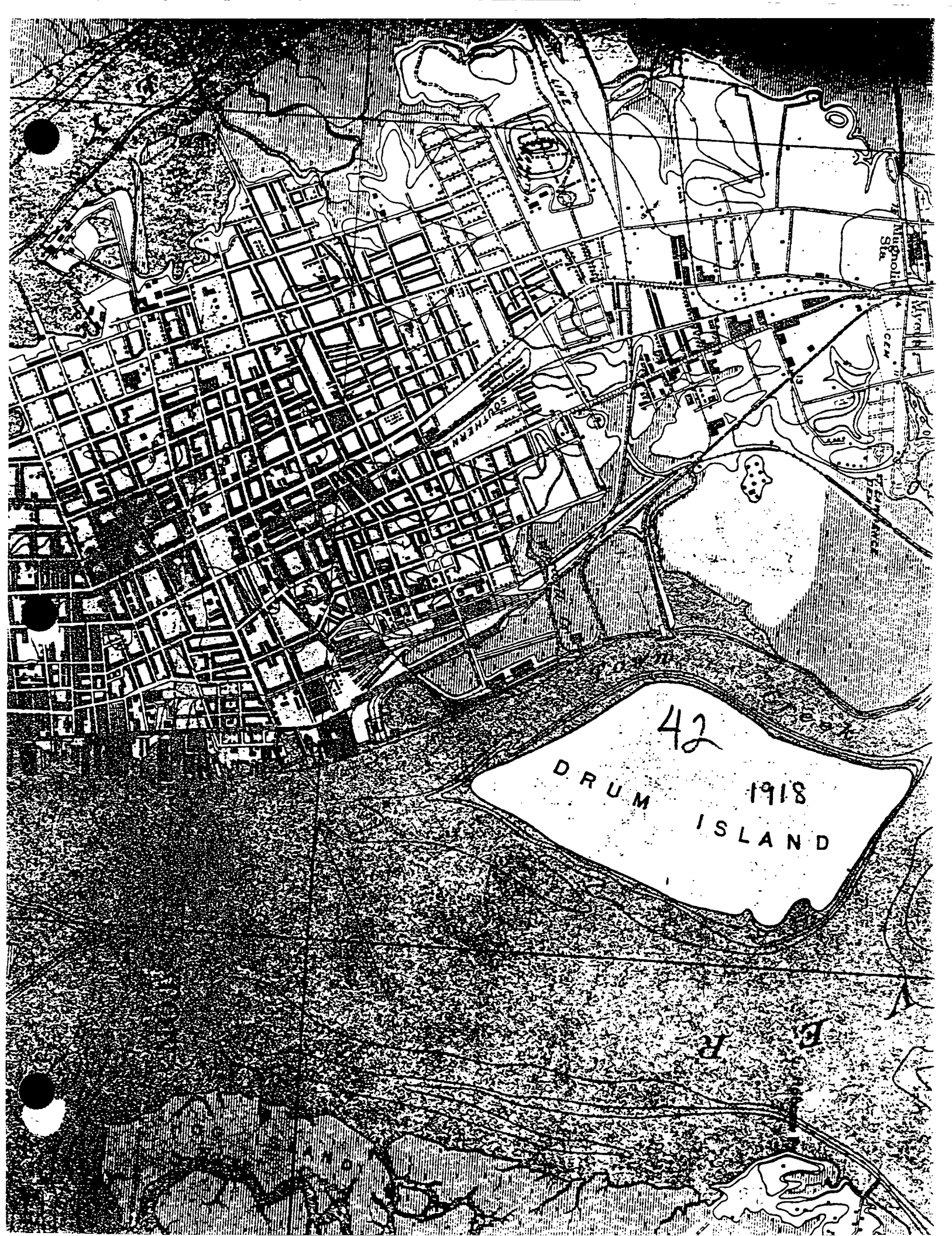
NOTICE.—The SANBORN MAP & PUBLISHING CO. (Limited) will Loan, to parties purchasing one copy of this map, a Duplicate, with the mutual understanding and agreement that it is to be used exclusively by their General or Local Agent, and with the further agreement that it not be used, one of the two copies will be returned to said Company

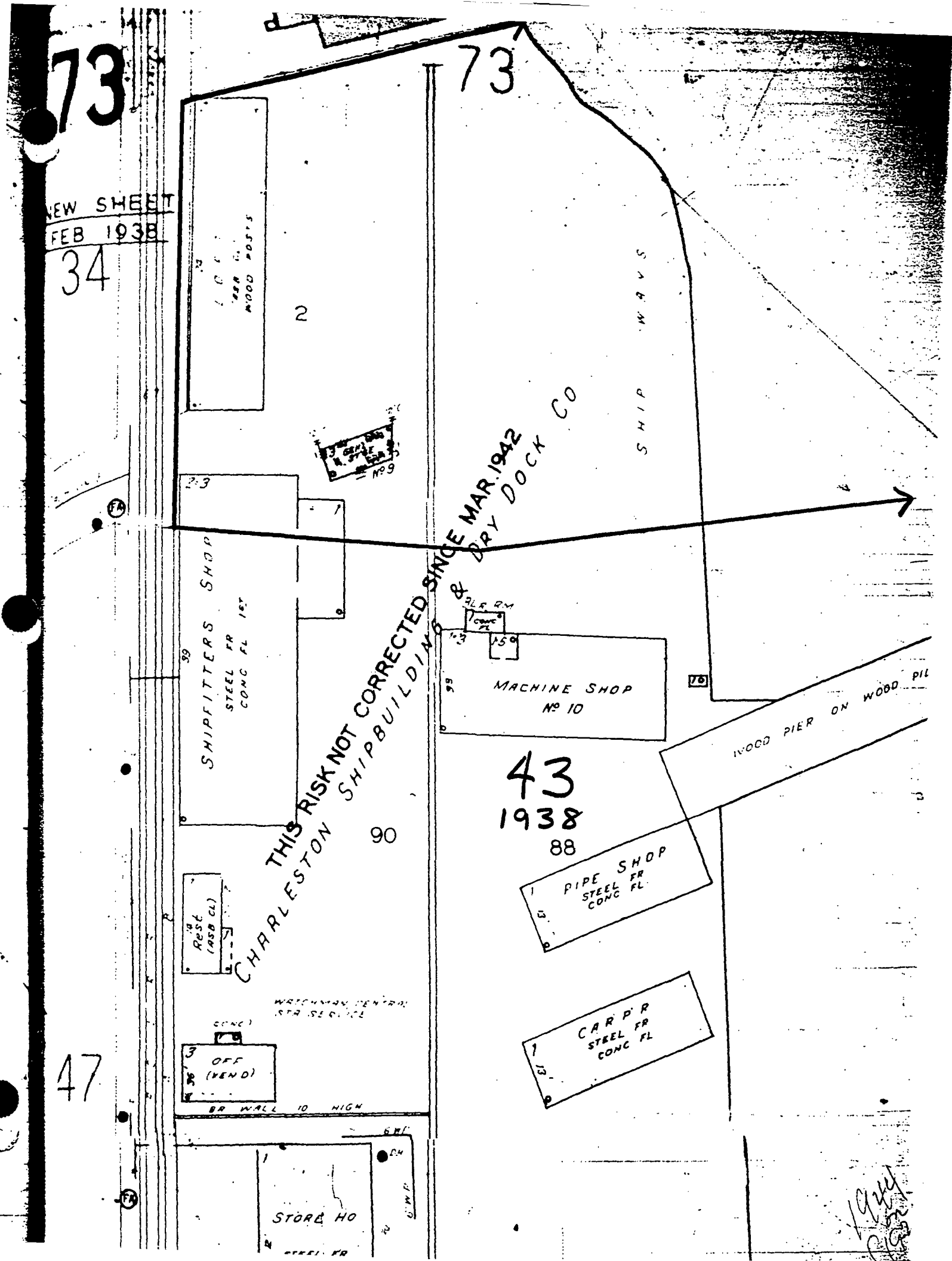


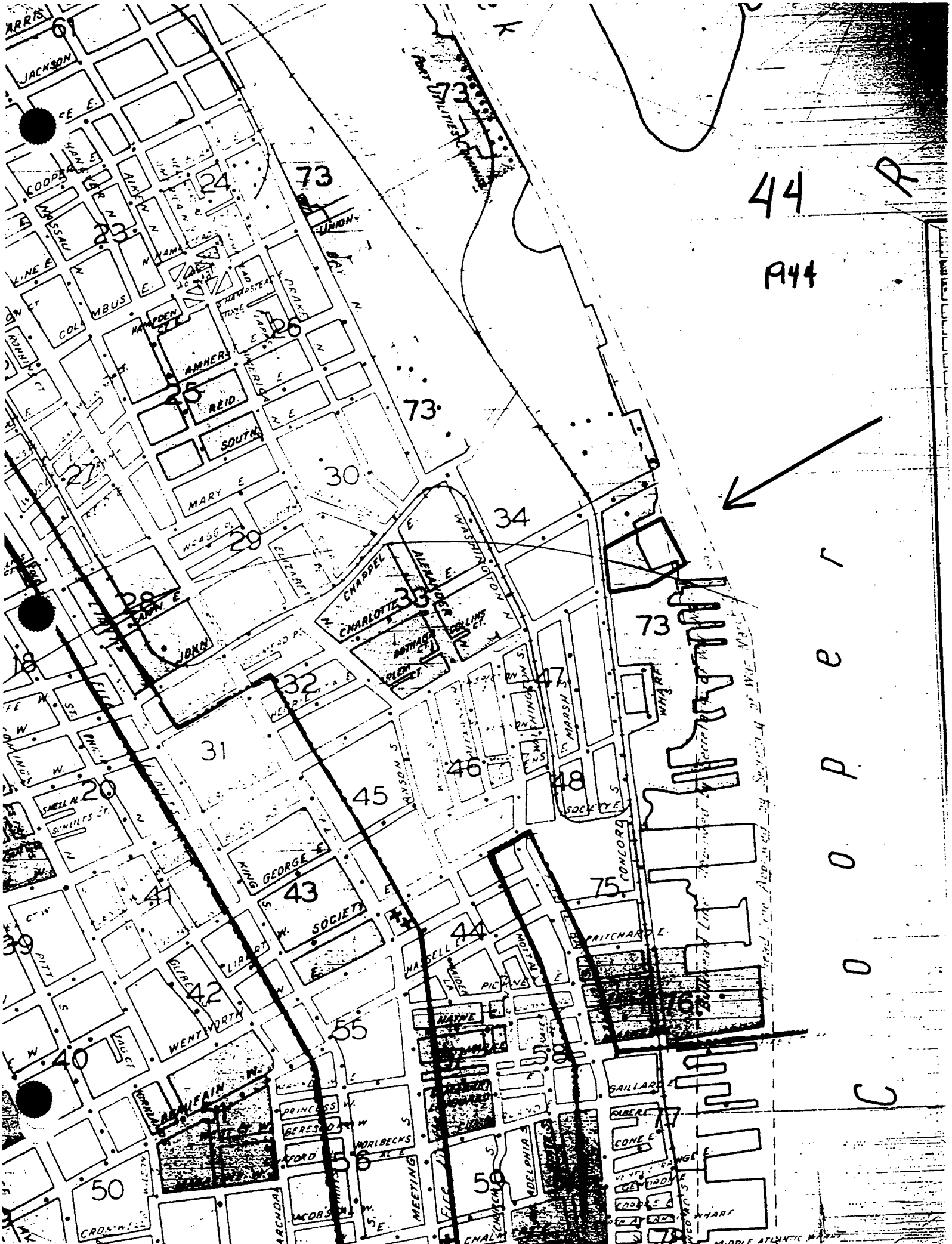
STON GASLIGHT CO.
Coal Ho.
Iron Filings Shed
Tar
Elevated Coal Tramway
Wooden Wharf
233
39
1888
River
Cooper
Store Ho.
RNOLINE CHEMICAL CO.
Storage Oils &c.
Retort Ho.
Pump Ho.
Tramway
Cord Wood
Wooden Wharf
Refining
CALHOUN
Scale of Feet.


40
1890
DOCK.
DOCK.
2. Stories Wood
Old Ship
RETORTS
Tramed building containing RETORTS
1 St. Shed
Machine Shop
Boiler House
Tram. Road. Way
PIER HEAD.
CONCORD ST.
Projection
50 F. wide
70. FT.
Plat of lot and buildings of Mattonee Mills and Fernoline Works, showing the location of CONCORD ST.
60 Feet wide, as ordered by Mayor Bryan. Charleston S.C. May 24th 1890.
Scale. 50 Feet to the Inch.


HANOVER
AIKEN
ST
AMERICA
THE MALL
ST
LINE or BLAKE
COOPER
DRAKE
ST.
COTTON FACTORY
BAY
ST
SOUTH
REID
AMHERST
MARY
ST
JUDITH
CHAPEL
ST
ALEXANDER
ST
WASHINGTON ST
N.E.R.R and C.&S.R.R Offices and Passenger Agencies
N.E.R.R and C.&S.R.R DEPOTS and YARD
CONCORD
ST
70 F.
CALHOUN
HENRIETTA
CHARLOTTE
WALL
EMIDDLE
BAY
ST
WASHINGTON
VERNON
INSPECTION
MARSH
CONCORD
WHARF
ST
So. Ca. R. Way
Piers and Store-Ho
TOW
DRU
R I V E R

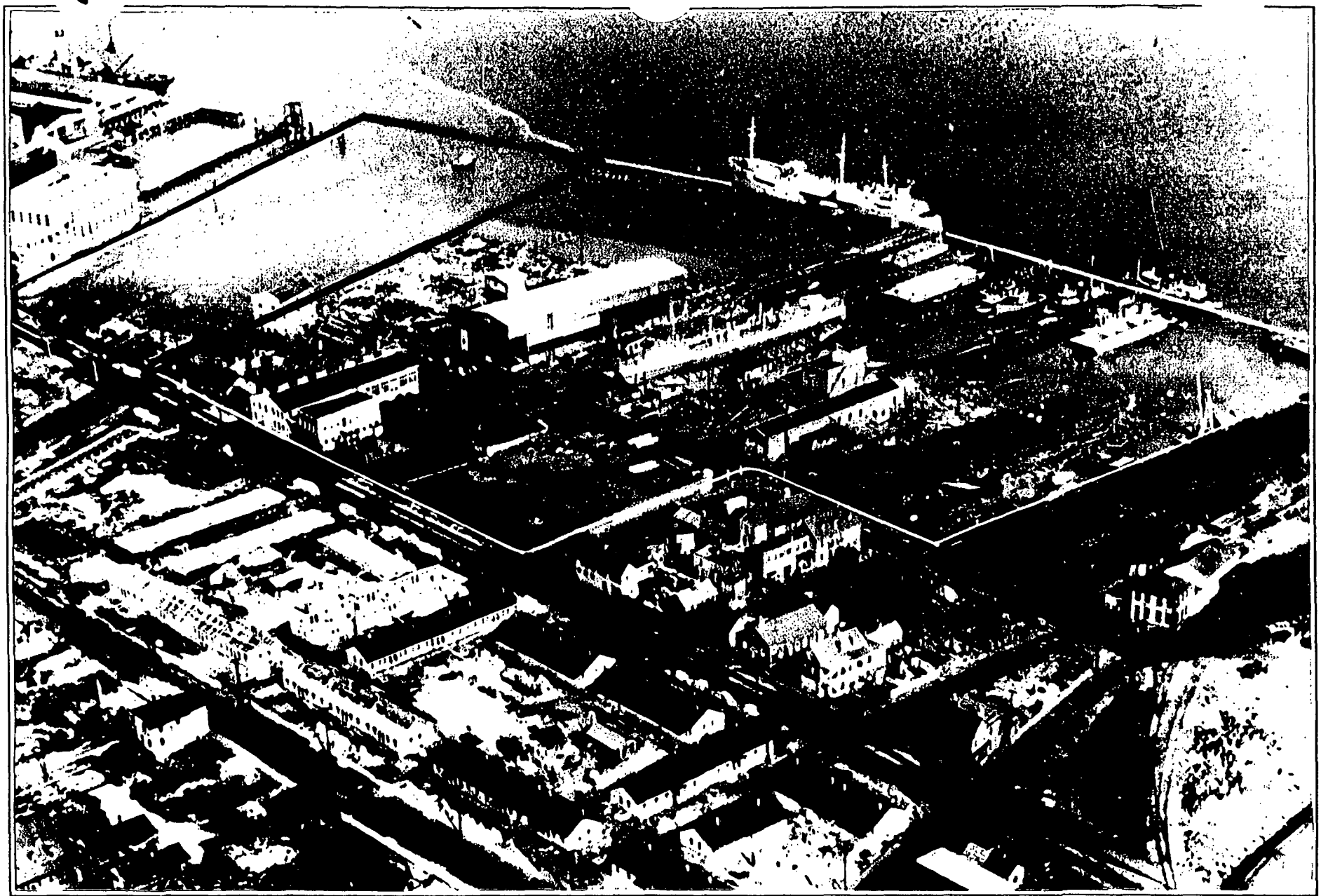

42
DRUM ISLAND
1918
SOUTHERN
Magnolia Sta.


73
73
NEW SHEET
FEB 1938
34
2
SHIP WAYS
CHARLESTON SHIPBUILDING & DRY DOCK CO
THIS RISK NOT CORRECTED SINCE MAR. 1942
SHIPFITTERS SHOP
STEEL FR
CONC FL 1ST
MACHINE SHOP
No 10
43
1938
88
90
WOOD PIER ON WOOD PIL
PIPE SHOP
STEEL FR
CONC FL
CARP'R
STEEL FR
CONC FL
OFF
(VEND)
BR WALL 10 HIGH
STORE HO
47


44
1944
73
24
23
26
25
27
30
29
34
33
28
32
31
20
45
46
47
48
43
41
42
40
55
44
75
76
50
59
56
JACKSON
COOPER
MASSAU
COLUMBUS
HAMPDEN
AMHERST
REID
SOUTH
MARY
ELIZABETH
CHAPPEL
CHARLOTTE
ALEXANDER
WASHINGTON
COLLINS CT.
JOHN
GEORGE
SOCIETY
WENTWORTH
HAYNE
PRINCESS
HORLBECKS
MEETING
ADELPHIA
CONCORD
PRITCHARD
GAILLARD
CONE
MARSH
WHARF
MIDDLE ATLANTIC WHARF
C O O P E R

APPENDIX II

POST-1938 HISTORICAL INFORMATION



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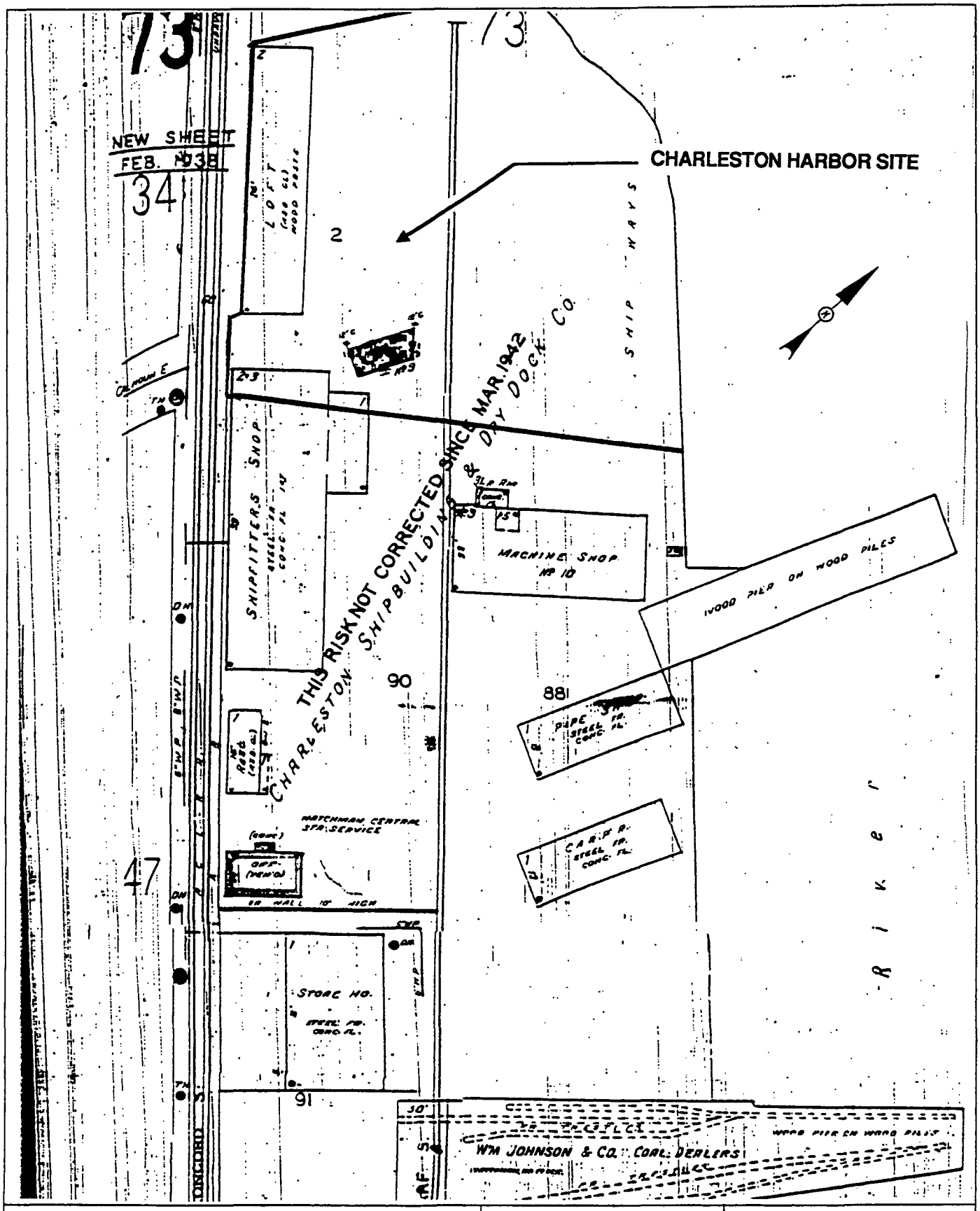
CHARLESTON, SC 29417
(803) 556-8171

NATIONAL PARK SERVICE
CHARLESTON HARBOR SITE
CHARLESTON, SOUTH CAROLINA

CHARLESTON HARBOR SITE CIRCA 1940.
NOTE THAT, EXCEPT FOR WESTERN
EDGE, THE SITE IS A TIDAL FLAT



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CHARLESTON HARBOR SITE
CHARLESTON, SOUTH CAROLINA

1942 SANBORN MAP
Western half of site filled.
Eastern half of site labelled
as "Ship Ways" is not filled.

APPENDIX III

JUNE 1992 "SITE SCREENING INVESTIGATION"
CALHOUN PARK/ANSONBOROUGH HOMES/COAL GAS

SITE SCREENING INVESTIGATION
CALHOUN PARK/ANSONBOROUGH HOMES/COAL GAS
CHARLESTON COUNTY
SCD 987 581 337

Completed By: Robert Cole
Reviewed By: Craig Dukes CD

Site Screening Section
Bureau of Solid & Hazardous Waste Management
South Carolina Department of Health & Environmental Control
2600 Bull Street
Columbia, SC 29202

Date Completed: June 4, 1992

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II.	SITE BACKGROUND AND HISTORY	5
	A. Ownership History	5
	B. Site Description	7
	C. Regulatory History/RCRA Summary	8
	D. Process and Waste Disposal History	8
	E. Removal/Remedial Actions	11
III.	FIELD INVESTIGATIONS	11
	A. CERCLA Inspection Activities	11
	B. Sample Types	11
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	A. Regional Hydrogeology	23
	B. Groundwater Use	24
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	A. Regional Characteristics	28
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I. INTRODUCTION/EXECUTIVE SUMMARY

The Calhoun Park/Ansonborough Homes/Coal Gas site is located in downtown Charleston, South Carolina. The site is approximately 500 feet west of the Cooper River and is located in an urban area that is both residential and industrial. The site is comprised of three sections.

The northernmost portion of the site is the South Carolina Electric and Gas Co. (SCE&G), Charlotte Street substation. This portion of the site was the location of a manufactured coal-gas plant from approximately 1855 to 1957. Potential wastes produced by manufactured gas plants include coal tar, various sludges, and iron oxide. Little is known of disposal practices at the plant, but sampling by the South Carolina Department of Health and Environmental Control (SCDHEC) and consulting firms hired by the City of Charleston and SCE&G, has found extensive contamination. The types of contaminants are consistent with hazardous substances found at former manufactured gas plants.

To the immediate south of the substation is Calhoun Park, a playground used since the 1940's. The park was closed in 1989 because of contamination in the soil. On this portion of the site, there was a chemical company between 1885 and 1892. The company manufactured a wide range of products obtainable through the distillation of coal tar. Samples from the playground also show contamination consistent with former gas plants.

The southernmost portion of the site is Ansonborough Homes, a housing project built in the 1940's. In December 1990, Ansonborough Homes had approximately 450 residents. Because of contamination discovered at Ansonborough Homes, a health risk assessment was performed in 1991. The results from sampling at the housing complex found a long term exposure threat existed, and the City of Charleston took action to vacate the property. As of March 26, 1992, no residents remained at the housing project. Contamination similar to that discovered at the substation and park has been found throughout Ansonborough Homes. This portion of the site was only used for storage of lumber, steel, scrap metal, and rosin in the past (1850's to 1930's).

Shallow groundwater at the site has been shown to be extensively contaminated. Numerous organic compounds, including polyaromatic hydrocarbons (PAH's), have been detected in monitoring wells on-site. Shallow groundwater is not used for drinking water within four miles of the site. The site is underlain by a confining layer; however, a potential conduit through the confining layer exists at the substation. A well was dug for the facility in 1910 to a depth of 1865 feet. The well was not grouted and at least two inches of annular space remained between the hole that was dug and the casing of the well. The City of Mount Pleasant has two wells within four miles of the site drawing from the deeper aquifer. Approximately 12,698 people use groundwater drawn within four miles of the site for drinking.

During this investigation, a sample was collected from the discharge point of an old brick archway that is part of the stormwater drainage system in Charleston. The archway empties into the Cooper River. The sample found significantly elevated levels of PAH's at the discharge point. Other routine SCDHEC sampling conducted between 1984 and 1989 found elevated levels of PAH's in sediment, oyster tissue, and crab tissue 0.7 miles from the site. This area of the Cooper River is a fishery and provides a habitat for threatened and endangered species.

The surface soil throughout the site has contamination with compounds commonly associated with former gas plants. The park and the substation are fenced, but contaminated soil is still accessible to the public outside of fenced areas and throughout Ansonborough Homes. Organic odors were detected at normal breathing height, but air samples collected for this investigation found no evidence of an impact to ambient air on-site. In contrast, subsequent air sampling by Davis & Floyd, Inc. found organic constituents in the air in the crawl space beneath the apartments at Ansonborough Homes. The potential exists for exposure to contaminants from the site via the air and soil exposure pathways.

Shallow groundwater at the site has previously been shown to be contaminated, but sampling at the site has not been conducted in the potentially impacted deeper aquifers. Surface soil contamination has been found throughout the site and access to contaminated areas is possible. Limited air sampling data and circumstantial evidence (such as creosote odors) suggest a potential impact to air quality near the site. Sampling for this investigation found high levels of PAH's at the discharge point into the Cooper River. Sampling by SCDHEC between 1984 and 1989 found some of the highest levels of PAH's in sediment, oyster tissue, and crab tissue in the Charleston Harbor 0.7 miles from the site.

Because of the potential and documented contamination in all four pathways, the Calhoun Park/Ansonborough Homes/Coal Gas site is given a "HIGH" priority for an Expanded Site Investigation (ESI). Samples should be collected in the Surface Water Pathway to confirm the presence of contamination attributable to the site. Sampling should be conducted to investigate the potential contamination of the deeper aquifers beneath the site.

Calhoun Park/Ansonborough Homes/Coal Gas
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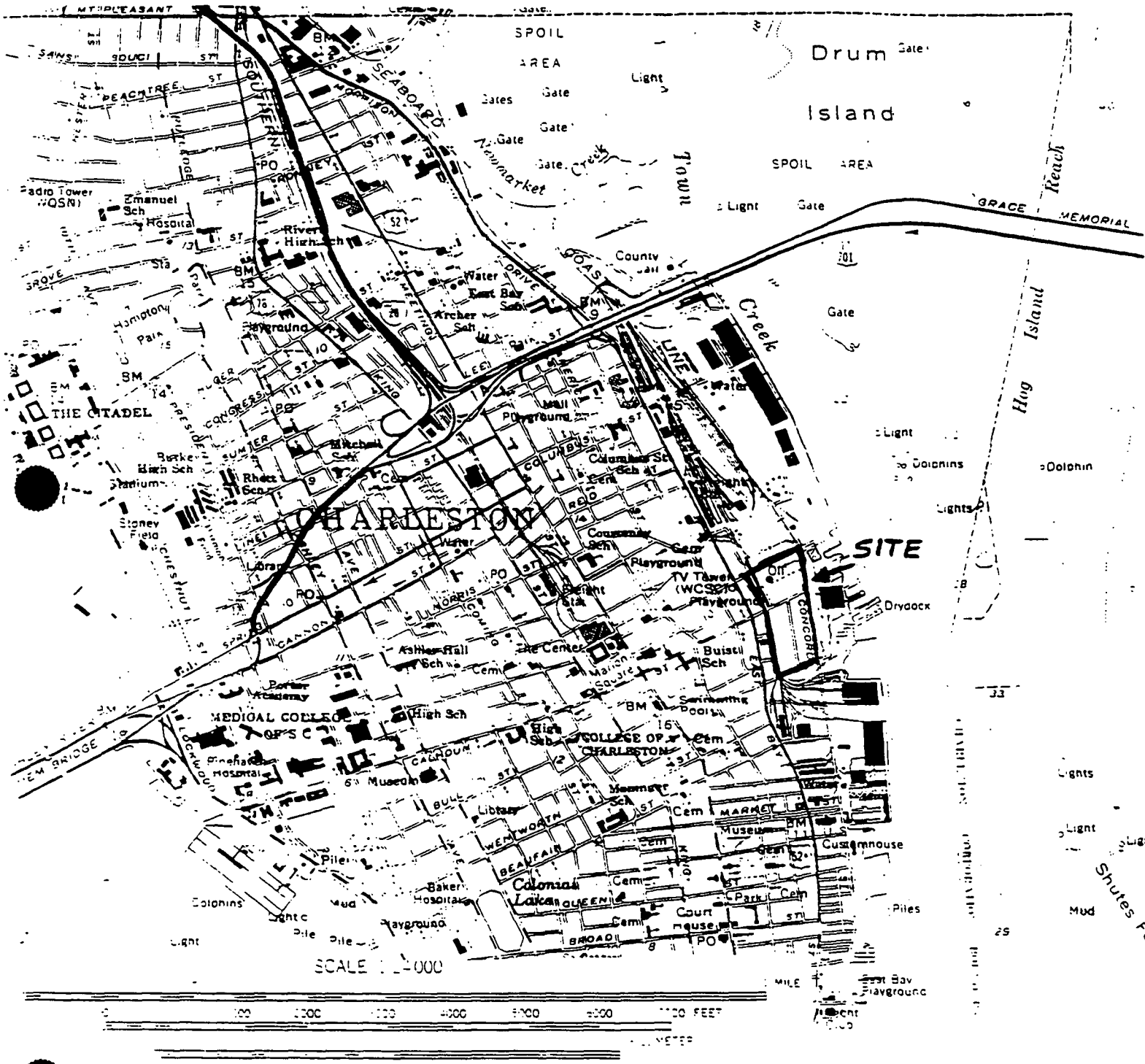
Page 3

SITE LOCATION



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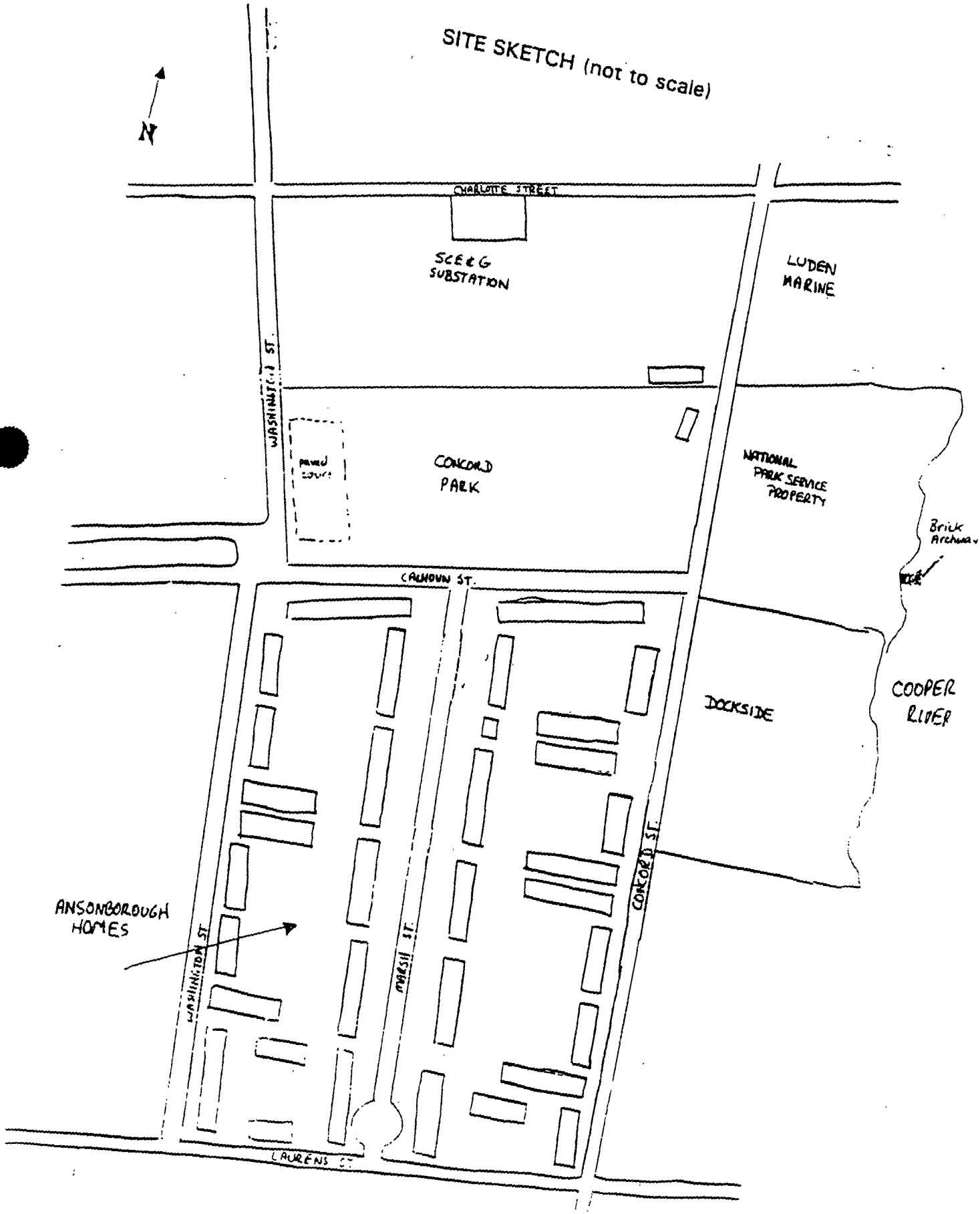


II. SITE BACKGROUND AND HISTORY

A. Ownership History

1) SCE&G Charlotte Street Substation - 1979 to present

Present Owner and Operator:	SCE&G 1426 Main Street Columbia, S.C. 29218
Contact:	Walter Irwin (803) 733-4019

2) Calhoun Park - 1947 to present

Present Owner:	The Housing Authority of the City of Charleston (HAC) 20 Franklin St. Charleston, S.C. 29401
Contact:	Donald Cameron (803) 723-1116
Present Operator:	City of Charleston (COC) 116 Meeting St. Charleston, S.C. 29401
Contact:	Douglas Smits (803) 724-3754

3) Ansonborough Homes - 1939 to present

Present Owner:	HAC 20 Franklin St. Charleston, S.C. 29401
Contact:	Donald Cameron (803) 723-1116

(Ref. 3)

The previous owners and a general description of their process histories follows:

SCE&G Charlotte Street Substation

1855 to 1858 -	Carolina Gas; coal-gas plant
1858 to 1910 -	Charleston Gas Light Co.; coal-gas plant
1910 to 1926 -	leased to Charleston Consolidated Railway & Lighting Co.; water-gas plant
1926 to 1929 -	merger of local companies to become South Carolina Power Co.; water-gas plant
1929 to 1934 -	gas properties and facilities to S.C. Public Service Co.; water-gas plant
1934 to 1957 -	S.C. Power Co. regained property, later transferred all property to SCE&G; water-gas plant
1979 to present -	SCE&G; electrical substation

Calhoun Park

Mid - 1800's -	used as a saw mill
1884 to 1885 -	Berkeley County Railway and Lumber Co.; cut and sold timber
1885 to 1892 -	Fernoline Chemical Co.; creosoting plant, chemical works, paint manufacturers
1892 to 1901 -	unused
1901 to 1904 -	Tumpowsky Iron Co.; junk dealership
1904 to 1917 -	unused
1917 to 1920 -	Cambell Fuel Co.; retailer for coal, wood and coke
1920 to 1934 -	wood dealers
1934 to 1942 -	steel storage yard; playground
1942 to 1947 -	United States Navy; use unknown
1947 to present -	The Housing Authority of the City of Charleston; used as a playground; under lease to the City of Charleston until 1997

Ansonborough Homes

1880's -	three "rosin yards: and one "rosin shed"
1915 to 1930's -	S.M. Parker Lumber Co.; cut and store lumber
1930 to 1939 -	Charleston Steel and Metal Co.; junk dealership
1939 to present-	property of the Housing Authority of the City of Charleston

(Ref. 3)

B. Site Description

The Calhoun Park/Ansonborough Homes/Coal Gas site is located in downtown Charleston, South Carolina in Charleston County. The site is bordered by Charlotte St. to the north, Laurens St. to the south, Concord St. to the east and Washington St. to the west. The Cooper River is approximately 500 feet east of the site (Ref. 4). The geographical coordinates of the site are 32 degrees, 47 minutes, 22.2 seconds north latitude and 79 degrees, 55 minutes, 39.2 seconds west longitude (Ref. 2).

North of the site across Charlotte Street there is a large trucking facility. During the reconnaissance and sampling of the site, trucks were frequently passing the site. West of the site there are mainly residential areas or small businesses. South of the site is a large fenced-in parking lot. Between the site and the Cooper River to the east, there is an open field that at one time was a soccer field. The field is currently owned by the National Park Service and is the proposed location of an aquarium and tour boat facility. Also east of the site are the Dockside Condiminiums (Ref. 4).

The entire site is approximately 30 acres in size and is comprised of three distinct areas. The northernmost portion of the site is the SCE&G Charlotte Street electrical transformer substation, built in 1979. As early as 1855, a coal-gasification plant was located on this part of the site. The substation is built on debris from the coal-gas plant. Several old buildings remain from the manufactured gas plant. The substation is fenced and the ground is covered with large gravel. The substation has been built up approximately three to four feet higher than the surrounding elevation. An old artesian well is located in the northeastern portion of the substation. During the recon, a strong creosote odor was noticed near the southern edge of the substation along a short retaining wall that separates the substation and Calhoun Park. Soil just outside the fence on the western side of the substation had a blue-green stain (Ref. 3,4,5).

The second portion of the site is Calhoun Park. The park has a baseball field, a paved basketball court, a large open field, and a picnic shed. The park is completely fenced, but several areas of the fence have been bent so that access is possible. The northern edge of the park borders the SCE&G substation, and several drainage pipes were noted along a retaining wall below the fence. At least one stain of a black tar-like substance was noticed during the recon (Ref. 4).

The southernmost portion of the site is Ansonborough Homes, a 162-unit housing project. In December 1990, 128 of the units were occupied (Ref. 6). During the recon of August 22, 1991, only 47 of the units were apparently occupied. The others had the windows and doors boarded and closed (Ref. 4). A Health Risk Assessment conducted by Davis & Floyd, Inc. in the spring of 1991 found contamination in surface soil at the housing complex. Because of these findings, the Housing Authority of the City of Charleston decided to move the remaining residents (Ref. 34). The complex was empty as of March 26, 1992 (Ref. 7).

Surface soil contamination has been detected in all three portions of the site, with contaminants that are commonly associated with former coal-gas plants. Similar contaminants have also been found at the property east of the site. This property is owned by the National Park Service and is being addressed as a separate site because of the Federal ownership. The National Park Service property is the proposed location of an aquarium and tour boat facility (Ref. 8).

Another concern at this site is an old brick archway that bisects the site, paralleling Calhoun Street. The brick archway is part of an old drainage system for Charleston. A sample collected at the discharge of the archway found significant levels of contaminants similar to those detected on-site. Because the archway is tidally influenced, water flows into the archway at high tide and drains out as the tide recedes. The archway backs up during periods of extra high tide, forcing water out of stormwater grates onto the yards and roads in Ansonborough Homes.

C. Regulatory History/RCRA Summary

On-site industries that were most likely to have caused the contamination operated before the implementation of RCRA regulations.

D. Process and Waste Disposal History

The Calhoun Park/Ansonborough Homes/Coal Gas site has had several industries on-site in the past. The most recent facility is the active SCE&G Charlotte St. Substation; however, it is unlikely that the substation has contributed to the contamination at this site. The SCE&G portion of the site was previously a coal-gasification plant. The plant was in operation from approximately 1855 until 1910. In 1910, the plant was upgraded and changed to a carbureted water gasification system, which operated until 1957 (Ref. 3).

The coal-gasification process heated coal in a closed vessel, or retort. The gases that evolved were passed through a washbox where the gas was cooled and some of the tars were condensed and removed, leaving a tar fog or "aerosols of tar" remaining in the gas. The common method for removal of the aerosols was to use towers or boxes of woodchips. The gas would flow through the woodchips and the tar within the gas would bind to the wood (Ref. 9).

After the removal of tars from the raw gas, several other contaminants were usually removed to further purify the gas. At some coal-carbonization plants, light oils (consisting of xylenes, benzenes and related compounds) and naphthalene were removed by various scrubbers. Not all plants recovered these compounds. Another compound typically removed from the gas was ammonia. Ammonia was normally removed by scrubbing with water, condesate, or sulfuric acid. The ammonia could be condensed to an ammonia liquor that some plants sold directly to chemical companies. Phenols were also removed from the gas prior to distribution. The

phenols were generally removed from the plant with the ammonia liquor. The liquor was sometimes discharged directly into streams or bays, as was most common along coastal areas (Ref. 9).

Hydrogen sulfide and cyanide were also removed from the gas prior to distribution. The gas would circulate through a series of oxide boxes containing rusted iron borings, bog ore, or precipitated iron oxides. The oxide sometimes had lime or soda ash added to it to keep the iron oxide in an alkaline state. Also, a fluffing material was added to create better gas flow. These materials were usually woodchips, but blast furnace slag and corn cobs were also used. The final form of the cyanide was generally complex ferri-, ferro-, and ferri-ferro ammonium cyanide complexes. These chemicals are easily identified by their intense blue color. The spent oxides were generally discarded or used as fill at manufactured gas plants (Ref. 9).

Carbureted water gasification systems operated a little differently. The coal gas initially produced in plants of this type was also known as blue gas. The blue gas is prepared by passing steam through a bed of incandescent carbon. The steam reacts with the carbon to produce a fuel gas comprised primarily of carbon monoxide and hydrogen. The blue gas has a low heating value, so liquid hydrocarbons are thermally cracked into the gas, creating carbureted water gas (CWG). The production of CWG produced many of the same byproducts as coal-carbonization with a few exceptions. The separation of tar was more difficult at CWG plants because the tar, oil, and condensate water formed an emulsion that was difficult to separate. The emulsion could quickly fill the tar separator and the emulsion would then flow out through the tar outlet and the condensate outlet (Ref. 9).

The naphthalene and light oils were also removed from the CWG, but the naphthalene could be added back into the process and was therefore not considered a waste at many CWG plants. Ammonia, cyanides, and phenolic compounds were produced in only trace amounts at CWG plants and were not removed or recovered from the process. The amount of iron oxide waste was usually considerably less at CWG plants than coal-gasification plants (Ref. 9).

During the period when the plant employed coal-carbonization, the disposal practices are unknown. It is not known whether the ammonia liquor was sold or discarded into the nearby river. Early insurance maps of the facility show equipment and structures that probably had iron oxide to remove hydrogen sulfide and cyanide. Photographs and maps of the plant after 1910 clearly show the different structures and equipment used for the carbureted water gasification system (Ref. 3).

A former employee of the CWG plant outlined a few of the disposal practices that he observed during his employment between 1947 and 1953. The spent iron oxide was spread on the ground around propane tanks near the park. The tar was boiled down to separate the tar out from the emulsion removed from the tanks and

transferred to railroad tank cars for shipment off-site. He estimated that two tanker cars per week were filled. According to him, the transfer pipes frequently ruptured and coal tar would spill onto what is now Calhoun Park. The gas relief holder, used as an emergency relief valve to vent off excess gas, also was a source of spills. The tank was of open bottom construction and was designed to rise up inside of an open-top tank of water. When the pressure was too great, the inverted tank would rise above the water level, and tar and water would spill onto the adjacent property (Calhoun Park). Gas was stored in a large collapsable iron tank (480,000 cubic feet) made in three sections, that rose and fell depending on the amount of gas being produced. The former employee stated that the tank rested in a hole that was approximately 25 feet deep and full of water. The full height of the tank was approximately 60 feet. The gas in the tank contained residual tars that would condense out and collect in the water. A collection system retrieved some of the tar. Several times a day, the tar was pumped into a 500 to 600 gallon tanker truck and some spills occurred during pumping. Also, another large 3-piece sectional tank was located at St. Phillips and Cannon Street to aid in storage of gas during peak times. Condensing pipes were also located at this tank and tar was pumped from this tank as well. Waste tars from both tanks were taken to the Old Charleston Dump (East Bay at the Cooper River Bridge). Neither of the large tanks remain (Ref. 10,11).

The Calhoun Park section of the site also had several companies on-site in the past. The Charleston Dry Dock Co. used the area between 1934 and 1942 for storage of steel. The U.S. Navy owned the land from 1942 to 1947, but the use of the land is unknown. Another company on-site was Fernoline Chemical Company, which was operational between 1885 until 1892. The company was listed under "creosote", "chemical works", and "paint manufacturers" in old Charleston directories (Ref. 3). Fernoline apparently did some creosoting of lumber, but an equipment list and map of the plant shows that most space was taken up by retorts and other refining equipment (Ref. 3). In the late 1800's, small tar distilleries were commonly established at or near gas plants to make use of the coal tar. When distilled, the coal tar could produce turpentine substitutes, rubber solvents, creosote for timber preservation, pitch for briquetting, dyes, antiseptics, perfumes, and food preservitives (Ref. 12). Fernoline probably got coal tar from the gas works and distilled it to make other products. The company had no apparent means of off-site disposal (no railroad tracks), and their disposal practices are unknown.

Part of the chemical company extended onto what is now National Park Service property (NPS). Pilings from the old wooden wharf shown on old maps of Fernoline still extend from NPS property (Ref. 3,4). One test pit dug on NPS property near the old wharf contained a pipe that contained "creosote", and the hole exhibited a strong creosote odor (Ref. 8).

The Ansonborough Homes portion of the site had little industry on-site in the past other than storage. In the 1880's, three "rosin yards" and one "rosin shed" were located in the northeast corner of this portion of the site. Rosin was used in making

varnishes and caulking ships. Lumber and scrap metal were stored on this portion of the site in the early 1900's (Ref. 3).

E. Removal/Remedial Actions

SCE&G removed soil stained by a transformer explosion in April 1989. Approximately three cubic yards of soil were approved for disposal at the Oakridge Landfill in Dorchester County, S.C. Approval was granted by SCDHEC. The transformer was non-PCB (Ref. 13).

Because of the results from various investigations, Calhoun Park was completely fenced in August 1989. The residents of Ansonborough Homes have been vacated from the housing complex (Ref. 28,29,34).

III. FIELD INVESTIGATIONS

A. CERCLA Inspection Activities

A CERCLA site reconnaissance was conducted August 22, 1991, by SCDHEC personnel including Gerald Shealy, Christine Coker, John Cresswell, Rick Richter, Craig Dukes, and Robert Cole. Walter Erwin, SCE&G, arrived and showed the SCE&G substation. The site was videotaped (Ref. 4,14).

Samples were collected September 10, 1991, by Craig Dukes, Robert Cole, John Cresswell, Gerald Shealy, Pam James, Chuck Arnold, Marion Feagin, Shannon Greene, Rick Richter, and Robin Coller-Socha of SCDHEC. Mark Parrington of General Engineering, Inc. received split samples for SCE&G (Ref. 4,14).

Sampling activities were conducted in Level C and Level D protection. After collection, the samples were placed on ice and delivered to the SCDHEC laboratory the following morning. The samples were analyzed for chemicals on the EPA Target Compound List (TCL) with the exception of pesticides and herbicides (Ref. 14).

B. Sample Types

Sampling activities included the collection of five surface soil samples, two sediment samples, four surface water samples, two air samples, and one groundwater sample from a public well. No changes to the sample plan were made in the field, and all samples were collected as described in the plan (Ref. 4,14,33).

A control surface soil sample, CP-SS-01, was collected approximately 100 to 150 yards north of the northwestern corner of the substation. The sample was 15 to 20 feet west of the fence bordering the truck facility, approximately five feet west of the railroad track, and ten feet east of Washington Street. The sample was comprised of sand, rock, small pieces of glass, and small amounts of red clay. The

sample was collected at depth of approximately six inches. This part of Washington Street received very little traffic. A telephone pole with tar on it was just on the other side of the fence inside the trucking facility. Split samples were obtained by General Enginering, representing SCE&G (Ref. 14).

A second control surface soil sample, CP-SS-02, was collected in an open field, southwest of Ansonborough Homes. The sample location was approximately 45 to 50 yards south of Broad Street and 25 to 30 yards west of Washington Street. The sample was collected at a depth of approximately six inches to one foot, and was comprised of sand, reddish-orange clay, grey soil, pieces of brick and rock, and bright red clay. No split samples were obtained for this sample (Ref. 14).

The surface soil sample, CP-SS-03, was collected at the northwestern corner of the substation, just outside of the fence. The soil in this vicinity had a blue-green stain during the reconnaissance; however, the stain was not reported during the sampling trip. The sample was collected approximately five to ten feet east of the railroad track. The sample was a wet, dark brown mud. The sample was collected above two feet in depth. Split samples were obtained for this sample (Ref. 14).

The surface soil sample, CP-SS-04, was collected from the iron oxide material inside the fence of the substation. The sample was a black chunk of material that was broken up for sampling by hand. The material was deposited on the surface of the gravel. Split samples were obtained for this sample (Ref. 14).

The surface soil sample, CP-SS-05, was collected inside CP, 22 feet south of the retaining wall of the substation, and 241 feet east of the fence on the Washington Street side of the park. The sample was collected at a depth of approximately one to two feet. The sample plan called for the sample to be collected from an area where surficial tar was absent, so as not to overwhelm the analytical equipment. The initial soil was comprised of a black to dark-brown mixture of sand and clay. Some small pieces of brick and small rocks were also in the sample. Below one foot in depth, the soil contained some yellow-tan sand and clay. No split samples were collected for this location (Ref. 14).

The surface soil sample, CP-SS-06, was collected inside Ansonborough Homes property in the southwest corner, from a yard inside a group of apartments. The sample was 10 to 15 feet from the sidewalk on the west side of the yard. The sample was comprised of black or dark brown sandy soil, with a small amount of clay. A few small rocks were also in the sample. The sample was collected at a depth of between six inches and 1.5 feet. No split samples were obtained. (Ref. 14).

The only groundwater sample collected, CP-PW-07, was collected from Mount Pleasant well # 2, approximately 2.5 miles northeast of the site. Split samples were not obtained (Ref. 14).

Sediment and surface water samples, CP-SD-08 and CP-SW-08, were collected as control samples in the tidally influenced brick archway. The samples were collected after access to the archway was obtained by removing a manhole cover at the intersection of Calhoun Street and Elizabeth Street, approximately one-half mile from the site. The sample was collected as the tide was going out. The sediment sample was collected by use of a Ponar dredge, lowered by string to the bottom of the archway. The sample contained a very dark sediment, black in color, and contained small pebbles, rocks, and bits of glass. A small amount of oily sheen was noted. The water sample was collected by means of lowering a pail attached to a string into the flowing water (Ref. 3,4).

The downgradient sediment and surface water samples, CP-SD-09 and CP-SW-09, were collected at the outfall of the brick archway into the Cooper River. The surface water sample was collected before the sediment sample. A strong creosote/coal-tar odor was noted during collection of this sample. An oily sheen was noted on the sediment ten to fifteen feet downgradient of the outfall prior to sampling. The sediment sample was black in color, with small pieces of rock, glass, and what seemed to be small pieces of coal. The sediment had a very heavy oily sheen and strong creosote odor. An oily sheen extended from the outfall into the Cooper River after sampling was complete. Split samples were obtained for both sediment sample locations (Ref. 3,4).

Two samples of flood water were collected, CP-SW-10 and CP-SW-11. The sampling inspection was scheduled at a time of seasonal flooding. The samples were collected in the area of Ansonborough Homes. The first sample was collected approximately 11 yards in front of Building 24 at Ansonborough Homes. The second sample was collected near Building 18, near a telephone pole. No split samples were obtained (Ref. 3,4).

Air samples were collected at two locations, CP-AIR-12 and CP-AIR-13. A Minipuf and a grab sample were collected at each location. The grab samples were collected by passivated stainless steel cannisters, which took approximately ten minutes each to fill. The Minipufs only ran for approximately four hours. The first sample CP-AIR-12 was collected at an upwind location, near the northeast corner of the SCE&G substation. Numerous trucks passed the location during sampling. The downwind sample (CP-AIR-13) was collected inside Calhoun Park, at the south edge of the substation. No split samples were obtained. The wind conditions on the day of sampling were calm with an unsteady wind from the northeast (Ref.4,14,32).

C. Analytical Results

Results from samples collected during this investigation confirm the presence of contamination in surface soil at the site. Also, sediment samples collected from the

outfall of the brick archway indicate that the surface water pathway has been impacted. The contaminants include both organic and inorganic compounds.

The area of the site is built largely upon fill material of unknown nature, so inorganic constituents, such as heavy metals, were expected to be variable within the area of the site. This variability was compensated for by the collection of two control samples for surface soil. Also, the site's close proximity to other potential sources of contamination, such as the large trucking facility just north of the site and the railroad track paralleling the site, were considered. The soil composition of all the surface soil samples collected for this investigation were similar. The control samples collected for this investigation are representative of conditions near the site.

The surface soil sample, CP-SS-03, contained several parameters significantly increased (3x) over the control levels, including: silver, cobalt, copper, manganese, lead, zinc, acenaphthylene, anthracene, chrysene, naphthalene, pyrene, and 2-methylnaphthalene. Numerous Tentatively Identified Compounds (TIC's) were also detected in this sample. TIC's are organic compounds that are not quantified by the SCDHEC laboratory due to the lack of appropriate reference standards. The majority of the TIC's detected are either derivatives of naphthalene or benzene. The significance of these TIC's is not known (Ref. 6).

The surface soil sample, CP-SS-04, also contained several parameters that were significantly increased over the control levels, including: silver, barium, cobalt, manganese, zinc, and 2-methylnaphthalene. Naphthalene was also slightly elevated. Again, numerous naphthalene and benzene derivatives were identified as TIC's (Ref. 6).

The surface soil sample, CP-SS-05, was collected inside CP. This sample contained no inorganic parameters significantly elevated over control levels; however, PCB 1254 was detected at a level 20 times higher than control levels (0.216 ppm). The sample also contained several TIC's (Ref. 6).

The surface soil sample, CP-SS-06, was collected from the Ansonborough Homes portion of the site. The sample contained one inorganic parameter, zinc, at a significant level and one organic parameter at a significant level, flouranthene. Several other organic compounds were slightly elevated, including: benzo(a)pyrene, benzo(ghi)perylene, chrysene, phenanthrene, and pyrene. Several TIC's were also detected (Ref. 6).

SAMPLE LOCATIONS
Locations marked by ⊗ .
(not to scale)

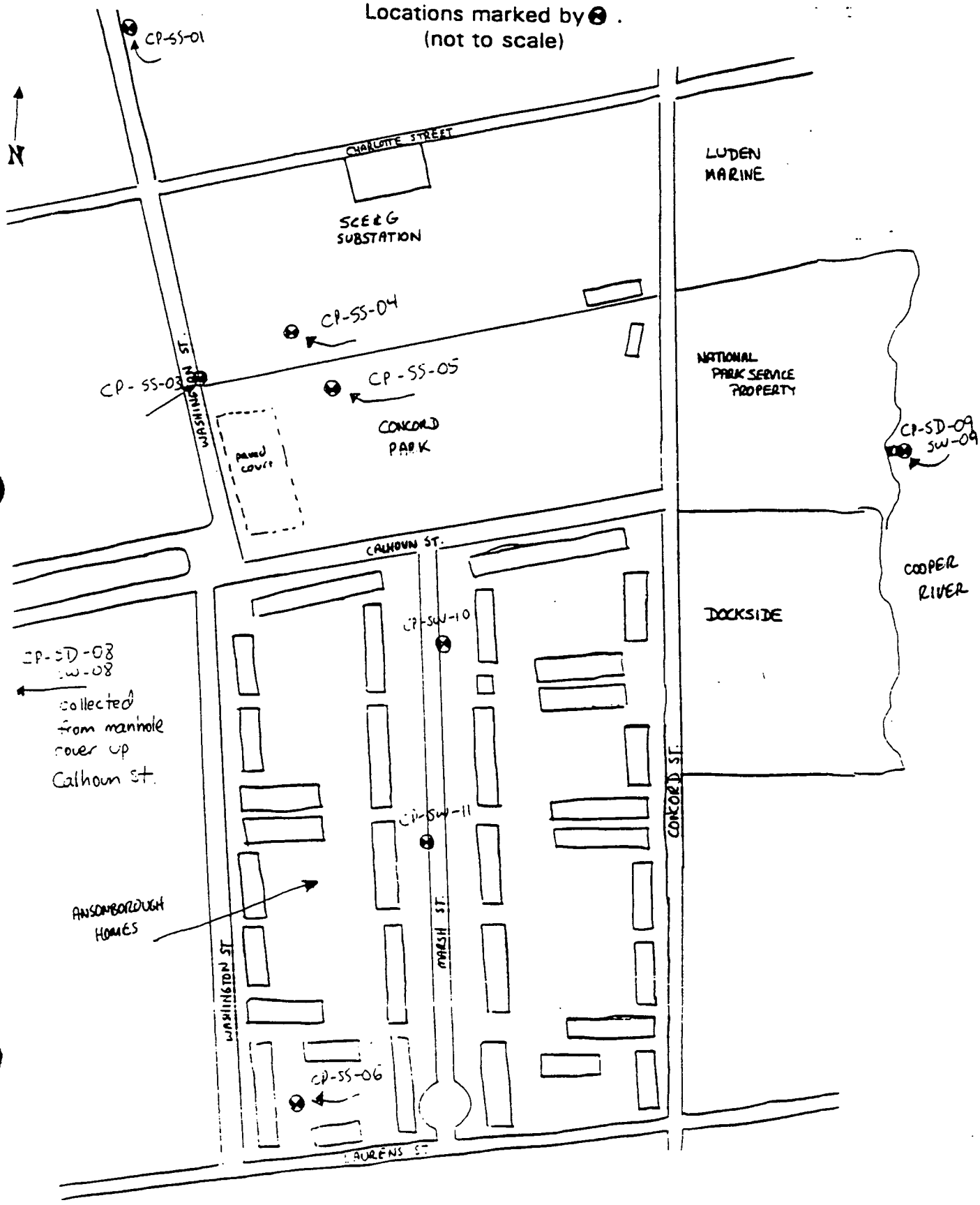


TABLE IA : SOIL SAMPLE SUMMARY
Summary of inorganic parameters in at least one sample.
All results in ppm.

INORGANICS						
Parameter	Control CP-SS-01	Control CP-SS-02	CP-SS-03	CP-SS-04	CP-SS-05	CP-SS-06
arsenic	11 U	0.99	15 U	0.82	2.7	3.6
silver	3.0 U	3.0 U	11	23	3.0. U	3.0 U
aluminum	4700	6800	6400	2200	7400	7000
barium	52 U	62	160	190	37	120
beryllium	0.5 U	0.5 U	0.6	0.5 U	0.5 U	0.5 U
cadmium	1.0 U	1.0 U	1.5	1.0 U	1.0 U	1.0
cobalt	3.1	2.0 U	9.7	13	2.0 U	2.0 U
chromium	600	9.0	30	13	17	13
copper	21	3.6	160	2.6	26	57
manganese	160	26	560	690	43	49
nickel	14	2.0 U	16	23	3.7	4.8
lead	82	150	410	220	63	230
tin	350	50 U	160	260	50 U	50 U
vanadium	7.8	9.0	18	2.0 U	15	12
zinc	39	39	280	160	67	320
mercury	0.25 U	0.25 U	0.42	0.25 U	0.25 U	0.3

TABLE IB : SOIL SAMPLE SUMMARY
Summary of organic parameters in at least one sample.
All results in ppm.

ORGANICS						
Parameter	Control CP-SS-01	Control CP-SS-02	CP-SS-03	CP-SS-04	CP-SS-05	CP-SS-06
acenaphthylene	0.3 U	0.3 U	16.7	0.1 U	0.3 U	0.3 U
anthracene	0.3 U	0.3 U	14.8	0.1 U	0.3 U	0.3 U
benzo (a) pyrene	0.3 U	0.3 U	0.3 U	0.1 U	0.3 U	0.415
benzo (ghi) perylene	0.3 U	0.3 U	0.3 U	0.1 U	0.3 U	0.393
chrysene	0.3 U	0.3 U	30.8	0.1 U	0.3 U	0.527
flouranthene	0.3 U	0.3 U	0.3 U	0.1 U	0.3 U	0.914
naphthalene	0.3 U	0.3 U	2.42	0.789	0.3 U	0.3 U
phenanthrene	0.3 U	0.3 U	0.3 U	0.1 U	0.3 U	0.631
pyrene	0.3 U	0.3 U	24	0.1 U	0.7	0.798
benzoic acid	0.3 U	0.3 U	0.328	0.1 U	0.3 U	0.3 U
2 -methyl naphthalene	0.3 U	0.3 U	1.59	1.1	0.3 U	0.3 U
PCB 1254	0.01 U	0.01 U	0.01 U	0.01 U	0.216	0,01 U
TIC	A,B,C,D	B	A,B,C,D,E,F,G,H, J,K,L,M,N,O,P	A,C,D,H,I,K,L,M, Q,R,S,T,*	P,R,V,W	M,O,X

Cyanide was not included in the original analysis. Three samples were reanalyzed for total cyanide (CP-SS-01, CP-SS-02, and CP-SS-03) approximately four months after the samples were collected. The control samples (01 and 02) did not have cyanide above the detection limit of 10 ppm. CP-SS-03 contained cyanide at 200 ppm. The holding time for soil samples to be analyzed for for cyanide is indefinite, so the accuracy of the results should not have been comprimised (Ref. 35). Complete results are available in Appendix I.

Sampling during this investigation has also shown an impact to the surface water pathway. Numerous organic compounds were detected in the sediment sample collected at the discharge point of the brick archway into the Cooper River. The upgradient sample contained 9025 ppb of total PAH's, compared to 98,450 total PAH's in the downgradient sample. The control sample received runoff from roadways that likely contributed to the level of PAH's; however, the downgradient sample contained numerous parameters that were significantly elevated over control levels. The only inorganic parameter that was 3x the control level was nickel. Numerous organic parameters (particularly polyaromatic hydrocarbons, or PAH's) were also significantly elevated, including acenaphthene, anthracene, benzo (k) flouranthene, chrysene, fiourene, indeno (1,2,3-C,D) pyrene, naphthalene, pyrene, and 2-methylnaphthalene. A large number of benzene and naphthalene derived TIC's were also found in this sample. A summary of sample results for sediment samples collected during this investigation is available in Table IIA and Table IIB.

Four surface water samples were collected for this investigation. Two of the samples, CP-SW-08 and CP-SW-09, correspond to the location of the sediment samples. No inorganic or organic parameters were detected in the downgradient sample (CP-SW-09) at significant levels. Two other surface water samples were of flood water, CP-SW-10 and CP-SW-11. None of the parameters detected in the two flood water samples were elevated compared to the control sample, and no PAH's were detected in any of the surface water samples. The TIC's detected in all four water samples have been detected in previous SCDHEC CERCLA sampling. A summary of the surface water sampling is in Table IIC.

The nearest public well to the site is the Mount Pleasant well. This well was sampled for this investigation because of the possibility that contaminants could have a conduit through the confining layer (the Cooper Marl). The well sample, CP-PW- 07, contained no parameters that were significantly elevated. The TIC detected in this sample, 4-hydroxy-3-methoxy-benzaldehyde, is also known as Vanillin and is a flavoring aid. The significance of this TIC is unknown. The complete results for this sample can be found in Appendix I.

Air samples collected for this investigation found no significant levels of any parameters compared to probable upwind levels. Cresols were not detected and the level of PAH's detected were consistent with levels detected elsewhere in the state (Ref. 32). Complete results can be found in Reference 32.

TABLE IIA : SURFACE WATER PATHWAY SAMPLES
SEDIMENT SAMPLES
Summary of inorganic parameters in at least one sample.
All results in ppm.

INORGANICS		
Parameter	Control CP-SD-08	CP-SD-09
arsenic	4.6	3.3
silver	3.0 U	5.3
aluminum	2000	2500
barium	80	20
cadmium	1.0 U	1.1
cobalt	2.0 U	4.0
chromium	100	72
copper	85	75
manganese	47	92
nickel	4.6	15
lead	480	210
tin	74	150
vanadium	2.8	7.0
zinc	250	430

TABLE IIB : SURFACE WATER PATHWAY SAMPLES
SEDIMENT SAMPLES
Summary of organic parameters in at least one sample.
All results in ppm.

Parameters	Control CP-SD-08	CP-SD-09
acenaphthene	0.3 U	12.9
anthracene	0.3 U	26.1
benzo (k) flouranthene	0.783	0.3 U
benzo (ghi) perylene	0.586	2.02
bis (2-ethylhexyl) phthalate	0.902	0.901
chrysene	1.12	9.73
flouranthene	2.2	0.3 U
flourene	0.3 U	3.09
indeno (1,2,3-CD) pyrene	0.3 U	2.66
naphthalene	0.3 U	9.54
phenanthrene	1.08	0.3 U
pyrene	1.53	13.2
2-methylnaphthalene	0.3 U	10.2
PCB 1254	0.824	0.01 U
TIC	B,Y	D,M,N,T,*,W,Z,AA,BB,CC,DD,EE, FF,GG,HH

TABLE IIC : SURFACE WATER PATHWAY SAMPLES
SURFACE WATER SAMPLES
Summary of parameters in at least one sample.
All results in ppm, except as noted.

Parameter	Control CP-SW-08	CP-SW-09	Flood Water CP-SW-10	Flood Water CP-SW-11
INORGANICS				
aluminum	0.22	0.07	0.32	0.39
copper	0.01	0.01	0.01 U	0.01 U
manganese	0.07	0.06	0.01	0.02
antimony	0.09	0.14	0.24	0.25
zinc	0.04	0.01 U	0.01 U	0.01 U
cyanide	0.02	0.01	0.01 U	0.01 U
ORGANICS				
bis (2-ethylhexyl) phthalate	0.0242	0.004 U	0.004 U	0.004 U
chloroform	0.00411	0.002 U	0.002 U	0.002 U
TIC	II,JJ,KK	L,II,LL	MM	II,LL,MM
INDICATOR PARAMETERS				
alkalinity	180	150	92	97
COD	1,200	520	970	700
nitrate/nitrite	0.18	0.39	0.13	0.11
pH (standard units)	7.2	7.1	7.7	7.7
TDS	6,600	12,300	23,700	25,700
TOC	12.3	12.8	6.8	6.1
total phenol	0.01 U	0.011	0.01 U	0.01 U

The following key is for Tables IA, IB, IIA, IIB, and IIC.

KEY

U) Parameter not detected. Listed value is the Method Detection Limit (MDL).

A) bicyclo[4.2.0]octa-1,3,5-triene
B) dimethoxymethyane
C) 1-ethenyl-4-methyl-benzene
D) (1-methyl-2-cyclopropen-1-yl)-benzene
E) (z) 1,3,5-hexatriene
F) 3-methyl-,(E) 1,3,5-hexatriene
G) 1,2-dimethylbenzene
H) 1-ethenyl-2-methyl-benzene
I) methyl (1-methylethenyl) benzene
J) 1,3-diethenyl benzene
K) 2-ethenyl-1,4-dimethylbenzene
L) azulene
M) 1-ethylidene-1H-indene
N) 1,5-dimethyl naphthalene
O) 2,3-dimethyl naphthalene
P) biphenylene
Q) (1-methylethenyl) benzene
R) (1-methyl-1-propenyl)-,(z) benzene
S) (1-nitroethyl) benzene
T) 1-methylene-1H-indene
*) 1,2,3,4-tetramethyl benzene
V) (I-methyl-2-cyclopropen-1-4L) benzene
W) 1,3,,5,7-cyclooctatetraene
X) benzophenane
Y) 1,1-(1,2-ethynediyl) bisbenzene
Z) 2,3-dihydro-1H-indene
AA) 1-ethyl-2,3-dimethyl benzene
BB) 4-ethyl-1,2-dimethyl benzene
CC) 2,3-dihydro-4-methyl-1H-indene
DD) 2-ethyl naphthalene
EE) 2,7-dimethyl benzo[B] thiophene
FF) 1,3-dimethyl naphthalene
GG) 1,2-dimethyl naphthalene
HH) 1,4,6-trimethyl naphthalene
II) 1,4-hexadiene
JJ) N,N-dibutyl formamide
K) N,N-diethyl-3-methyl-benzamide
LL) (z)-9-octadecen-1-ol
MM) 4-hydroxy-3-methoxy-benzaldehyde

IV. GROUNDWATER PATHWAY

A. Regional Hydrogeology

The following geologic units underlie the Calhoun Park/Ansonborough Homes/ Coal Gas site:

Name	Description	Estimated Hydraulic Conductivity	Depth of Occurrence
Terrace Deposits	Fine- to medium grained sands, shelly sands, and shell beds	10^{-4}	0-50 ft.
Cooper Formation	Sandy, calcareous, phosphatic limestone and marl with layers of clay	10^{-8}	50-225 ft.
Santee Limestone	Fossiliferous, locally phosphatic, limestone	10^{-4}	225-375 ft.
Black Mingo	Fossiliferous limestone, argillaceous sands, sandstones, and clays	10^{-4}	375-725 ft.
Pee Dee	Fossiliferous, muddy sands, and silty and sandy calcareous clays	10^{-6}	725-1150 ft.
Black Creek	Muddy sands, silty clays, and shelly limestone	10^{-6}	1150-1950 ft.
Middendorf	Feldspathic sands, clay, silty clay, and clayey silt	10^{-6}	1950-3000 ft.

The potentially impacted aquifers include all of the aquifers below the Cooper Formation. The Cooper Formation underlies the surficial aquifer and and is a documented, laterally extensive confining layer; however, an artesian well penetrating the Cooper is located on the SCE&G property. This well is approximately 1865 feet deep and may act as a conduit for the downward, vertical migration of contaminants. The well was completed in 1911 and was intended to be used as a source of water for a boiler supply at the gas works. The well casing is 6.5 inches in diameter and no grout exists within the annular space of the well. The hole was drilled at least two inches larger than the diameter of casing. The drilling log for the well indicates that the initial drilling went through at least six feet of cinders, brick, and tar (Ref. 15).

On-site soil borings indicate that the surficial water table is overlain by fill material consisting of sand, clay, silt, shells, clayey sand, silty sand, top soil, solidified coal tar, organic debris, and building rubble. These materials have estimated hydraulic conductivities ranging from $>10^{-3}$ to 10^{-8} cm/sec. The depth to groundwater at the site varies in monitoring wells from 2.5 to 4.1 feet, but the level may fluctuate due to tidal influence. Locally, the shallow groundwater discharges into the Cooper River. Groundwater flow direction in the deeper aquifers is as follows: Santee-Limestone to the east: Black Mingo to the southeast; Black Creek to the north/northeast; and Middendorf to the northeast. Flow direction in the Pee Dee is unknown. The site is not in area of karst topography. The Cooper River is a discontinuity within the shallow water table (Ref. 15). The net precipitation for this area of the state is 5 to 15 inches (Ref. 1).

B. Groundwater Use

Groundwater within a four-mile radius of the site is used for industrial, irrigation, domestic, and community water supply (Ref. 15). Shallow groundwater is not used for drinking watrer within four miles of the site. The only public supply wells within four miles of the site are two wells in the City of Mount Pleasant system. The system has five operational wells, and the system is blended prior to distribution. The total number of people served by the system is 31,746 (Ref. 15,17). Based on available file information, all other areas are covered by Charleston City Water or other systems that obtain their water supply from upgradient surface water sources. There are no known private wells within four miles of the site.

C. Groundwater Impact

Documentation of contamination of the shallow aquifer beneath the site is extensive. Free product has been detected in most of the monitoring wells on-site, with one well having over six feet of a black, tarry substance. The following tables are a summary of results from sampling conducted by Davis and Floyd in August 1990, Reference 3.

GROUNDWATER SAMPLING RESULTS (1990)
Parameters found in at least one sample.
All results in ppm.
A : monitoring well at Ansonborough Homes; CP : monitoring well at Calhoun Park

INORGANICS							
PARAMETER	AMW1	AMW2	AMW3	CPMW1	CPMW2	CPMW2 Dup.	CPMW3
cyanide	<0.016X	<0.016X	<0.016X	1.76	0.095	0.058	<0.016X
aluminum	250	790	73	280	450	310	119
arsenic	0.15	0.2	0.014	0.26	0.14	0.14	0.048
barium	2.88	4.53	0.19	2.2	1.52	1.3	0.59
beryllium	0.006	0.015	<0.005U	0.008	0.01	0.008	<0.005U
cadmium	0.015	0.025	0.007	0.01	0.01	0.01	0.004
calcium	435	408	267	424	347	366	290
chromium	0.45	1.1	0.07	0.4	0.6	0.45	0.14
cobalt	0.06	0.11	<0.01U	0.09	0.08	0.07	0.04
copper	0.49	2.1	0.03	0.65	0.9	0.65	0.38
iron	238	776	58.3	352	396	284	157
lead	9.25	12.7	0.18	7.1	4.65	3.6	1.56
magnesium	291	343	273	91.5	166	139	50.5
manganese	2.75	4.65	1.19	5.85	3.5	2.8	1.67
mercury	0.04	0.06	<0.0002U	0.03	0.016	0.018	0.0046
nickel	0.10	0.21	0.02	0.04	0.22	0.18	0.06
potassium	150	125	155	40	85	70	29
selenium	<0.14X	<0.10X	<0.05X	<0.04X	<0.1X	<0.06X	<0.025X
silver	<0.01U	0.01	<0.01U	<0.01U	<0.01U	<0.01U	<0.01U
sodium	2200	2400	1800	440	600	525	170
thallium	<0.025X	<0.03X	0.94	<0.016X	<0.025X	<0.025X	2.6
vanadium	0.20	0.3	0.06	0.15	0.15	0.15	0.05
zinc	3.50	9.45	0.15	4.35	2.35	1.75	1.48

GROUNDWATER SAMPLING RESULTS (1990) cont.

ORGANICS							
PARAMETER	**AMW1**	**AMW2**	**AMW3**	**CPMW1**	**CPMW2**	**CPMW2 Dup.**	**CPMW3**
methylene chloride	0.002B,J	0.003B,J	0.002B,J	0.003B,J	0.002B,J	0.002B,J	0.002B,J
acetone	0.025	0.028	0.046	0.037	0.076	0.050	0.055
1,1-dichoroethene	0.001B,J	0.001B,J	<0.005U	<0.005U	<0.005U	<0.005U	0.001J
bis(2-ethylhexyl) phthalate	0.001J	<0.01U	<0.01U	<0.01U	<0.01U	<0.01U	<0.01U
1,2-dichloroethane (total)	<0.005U	0.002J	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U
trichloroethane	<0.005U	0.002J	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U
benzene	<0.005U	0.001J	<0.005U	<0.005U	0.001J	0.001J	1.582D
napthalene	<0.01U	0.001J	<0.01U	<0.01U	<0.01U	<0.01U	4.633D
chloromethane	<0.01U	<0.01U	<0.01U	<0.01U	0.012	0.006	<0.01U
toluene	<0.005U	<0.005U	<0.005U	<0.005U	0.005	0.003J	1.756D
ethylbenzene	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	0.974D
xylene (total)	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	2.152D

GROUNDWATER SAMPLING RESULTS (1990) cont.

PARAMETER	AMW1	AMW2	AMW3	CPMW1	CPMW2	CPMW2 Dup.	CPMW3
2-methyl Napthalene	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	1.116D
acenapthylene	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	0.081D,J
acenapthene	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	0.22D,J
dibenzofuran	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	0.064D,J
flourene	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	0.163D,J
phenathrene	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	0.434D
anthracene	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	0.1D,J
pyrene	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	0.154D.J
flouranthene	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	0.133D,J
chrysene	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	0.064D,J
benzo(a)pyrene	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U	0.028D,J
1,1-dichloro-ethane	<0.005U	0.003J	<0.005U	<0.005U	<0.005U	<0.005U	<0.005U

KEY

B - Parameter detected in method blank
D - A second dilution was required
J - Estimated below the required detection limit
U - Below detectable limits
X - Dilution required or unable to report due to matrix interference

Sampling activities during this investigation included the collection of a groundwater sample from the City of Mount Pleasant well approximately 2.5 miles from the site. The results from that sample found no evidence that the well has been impacted by the site; however, due to the amount of contamination in the shallow water table and the presence of a potential conduit to the lower aquifers, there is a potential for the lower aquifers to become contaminated. Also, the potential exists that contaminated groundwater could be discharging into the Cooper River (Ref. 15).

V. SURFACE WATER PATHWAY

A. Regional Characteristics

The Calhoun Park/Ansonborough Homes/Coal Gas site is relatively flat and runoff discharges into stormwater grates at various locations around the site (Ref. 4). Most of the runoff discharges into the old brick archway that discharges into the Cooper River. The brick archway is tidally influenced as is the Cooper River near the site.

The site is approximately 500 feet from the Cooper River. The probable point of entry is the discharge point of the brick archway into the river. The river flows approximately one-half mile before entering Charleston Harbor and approximately three miles further to the Atlantic Ocean (Ref. 2,4). The average flow of the river is difficult to assess because of its tidal nature. The Cooper River Rediversion Project (scheduled completion in 1983, completed 1990) was to have reduced the streamflow from 15,600 cfs to 3,000 cfs (Ref. 18).

The area of the site floods several times a year (Ref. 19). The Calhoun Park and Ansonborough Homes portions of the site have ground elevation ranging between 4.1 to 7.5 feet above mean sea level. Normal monthly maximum high tides range between 5.0 and 5.2 feet above mean sea level with "spring" tides ranging between 5.2 and 7.2 feet above mean sea level (Ref. 6). Because of the tidal nature of the archway and low ground elevation at the site, flood water periodically backs up through the grates around the site (particularly at the housing complex). During this investigation, flooding was observed at the Ansonborough Homes portion of the site (Ref. 4).

The type of on-site soil varies greatly because the area is built upon fill material. The type of material used to fill in the marsh ranged from rubble and construction debris to sand. The area was filled during the 1700's and 1800's (Ref. 3). The 2-year, 24-hour maximum rainfall at the center of Charleston County is 4.60 inches (Ref. 20).

B. Surface Water Use

No surface water intakes for community or industrial supply are located within 15 miles downstream of the site. The Cooper is tidally influenced but no intakes are within 15 miles upstream of the site (Ref. 21). The Cooper River and Charleston Harbor are used for recreational activities such as boating and fishing. These tidal saltwaters have had restrictions on shellfish harvesting due to water quality problems (Ref. 18). The area of the Cooper River from Drum Island south to Shutes Folly is a fishery (Ref. 22).

The Shortnose Sturgeon (Federal endangered) has been known to occupy surface water within 15 miles of the site. A Shortnose Sturgeon was caught by gillnet at Fort Johnson in Charleston Harbor approximately three miles from the site (Ref. 23). The shortnose sturgeon is anadromous and could be found in the upper portions of the Cooper and Ashley Rivers. The loggerhead turtle (federal threatened) also can be found in the Cooper and Ashley Rivers. One loggerhead was seen near the naval base, upgradient of the site (Ref. 24).

Wetlands are located along the Cooper at various locations up and downgradient of the site. The nearest wetlands marked on the topographic maps of the area are between one-half and one mile north of the site (Ref. 2).

C. Surface Water Impact

Sediment samples collected from the discharge point of the brick archway into the Cooper River found contamination attributable to the site. The concentration of total PAH's detected at the discharge point of the brick archway was 97,549 ppb. The area where the sample was collected is perennial due to the tidal influence on the archway.

The SCDHEC Coastal Toxics Monitoring Network maintains a statewide, fixed-station monitoring network to study ambient water quality. Between 1984 and 1986, sediment and tissue samples (human food chain organisms) were collected throughout the state and at locations in and around Charleston Harbor. Between 1987 and 1989, a separate SCDHEC study was conducted in Charleston Harbor that included the collection of more sediment and tissue samples. Both studies included PAH's in the parameters to be tested for. These compounds can enter aquatic systems from industrial and municipal wastewaters, oil drilling activities, boating and shipping activities, forest fires and other sources that generate waste by the incomplete combustion of organic compounds (Ref. 25,26).

A review of the results from both studies found two locations in and around Charleston Harbor that had elevated levels of PAH's in the sediment. One location was approximately 2.5 miles south of the Koppers Company /Treatment Plant (Koppers) on the Ashley River. Koppers operated a milling, wood-preserving, and pole

storage facility from 1925 until 1978. Creosote, a source of PAH's, was extensively used at Koppers. The concentration of total PAH's found below Koppers was 13,478 ppb. A location north of Koppers in the Ashley, and a sediment sample from Charleston Harbor at the mouth of the Ashley River did not detect PAH's (Ref. 25,26).

The second highest level of PAH's, 1988.1 ppb, was found at a location on the north side of Shutes Folly, approximately 0.7 miles from the brick archway draining the site. No other detections of PAH's were found in sediment at other sample locations in the Charleston Harbor area, including locations in major shipping lanes. Oyster and Blue Crab tissue analyses also detected PAH's at the Shutes Folly location and the location below Koppers. The only other tissue analysis which detected PAH's was near the mouth of the Wando River, approximately two miles north of the brick archway. (Ref. 2,25,26). The following table summarizes the level of total PAH's detected at the different sample locations.

TABLE III
All results are shown in ppb (ug/kg).

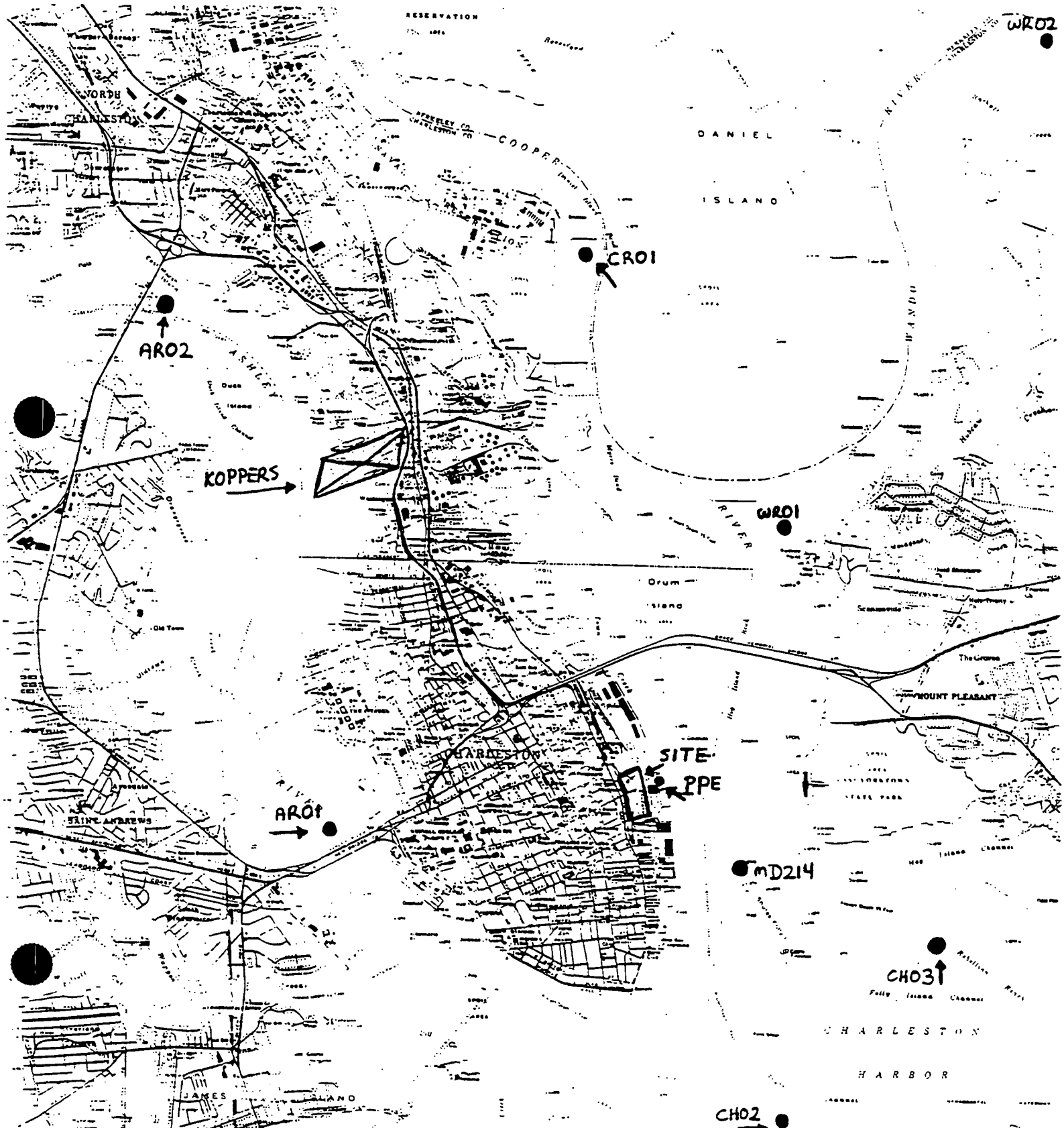
TOTAL POLYAROMATIC HYDROCARBONS			
Sample Location	Sample media		
	Sediment	Oyster	Blue Crab
MD-214	1988.1	1074	294
AR01	13,478	448	130
AR02	ND	NT	ND
CH02	ND	ND	ND
CH03	ND	ND	NT
CR01	ND	ND	ND
WR01	ND	ND	564
WR02	ND	ND	ND

KEY
ND - Not detected.
NT - Not tested.

* The preceding results were a summary of testing that occurred between 1984 and 1986 for the MD-214 sample. The other samples were collected between 1987 and 1989. The tissue samples were composited with up to 55 organisms for oyster and up to 10 for crabs (Ref. 25,26).

The following map shows the location of the sample stations in relation to the site and the probable point of entry (PPE).

MAP OF SAMPLE STATIONS IN AND AROUND CHARLESTON HARBOR (1984-1989)



The data obtained during the two SCDHEC studies between 1984 and 1989 seems to indicate that an impact to the Cooper River has occurred. Because of the level of PAH's detected at the archway, it is possible that the site has contributed to contamination in the Cooper River. More sediment sampling should be conducted closer to the site to confirm that the PAH's found at Shutes Folly are attributable to the site.

VI. SOIL EXPOSURE PATHWAY

The possibilty of exposure to contaminated soil exists at the Calhoun Park/Ansonborough Homes site. The park has been closed since July 1989 because of the discovery of coal-tar residue and was fenced in August 1989. The fence has been bent in several places so that access is still possible (Ref. 4,28, 29). Samples collected by SCDHEC during this investigation and samples collected by Davis & Floyd, Inc. during previous investigations found a wide variety of contaminants in surface soil at the site (particularly PAH's). Davis & Floyd conducted a Health Risk Assessment for Calhoun Park/Ansonborough Homes in August 1991. The report concluded that the surface soil contamination at Calhoun Park constituted an immediate health risk. The compounds of concern were benzo(a)pyrene and benzo(a)anthracene (Ref. 27). The risk assessment also concluded that a health risk was present at Ansonborough Homes; however, the risk was for long term exposure, not short term exposure. Again, the compounds of concern were benzo(a)pyrene and benzo(a)anthracene (Ref. 27).

In December 1990, 128 units of Ansonborough Homes were occupied by approximately 450 residents (Ref. 6). During the reconnaissance for this investigation, only 47 of the units were occupied (Ref. 4). Because of the results found during the risk assessment in August 1991, the City decided to vacate the property (Ref. 34). As of March 26, 1992, no people were living in Ansonborough Homes (Ref. 7). By 1990 census data, 1,691 people lived within a quarter mile of the site, 3,301 lived within one-half mile, and 9,893 people lived within one mile of the site (Ref. 30).

VII. AIR PATHWAY

Although no conclusive analytical data has been found, the potential for exposure to contaminants via the air pathway exists at the Calhoun Park/Ansonborough Homes site. During a 1989 walkover of the SCE&G portion of the site by personnel of Keystone Environmental Resources, Inc., organic odors were noted at normal breathing height (Ref. 5). During sampling by Davis & Floyd at Calhoun Park and Ansonborough Homes in August 1990, strong odors were noted during soil borings (0 to 3 feet in depth). Readings taken by an OVA ranged from below detectable limits to greater than 1000 ppm (Ref. 6). Because of the release that occurred during soil borings, the city asked the residents of Ansonborough Homes not to disturb the soil around their apartments (Ref. 31). The health risk assessment prepared by Davis & Floyd in August 1991 included air sampling data. Air samples were collected from the interior of selected apartments; however, no significant levels of contaminants were found. Sampling of air in the crawl space beneath the apartments detected some contamination. One of the apartments contained 130 micrograms per cubic meter of 2-hexanone, and 400 micrograms per cubic meter of 1,1,2,2-tetrachloroethane in the crawl space air. The report concluded that no immediate health risk was present, but that during any maintenance work conducted in the crawl space of the apartments, respiratory protection should be considered (Ref 27).

The air samples collected for this investigation centered on the border between the park and the former gas works area. None of the samples collected detected any hazardous substances at significant concentrations compared to background levels (Ref. 32). As stated previously, the amount of truck traffic in the immediate area made it difficult to collect a good control sample.

VIII. CONCLUSION AND RECOMMENDATIONS

This investigation has demonstrated that contaminants from the site are entering the Cooper River, and potentially impacting a fishery. Groundwater has previously been shown to be extensively contaminated. Surface soil throughout the site is contaminated, and the air pathway is also a potential concern.

A well was dug through the confining layer in 1910 and may provide a conduit into the deeper aquifer. 12,698 people use groundwater drawn from the deeper aquifer within four miles of the site. Although no residents remain in Ansonborough Homes, the potential for exposure to contaminated surface soil exists at the site. Air quality at the site could be impacted. Organic odors were noticed during this investigation in the park and at the discharge point of the archway into the Cooper River. Air sampling by Davis & Floyd conducted in 1991, found organic compounds in the air in the crawlspace beneath the apartments at Ansonborough Homes.

The sample collected at the discharge point of the archway into the river, found high levels of PAH's. The area of the river near the site is fished, and previous sampling by SCDHEC found elevated levels of PAH's in sediment, oyster tissue, and crab tissue 0.7 miles from the site. Although the previous sample data seems to indicate an impact attributable to the site has occurred, more sediment sampling should be conducted closer to the site and more control samples on other potential sources of PAH's are needed.

Because of the observed impact to the surface water and groundwater, and the potential impact via the soil exposure and air pathways, the Calhoun Park/Ansonborough Homes/Coal Gas site is given a "HIGH" priority for an Expanded Site Inspection. Further sampling should be conducted in the Cooper River to further document the extent of contamination in this pathway. The deep aquifer beneath the site should be sampled to determine if a conduit exists and if so, the extent of contamination. Samples should also be collected to determine the amount of waste present on-site.

IX. REFERENCES

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APPENDIX IV

NOVEMBER 1989 APPENDIX IX ANALYSES OF TWO SOIL SAMPLES-CHARLESTON HARBOR SITE

APPENDIX A

Laboratory Analysis Reports

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 89-09-058

Received: 09/15/89

10/23/89 15:27:59

REPORT NATIONAL PARK SERVICE
TO CONCORD STREET
CHARLESTON, S.C.

ATTEN DAVIS & FLOYD, INC. R. POWELL

PREPARED DAVIS & FLOYD, INC.
BY Environmental Services Div.
Post Office Drawer 428
Greenwood, S.C. 29648
PHONE (803) 229-5211

CERTIFIED BY

JOHN_MCCORD

WORK ID JOB # 5374
P.O. #
TAKEN DAVIS & FLOYD, INC.
TYPE SOIL SAMPLE
NUMBER OF SAMPLES 2

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 28 DAYS AFTER ISSUANCE OF THIS REPORT.

	SAMPLE IDENTIFICATION	DATE COLLECTED
01	SP #1 NEAR B-4 DRILL SITE	09/14/89 11:00:00
02	SP #2 NEAR P-1 DRILL SITE	09/14/89 13:50:00

Received: 09/15/89

10/23/89 15:27:59

Test Description	Units	01 SP #1 NEAR B-4 DRILL SITE	02 SP #2 NEAR P-1 DRILL SITE
SILVER	mg/kg	<2	<2
BARIUM	mg/kg	37	25
BERYLLIUM	mg/kg	<0.6	<0.6
CADMIUM	mg/kg	3.3	<0.5
COBALT	mg/kg	<5	<5
CHROMIUM	mg/kg	32	6.2
COPPER	mg/kg	16100	1.9
MERCURY	mg/kg	<0.1	<0.1
NICKEL	mg/kg	31.0	3.1
TIN	mg/kg	1056	<12
VANADIUM	mg/kg	12	12
ZINC	mg/kg	2570	26
ARSENIC	mg/kg	16.4	6.6
LEAD	mg/kg	869	6.6
ANTIMONY	mg/kg	22	<0.2
SELENIUM	mg/kg	<1.6 X	<0.6 X
THALLIUM	mg/kg	<3	<2

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 89-09-058

Received: 09/15/89

Results by Sample

SAMPLE ID SP #1 NEAR B-4 DRILL SITE FRACTION 01A TEST CODE AP9BNA NAME APPENDIX IX SEMIVOLATILES
Date & Time Collected 09/14/89 11:00:00 Category

ANALYST JPC ANALYZED 10/04/89 FACTOR 106 UNITS ug/kg VERIFIED JHM

COMPOUND	RESULT	DET LIMIT
Phenol	BDL	500
bis(2-Chloroethyl)ether	BDL	500
2-Chlorophenol	BDL	500
1,3-Dichlorobenzene	BDL	500
1,4-Dichlorobenzene	BDL	500
Benzyl chloride	BDL	500
1,2-Dichlorobenzene	BDL	500
2-Methylphenol	BDL	500
bis(2-Chloroisopropyl)ether	BDL	500
4-Methylphenol	BDL	500
N-Nitroso-di-n-propylamine	BDL	500
Hexachloroethane	BDL	500
Nitrobenzene	BDL	500
Isophorone	BDL	500
2-Nitrophenol	BDL	500
2,4-Dimethylphenol	BDL	500
3-Methylphenol	BDL	2700
bis(2-Chloroethoxy)methane	BDL	500
2,4-Dichlorophenol	BDL	500
1,2,4-Trichlorobenzene	BDL	500
Naphthalene	BDL	500
4-Chloroaniline	BDL	500
Hexachlorobutadiene	BDL	500
4-Chloro-3-methylphenol	BDL	500
2-Methylnaphthalene	BDL	500
Hexachlorocyclopentadiene	BDL	500
2,4,6-Trichlorophenol	BDL	500
2,4,5-Trichlorophenol	BDL	2700
2-Chloronaphthalene	BDL	500
2-Nitroaniline	BDL	2700
Dimethylphthalate	BDL	500
Acenaphthylene	BDL	500

COMPOUND	RESULT	DET LIMIT
Benzo(a)anthracene	937	500
Chrysene	628	500
bis(2-ethylhexyl)phthalate	BDL	500
Di-n-octylphthalate	BDL	500
Benzo(b)fluoranthene	564	500
Benzo(k)fluoranthene	330 J	500
Benzo(a)pyrene	564	500
Indeno(1,2,3-cd)pyrene	766	500
Dibenz(a,h)anthracene	BDL	500
Benzo(g,h,i)perylene	436 J	500
2-Acetylaminofluorene	BDL	2700
4-Aminobiphenyl	BDL	500
Aniline	BDL	2700
Aramite	ND	LS
Dinoseb	BDL	2700
p-Dimethylaminoazobenzene	BDL	500
7,12-Dimethylbenz(a)anthracene	ND	LS
3,3'-Dimethylbenzidine	BDL	2700
a,a,a-Dimethylphenethylamine	ND	LS
m-Dinitrobenzene	BDL	500
Diphenylamine	735	500
Ethyl methanesulfonate	BDL	500
Hexachlorophene	ND	LS
Hexachloropropene	BDL	500
Isosafrole	BDL	500
Methapyrilene	ND	LS
3-Methylcholanthrene	BDL	500
Methyl methanesulfonate	BDL	500
1,4-Naphthoquinone	BDL	500
1-Naphthylamine	BDL	500
2-Naphthylamine	BDL	500
4-Nitroquinoline-1-oxide	BDL	2700

SAMPLE ID SP #1 NEAR B-4 DRILL SITE FRACTION 01A TEST CODE AP9BNA NAME APPENDIX IX SEMIVOLATILES
Date & Time Collected 09/14/89 11:00:00 Category

3-Nitroaniline	BDL	2700
Acenaphthene	BDL	500
2,4-Dinitrophenol	BDL	2700
4-Nitrophenol	BDL	2700
Dibenzofuran	BDL	500
2,4-Dinitrotoluene	BDL	500
2,6-Dinitrotoluene	BDL	500
Diethylphthalate	BDL	500
4-Chlorophenyl-phenylether	BDL	500
Fluorene	BDL	500
4-Nitroaniline	BDL	2700
4,6-Dinitro-2-methylphenol	BDL	2700
N-Nitrosodiphenylamine	852	500
4-Bromophenyl-phenylether	BDL	500
Hexachlorobenzene	BDL	500
Pentachlorophenol	BDL	2700
Phenanthrene	245 J	500
Anthracene	BDL	500
Di-n-butylphthalate	2576	500
Fluoranthene	1320	500
Pyrene	BDL	500
Butylbenzylphthalate	BDL	500
3,3'-Dichlorobenzidine	BDL	1100
N-Nitroso-n-butylamine	BDL	500
N-Nitrosodiethylamine	BDL	500
N-Nitrosodimethylamine	BDL	500
N-Nitrosomethylethylamine	BDL	500
N-Nitrosomorpholine	BDL	500
N-Nitrosopiperidine	BDL	500
N-Nitrosopyrrolidine	BDL	500
5-Nitro-o-toluidine	BDL	500
Pentachlorobenzene	BDL	500
Pentachloronitrobenzene	BDL	500
Phenacetin	BDL	500
p-Phenylenediamine	BDL	500
2-Picoline	BDL	500
Pronamide	BDL	500
Pyridine	BDL	500
Safrole	BDL	500
1,2,4,5-Tetrachlorobenzene	BDL	500
2,3,4,6-Tetrachlorophenol	BDL	500
o-Toluidine	BDL	500
O,O,O-Triethyl phosphorothioate	BDL	500
1,3,5-Trinitrobenzene	BDL	500
2,6-Dichlorophenol	BDL	500
Acetophenone	639 J	2700
Diallate	BDL	500
Sulfotepp	BDL	500
Thionazin	ND	LS

NOTES AND DEFINITIONS FOR THIS REPORT

ND = not detected
BDL = below the required detection limit.
LS = library search on the target compound.
B = compound detected in method blank.
J = estimate below the required det limit.

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 89-09-058

Received: 09/15/89

Results by Sample

SAMPLE ID SP #1 NEAR B-4 DRILL SITE FRACTION 01A TEST CODE AP9PES NAME APPENDIX IX PEST/PCB/HERB
Date & Time Collected 09/14/89 11:00:00 Category

ANALYST DSC ANALYZED 10/05/89 FACTOR 160 UNITS ug/kg VERIFIED JHM

COMPOUND	RESULT	DET LIMIT	COMPOUND	RESULT	DET LIMIT
Alpha BHC	BDL	8	Arochlor 1016	BDL	80
Beta BHC	BDL	8	Arochlor 1221	BDL	80
Delta BHC	BDL	8	Arochlor 1232	BDL	80
Gamma BHC (Lindane)	BDL	8	Arochlor 1242	BDL	80
Heptachlor	BDL	8	Arochlor 1248	BDL	80
Aldrin	BDL	8	Arochlor 1254	BDL	160
Heptachlor Epoxide	BDL	8	Arochlor 1260	BDL	160
Endosulfan I	BDL	8	Methyl Parathion	BDL	8
Dieldrin	BDL	16	Parathion	BDL	8
P,P'-DDE	BDL	16	Disulfoton	BDL	16
Endrin	BDL	16	Isodrin	BDL	8
Endosulfan II	BDL	16	Famphur	BDL	160
P,P'-DDD	120 D	16	Phorate	BDL	16
Endosulfan Sulfate	BDL	16	Chlorobenzilate	BDL	80
P,P'-DDT	BDL	16	Kepone	BDL	8
Endrin Aldehyde	BDL	16	Dimethoate	BDL	80
Methoxychlor	BDL	80	2,4-D	BDL	1
Chlordane	BDL	80	2,4,5-T	BDL	0.1
Toxaphene	BDL	160	2,4,5-TP (Silvex)	BDL	0.1

NOTES AND DEFINITIONS FOR THIS REPORT
BDL = below the required detection limit.
B = compound detected in the method blank.

"D" INDICATES THAT A SECONDARY DILUTION WAS REQUIRED BECAUSE A SPECIFIC ANALYTE EXCEEDED THE CALIBRATION RANGE.

Davis & Floyd, Inc.

Laboratory Analysis Report

Work Order # 89-09-058

Received: 09/15/89

Results by Sample

SAMPLE ID SP #1 NEAR B-4 DRILL SITE FRACTION 01C TEST CODE AP9VOA NAME APPENDIX IX VOLATILES

Date & Time Collected 09/14/89 11:00:00 Category

VERIFIED JHM

ANALYST PAP ANALYZED 09/26/89 FACTOR 1 UNITS ug/kg

COMPOUND	RESULT	DET LIMIT
Chloromethane	BDL	10
Bromomethane	BDL	10
Vinyl Chloride	BDL	10
Chloroethane	BDL	10
Methylene Chloride	5	5.0
Acetone	149 B	10
Carbon Disulfide	BDL	5.0
Trichlorofluoromethane	3 B J	5.0
1,1-Dichloroethene	BDL	5.0
1,1-Dichloroethane	BDL	5.0
1,2-Dichloroethene total	BDL	5.0
Chloroform	BDL	5.0
1,2-Dichloroethane	BDL	5.0
2-Butanone	BDL	10
1,1,1-Trichloroethane	18	5.0
Carbon Tetrachloride	BDL	5.0
Vinyl Acetate	BDL	10
Bromodichloromethane	BDL	5.0
1,2-Dichloropropane	BDL	5.0
cis-1,3-Dichloropropene	BDL	5.0
Trichloroethene	30	5.0
Dibromochloromethane	BDL	5.0
1,1,2-Trichloroethane	BDL	5.0
Benzene	BDL	5.0
trans-1,3-Dichloropropene	BDL	5.0
Bromoform	BDL	5.0
4-Methyl-2-Pentanone	BDL	10
2-Hexanone	BDL	10

COMPOUND	RESULT	DET LIMIT
Tetrachloroethene	46	5.0
1,1,2,2-Tetrachloroethane	BDL	5.0
Toluene	2 J	5.0
Chlorobenzene	BDL	5.0
Ethylbenzene	BDL	5.0
Styrene	BDL	5.0
Xylene total	BDL	5.0
Allyl Chloride	BDL	10
1,2-Dibromo-3-chloropropane	BDL	10
1,2-Dibromoethane	BDL	10
trans-1,4-Dichloro-2-butene	BDL	10
Dichlorodifluoromethane	ND	LS
Ethyl Methacrylate	BDL	10
Methacrylonitrile	BDL	10
Dibromomethane	BDL	10
Iodomethane	BDL	10
Methyl Methacrylate	BDL	10
Pentachloroethane	BDL	10
Ethyl Cyanide	BDL	10
1,1,1,2-Tetrachloroethane	BDL	10
1,2,3-Trichloropropane	BDL	10
Acetonitrile	BDL	100
Acrylonitrile	BDL	100
Acrolein	BDL	100
1,4-Dioxane	BDL	100
Isobutyl Alcohol	BDL	100
2-Chloro-1,3-butadiene	BDL	10

Received: 09/15/89

Results by Sample

Continued From Above

SAMPLE ID SP #1 NEAR B-4 DRILL SITE FRACTION 01C TEST CODE AP9VOA NAME APPENDIX IX VOLATILES

Date & Time Collected 09/14/89 11:00:00 Category

NOTES AND DEFINITIONS FOR THIS REPORT

ND = not detected

BDL = below the required detection limit.

LS = library search on the target compound.

B = compound detected in the method blank.

J = estimate below the required det limit.

THE METHOD BLANK CONTAINED 16 ug/l ACETONE AND 3 ug/l TRICHLOROFLUOROMETHANE.

Davis & Floyd, Inc.

Laboratory Analysis Report

Received: 09/15/89

Work Order # 89-09-058

Results by Sample

SAMPLE ID SP #2 NEAR P-1 DRILL SITE FRACTION 02A TEST CODE AP9BNA NAME APPENDIX IX SEMIVOLATILES
Date & Time Collected 09/14/89 13:50:00 Category

ANALYST JPC ANALYZED 10/04/89 FACTOR 82 UNITS ug/kg VERIFIED JHM

COMPOUND	RESULT	DET LIMIT	COMPOUND	RESULT	DET LIMIT
Phenol	BDL	400	Benzo(a)anthracene	BDL	400
bis(2-Chloroethyl)ether	BDL	400	Chrysene	BDL	400
2-Chlorophenol	BDL	400	bis(2-ethylhexyl)phthalate	BDL	400
1,3-Dichlorobenzene	BDL	400	Di-n-octylphthalate	BDL	400
1,4-Dichlorobenzene	BDL	400	Benzo(b)fluoranthene	BDL	400
Benzyl chloride	BDL	400	Benzo(k)fluoranthene	BDL	400
1,2-Dichlorobenzene	BDL	400	Benzo(a)pyrene	BDL	400
2-Methylphenol	BDL	400	Indeno(1,2,3-cd)pyrene	BDL	400
bis(2-Chloroisopropyl)ether	BDL	400	Dibenz(a,h)anthracene	BDL	400
4-Methylphenol	BDL	400	Benzo(g,h,i)perylene	BDL	400
N-Nitroso-di-n-propylamine	BDL	400	2-Acetylaminofluorene	BDL	2100
Hexachloroethane	BDL	400	4-Aminobiphenyl	BDL	400
Nitrobenzene	BDL	400	Aniline	BDL	2100
Isophorone	BDL	400	Aramite	ND	LS
2-Nitrophenol	BDL	400	Dinoseb	BDL	2100
2,4-Dimethylphenol	BDL	400	p-Dimethylaminoazobenzene	BDL	400
3-Methylphenol	BDL	2100	7,12-Dimethylbenz(a)anthracene	ND	LS
bis(2-Chloroethoxy)methane	BDL	400	3,3'-Dimethylbenzidine	BDL	2100
2,4-Dichlorophenol	BDL	400	a,a,a-Dimethylphenethylamine	ND	LS
1,2,4-Trichlorobenzene	BDL	400	m-Dinitrobenzene	BDL	400
Naphthalene	BDL	400	Diphenylamine	BDL	400
4-Chloroaniline	BDL	400	Ethyl methanesulfonate	BDL	400
Hexachlorobutadiene	BDL	400	Hexachlorophene	ND	LS
4-Chloro-3-methylphenol	BDL	400	Hexachloropropene	BDL	400
2-Methylnaphthalene	BDL	400	Isosafrole	BDL	400
Hexachlorocyclopentadiene	BDL	400	Methapyrilene	ND	LS
2,4,6-Trichlorophenol	BDL	400	3-Methylcholanthrene	BDL	400
2,4,5-Trichlorophenol	BDL	2100	Methyl methanesulfonate	BDL	400
2-Chloronaphthalene	BDL	400	1,4-Naphthoquinone	BDL	400
2-Nitroaniline	BDL	2100	1-Naphthylamine	BDL	400
Dimethylphthalate	BDL	400	2-Naphthylamine	BDL	400
Acenaphthylene	BDL	400	4-Nitroquinoline-1-oxide	BDL	2100

Received: 09/15/89

Results by Sample

Continued From Above

SAMPLE ID SP #2 NEAR P-1 DRILL SITE FRACTION 02A TEST CODE AP9BNA NAME APPENDIX IX SEMIVOLATILES

Date & Time Collected 09/14/89 13:50:00 Category

3-Nitroaniline	BDL	2100
Acenaphthene	197 J	400
2,4-Dinitrophenol	BDL	2100
4-Nitrophenol	BDL	2100
Dibenzofuran	BDL	400
2,4-Dinitrotoluene	BDL	400
2,6-Dinitrotoluene	BDL	400
Diethylphthalate	BDL	400
4-Chlorophenyl-phenylether	BDL	400
Fluorene	BDL	400
4-Nitroaniline	BDL	2100
4,6-Dinitro-2-methylphenol	BDL	2100
N-Nitrosodiphenylamine	BDL	400
4-Bromophenyl-phenylether	BDL	400
Hexachlorobenzene	BDL	400
Pentachlorophenol	BDL	2100
Phenanthrene	BDL	400
Anthracene	BDL	400
Di-n-butylphthalate	666	400
Fluoranthene	BDL	400
Pyrene	BDL	400
Butylbenzylphthalate	BDL	400
3,3'-Dichlorobenzidine	BDL	820
N-Nitroso-n-butylamine	BDL	400
N-Nitrosodiethylamine	BDL	400
N-Nitrosodimethylamine	BDL	400
N-Nitrosomethylethylamine	BDL	400
N-Nitrosomorpholine	BDL	400
N-Nitrosopiperidine	BDL	400
N-Nitrosopyrrolidine	BDL	400
5-Nitro-o-toluidine	BDL	400
Pentachlorobenzene	BDL	400
Pentachloronitrobenzene	BDL	400
Phenacetin	BDL	400
p-Phenylenediamine	BDL	400
2-Picoline	BDL	400
Pronamide	BDL	400
Pyridine	BDL	400
Safrole	BDL	400
1,2,4,5-Tetrachlorobenzene	BDL	400
2,3,4,6-Tetrachlorophenol	BDL	400
o-Toluidine	BDL	400
O,O,O-Triethyl phosphorothioate	BDL	400
1,3,5-Trinitrobenzene	BDL	400
2,6-Dichlorophenol	BDL	400
Acetophenone	BDL	2100
Diallate	BDL	400
Sulfotepp	BDL	400
Thionazin	ND	LS

NOTES AND DEFINITIONS FOR THIS REPORT

ND = not detected

BDL = below the required detection limit.

LS = library search on the target compound.

B = compound detected in method blank.

J = estimate below the required det limit.

Received: 09/15/89

Results by Sample

SAMPLE ID SP #2 NEAR P-1 DRILL SITE FRACTION 02A TEST CODE AP9PES NAME APPENDIX IX PEST/PCB/HERB
Date & Time Collected 09/14/89 13:50:00 Category

ANALYST DSC ANALYZED 10/05/89 FACTOR 160 UNITS ug/kg VERIFIED JHM

COMPOUND	RESULT	DET LIMIT	COMPOUND	RESULT	DET LIMIT
Alpha BHC	BDL	8	Arochlor 1016	BDL	80
Beta BHC	BDL	8	Arochlor 1221	BDL	80
Delta BHC	BDL	8	Arochlor 1232	BDL	80
Gamma BHC (Lindane)	BDL	8	Arochlor 1242	BDL	80
Heptachlor	BDL	8	Arochlor 1248	BDL	80
Aldrin	BDL	8	Arochlor 1254	BDL	160
Heptachlor Epoxide	BDL	8	Arochlor 1260	BDL	160
Endosulfan I	BDL	8	Methyl Parathion	BDL	8
Dieldrin	BDL	16	Parathion	BDL	8
P,P'-DDE	BDL	16	Disulfoton	BDL	16
Endrin	BDL	16	Isodrin	BDL	8
Endosulfan II	BDL	16	Famphur	BDL	160
P,P'-DDD	BDL	16	Phorate	BDL	16
Endosulfan Sulfate	BDL	16	Chlorobenzilate	BDL	80
P,P'-DDT	BDL	16	Kepone	BDL	8
Endrin Aldehyde	BDL	16	Dimethoate	BDL	80
Methoxychlor	BDL	80	2,4-D	BDL	5
Chlordane	BDL	80	2,4,5-T	BDL	0.5
Toxaphene	BDL	160	2,4,5-TP (Silvex)	BDL	0.5

NOTES AND DEFINITIONS FOR THIS REPORT
BDL = below the required detection limit.
B = compound detected in the method blank.

Davis & Floyd, Inc.

Laboratory Analysis Report

Received: 09/15/89

Work Order # 89-09-058

Results by Sample

SAMPLE ID SP #2 NEAR P-1 DRILL SITE FRACTION 02C TEST CODE AP9VOA NAME APPENDIX IX VOLATILES

Date & Time Collected 09/14/89 13:50:00 Category

VERIFIED JHM

ANALYST PAP ANALYZED 09/26/89 FACTOR 1 UNITS ug/kg

COMPOUND	RESULT	DET LIMIT
Chloromethane	BDL	10
Bromomethane	BDL	10
Vinyl Chloride	BDL	10
Chloroethane	BDL	10
Methylene Chloride	4 J	5.0
Acetone	124 B	10
Carbon Disulfide	BDL	5.0
Trichlorofluoromethane	2 B J	5.0
1,1-Dichloroethene	BDL	5.0
1,1-Dichloroethane	BDL	5.0
1,2-Dichloroethene total	BDL	5.0
Chloroform	BDL	5.0
1,2-Dichloroethane	BDL	5.0
2-Butanone	BDL	10
1,1,1-Trichloroethane	BDL	5.0
Carbon Tetrachloride	BDL	5.0
Vinyl Acetate	BDL	10
Bromodichloromethane	BDL	5.0
1,2-Dichloropropane	BDL	5.0
cis-1,3-Dichloropropene	BDL	5.0
Trichloroethene	10	5.0
Dibromochloromethane	BDL	5.0
1,1,2-Trichloroethane	BDL	5.0
Benzene	BDL	5.0
trans-1,3-Dichloropropene	BDL	5.0
Bromoform	BDL	5.0
4-Methyl-2-Pentanone	BDL	10
2-Hexanone	BDL	10

COMPOUND	RESULT	DET LIMIT
Tetrachloroethene	BDL	5.0
1,1,2,2-Tetrachloroethane	BDL	5.0
Toluene	BDL	5.0
Chlorobenzene	BDL	5.0
Ethylbenzene	BDL	5.0
Styrene	BDL	5.0
Xylene total	BDL	5.0
Allyl Chloride	BDL	10
1,2-Dibromo-3-chloropropane	BDL	10
1,2-Dibromoethane	BDL	10
trans-1,4-Dichloro-2-butene	BDL	10
Dichlorodifluoromethane	ND	LS
Ethyl Methacrylate	BDL	10
Methacrylonitrile	BDL	10
Dibromomethane	BDL	10
Iodomethane	BDL	10
Methyl Methacrylate	BDL	10
Pentachloroethane	BDL	10
Ethyl Cyanide	BDL	10
1,1,1,2-Tetrachloroethane	BDL	10
1,2,3-Trichloropropane	BDL	10
Acetonitrile	BDL	100
Acrylonitrile	BDL	100
Acrolein	BDL	100
1,4-Dioxane	BDL	100
Isobutyl Alcohol	BDL	100
2-Chloro-1,3-butadiene	BDL	10

SAMPLE ID SP #2 NEAR P-1 DRILL SITE FRACTION 02C TEST CODE AP9VOA NAME APPENDIX IX VOLATILES

Date & Time Collected 09/14/89 13:50:00 Category

NOTES AND DEFINITIONS FOR THIS REPORT

ND = not detected

BDL = below the required detection limit.

LS = library search on the target compound.

B = compound detected in the method blank.

J = estimate below the required det limit.

THE METHOD BLANK CONTAINED 16 ug/l ACETONE AND 3 ug/l TRICHLOROFLUOROMETHANE.

NATIONAL PARK SERVICE

DEFINTIONS:

1. THE RESULTS REPORTED IN mg/kg DRY BASIS.

2. THE " X " INDICATES MATRIX INTERFERENCE WHICH MAY REQUIRE A DILUTION OR WHICH PREVENTS THE REPORTING OF A RESULT.

APPENDIX V

MAY 1991 "PRELIMINARY ASSESSMENT REPORT"
CHARLESTON HARBOR SITE

Chen Northern, Inc.

PRELIMINARY ASSESSMENT REPORT
FORT SUMTER NATIONAL MONUMENT SITE
PROPOSED TOUR BOAT FACILITY
NORTHEAST CORNER
CONCORD AND CALHOUN STREETS
CHARLESTON, SOUTH CAROLINA

Chen Northern, Inc.

Consulting Engineers and Scientists

96 South Zuni Street
Denver Colorado 80223

303 744-7105
303 744-0210 Facsimile

PRELIMINARY ASSESSMENT REPORT
FORT SUMTER NATIONAL MONUMENT SITE
PROPOSED TOUR BOAT FACILITY
NORTHEAST CORNER
CONCORD AND CALHOUN STREETS
CHARLESTON, SOUTH CAROLINA

PREPARED FOR:

NATIONAL PARK SERVICE
DENVER SERVICE CENTER
P.O. BOX 25287
DENVER, COLORADO 80225-0287

JOB NO. 6 104 91

MAY 16, 1991

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1.0 INTRODUCTION

1.1 Purpose and Scope

The purpose of this preliminary assessment (PA) is to provide an initial evaluation of the Fort Sumter National Monument's Proposed Tour Boat Facility ("NPS") site with respect to impacts to the site and the surrounding environment due to the release of hazardous substances on or adjacent to the site. The PA is based on existing historical information and previous reports of site investigation including analytical data for soil samples collected from the site.

This report includes discussions of:

1. Site conditions;
2. Evidence of known and suspected release(s);
3. Target populations and environments and release pathways; and
4. Recommendations.

Appendix A includes EPA Form 2070-12, Potential Hazardous Waste Site Preliminary Assessment, Parts 1, 2 and 3. Appendix B includes the Preliminary Assessment Questionnaire.

1.2 Sources of Information

The information contained in this report has two source groups. The first source group includes four documents containing data pertaining specifically to the site. These documents are:

1. Chen-Northern's Environmental Site Investigation, November, 1990. This report included a summary of the history of the site and analytical data for 14 soil samples collected from the site.
2. Davis & Floyd's Preliminary Site Investigation, November, 1989. This report includes analytical data for 2 soil samples collected at the site.

3. Soil Consultants' Geotechnical Investigation, March, 1989. This report included boring log descriptions of soils for several borings at the site and identified soil staining and odors during drilling below the ground-water table at the site.

4. Clark G. Reynolds' Historical Study, Fort Sumter National Monument "Dockside II", Charleston, South Carolina, undated.

The second source group for the this report included several local and state officials who were helpful in providing information relating to the site area. These individuals are specifically identified in the PA Questionnaire included in the deliverables for this phase of site evaluation.

2.0 SITE CONDITION AND MANAGEMENT

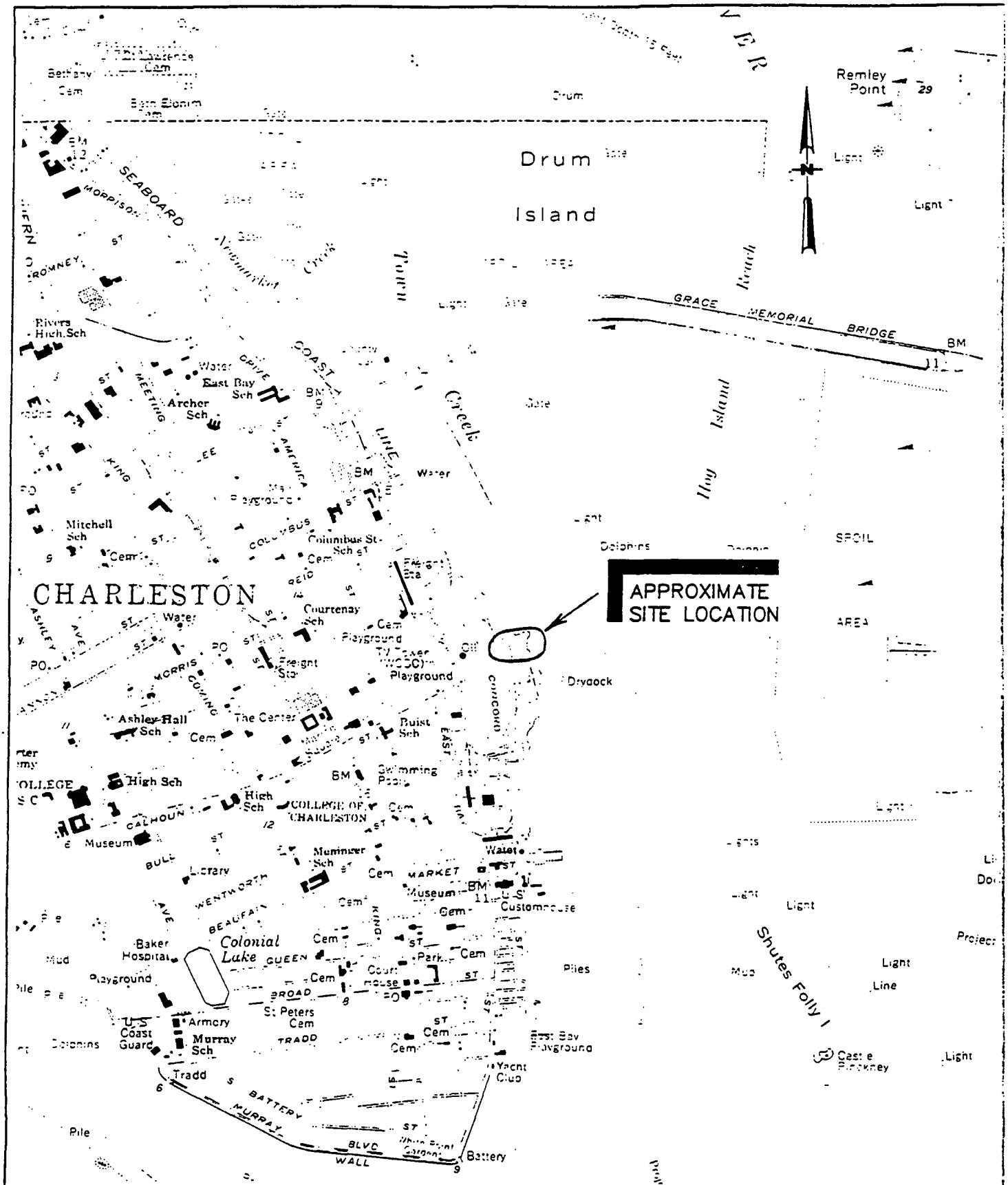
Site management at the NPS site has consisted of attempting to restrict access to the site upon learning of a potential environmental problem in the soils. Use of the site as a youth soccer field was suspended, and a security fence was erected to control access. The fence was damaged by Hurricane Hugo in 1989. The fence was subsequently replaced to prevent access to the site.

3.0 EVIDENCE OF KNOWN AND SUSPECTED RELEASES

3.1 Location and Topography

The NPS site is within the city limits of Charleston, South Carolina. The site located in a mixed residential/industrial area along the Cooper River at the northeast corner of the intersection of Concord and Calhoun Streets (Figure 1). The site is approximately 4 acres in size above Mean High Tide (MHT) with an additional 4 submerged acres and is currently undeveloped and inactive.

The site is bounded on the east by the Cooper River. The Cooper River is a substantial estuarine environment less than 3.5 miles from the Atlantic Ocean. Immediately north of the site is Ludens Marine. To the south of the site are the Dockside Condominiums. Across



SOURCE: USGS QUADRANGLE
CHARLESTON, S.C.
1958 PHOTOREVISED 1979
SCALE: 1" = 2000'

6-104-91	Chen Northern, Inc.	SITE LOCATION MAP	Fig. 1

Concord Street to the west is a park which has been fenced off and closed, pending an evaluation for the presence of hazardous substances similar to those found at the NPS site. To the southeast of the site, several multi-family buildings are present in a public housing project.

The site is flat, exhibiting only a few feet of relief, except for the area immediately west of the high tide mark. During soil sampling operations at the site, it appeared that the area consisted predominantly of fill, including of soil, bricks, lumber, and miscellaneous debris. Up to several feet of relief are present within the 100 feet west of the high tide mark. This area appears to be built up with coarse fill and debris, and grass, bushes and small trees have stabilized the area.

3.2 Historical Information

The site was initially developed in the mid-1700's and was part of "Gadsden's Wharf", the largest wharf in North America for many years. The site was apparently open water for much of its history, and it was not until many years later that fill was placed at the site and the ground elevation was raised above the high tide mark.

In general, the site was used for docking of merchant and warships for much of the 1700's into the early 1800's. From 1850 to 1920, a lumbering wharf was present on the west side of the site and lumbering operations were conducted in the general area. It was during this period that there was supposedly a sawmill and creosote operation immediately west of the site. A chemical manufacturing operation was present on the northern portion of the site for a short time before the turn of the century.

A drydock operation was present on the site during the 1930's and 1940's. No historical information was provided in Reynolds' historical study of the site for the period from the 1940's to present.

Currently, there are no structures present, although a storm sewer transects the site from the intersection of Calhoun and Concord Streets to the Cooper River. As recently as the 1980's, the site was a soccer field as confirmed by aerial photographs. Subsequent to the initial indications that hazardous substances might be present at the site, active use of the site was terminated,

and the National Park Service installed a security fence to control access to the site. The fence remained in place until a tidal surge during Hurricane Hugo destroyed the fence. The fence was subsequently replaced to prevent access to the site.

3.3 Analytical Results

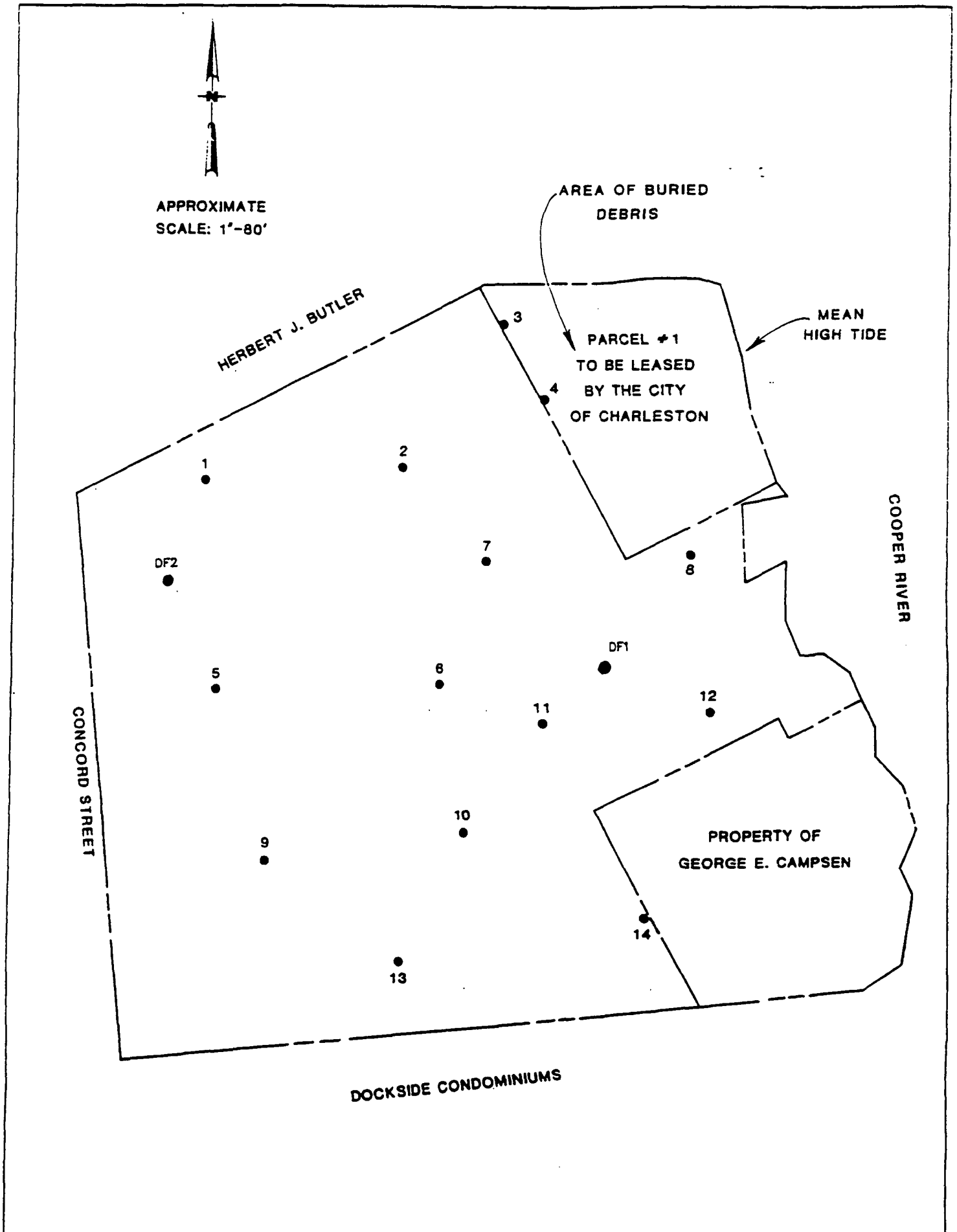
The following analytical results and the narrative discussion of the geotechnical sample descriptions in Section 3.4 below, indicate that there has been a release of hazardous substances on or near the NPS site.

3.3.1 On-site sampling

Soil samples collected during both the Davis & Floyd and the Chen-Northern investigations were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides and polychlorinated biphenyls (PCB's), and several metals. Samples were collected from the subsoils above the ground water. Ground water at the site was present at a depth of approximately 3 to 5 feet, however, no ground-water samples have been collected.

On September 6 - 9, 1990, Chen-Northern personnel collected 14 soil samples during field operations at the site. Figure 2 is a location map for the soil samples, and Table I is a summary of the soil boring information collected during the Chen-Northern field investigation. The information indicates that the presence of visible soil staining was widespread and petroleum odors were detected at three locations. Soil samples were generally collected at depths of 2 to 5 feet.

Table II is a summary of the semi-volatile organic compounds detected in the samples from the site. Samples were analyzed by Cenref Laboratory (an EPA CLP laboratory), in Brighton, Colorado, by EPA Method 8260. Seven compounds present on the Hazardous Substances List (HSL), including benzo(a)anthracene, benzo(a)pyrene, and benzo(k)fluoranthene were detected in each of the 14 samples. Concentrations ranged from 160 parts per billion (ppb) to 4,300 ppb, 170 ppb to 4,200 ppb, and 160 ppb to 4,400 ppb, respectively.



6-104-91	Chen Northern, Inc.	SITE MAP	Fig. 2

TABLE I

Summary of Boring Information

Sample No.	Maximum Depth	Ground Water Encountered	Notes
CN-1	2.0'	No	Collect with 1"x12" sample tube, visible black staining
CN-2	3.0'	Yes	
CN-3	3.0'	No	Couldn't get below 3' with 4 borings; petroleum odor, black soil staining
CN-4	4.5'	No	Edge of debris pile; black soil staining, petroleum odor
CN-5	3.5'	Yes	
CN-6	3.0'	Yes	Black soil staining
CN-7	4.5'	No	Black soil staining
CN-8	5.0'	No	Edge of debris pile
CN-9	3.5'	No	Black soil staining
CN-10	5.0'	No	
CN-11	4.0'	Yes	Ground water entered slowly to depth of 3'; collected MS/MSD samples
CN-12	5.0'	No	
CN-13	4.5'	No	Black soil staining, petroleum odor
CN-14	2.5'	No	Couldn't get below 2.5' in five borings

NOTES:

MS/MSD - Matrix Spike/Matrix Spike Duplicate. Used for a quality control procedure to ascertain that the analyzed matrix is not interfering with the analytical procedure. The duplicate is tested to assure repeatability.

TABLE II
PROPOSED TOUR BOAT FACILITY
NATIONAL PARK SERVICE
CHARLESTON, SOUTH CAROLINA
CONCENTRATIONS IN UG/KG (PPB)

BASE, NEUTRAL, ACID EXTRACTABLES

COMPOUND	CN-1	CN-2	CN-3	CN-4	CN-5	CN-6	CN-7	CN-8	CN-9	CN-10	CN-11	CN-12	CN-13	CN-14	MAX. VALUE
Naphthalene	150			370			470		210		1.200		55	3.900	3.900
2-Methylnaphthalene	180	290	460	190			420	1.000	230	410	370		54	910	1.000
Acenaphthylene	420			350		67	260		1.400		460	370	270		1.400
Acenaphthene			700	990		59	1.300	470		5.800	3.300			2.300	5.800
Dibenzofuran				620			350			1.600	1.800			820	1.800
Fluorene			600	1.100		46	530	590	260	4.300	2.300		61	1.800	4.300
Phenanthrene	790	730	990	5.900	1.200	230	710	2.300	2.700	9.200	3.900	1.900	1.000	5.000	9.200
Anthracene	230			1.600	420	86	690	710	1.000	2.600	2.100	380	220	1.600	2.600
Fluoranthene	1.900	1.100	1.700	6.100	2.900	340	1.200	3.100	6.700	5.500	7.800	2.600	1.900	6.000	7.800
Pyrene	2.000	1.100	4.700	6.200	3.100	400	1.400	3.700	7.100	6.600	8.200	2.400	1.600	4.400	8.200
Benzo(a)anthracene	1.200	540	870	2.700	1.500	160	580	1.300	4.400	1.900	2.500	990	990	1.400	4.400
Chrysene	1.100	580	1.600	2.900	1.600	180	1.300	1.900	4.100	1.800	2.700	1.100	1.100	1.800	4.100
bis(2-Ethylhexyl)phthalate	180			200		160	210				590	290	330		590
Benzo(b)fluoranthene	1.100	480	1.000	2.000	2.600	170	1.600	2.900	4.200	1.500	3.300	980	1.100	2.400	4.200
Benzo(k)fluoranthene	990	480	740	2.100		140	670		3.500	960	2.800	750	680		3.500
Benzo(a)pyrene	1.100	510	1.200	2.000	1.400	160	1.000	1.400	4.300	1.900	2.000	940	910	860	4.300
Indeno(1,2,3-cd)pyrene	680	280		1.300	730	86	680	920	2.200	400	1.200	540	560	390	2.200
Dibenzo(a,h)anthracene	160			450					460		350		150		460
Benzo(g,h,i)perylene	710		770		800	97	770		2.400	960	1.200		560		2.400
TOTAL BNA	12.890	6.090	15.330	37.070	16.250	2.381	14.140	20.290	45.160	45.430	48.070	13.240	11.540	33.580	48.070
TOTAL TIC'S	15.920	66.990	136.200	44.990	42.100	14.930	35.200	59.600	117.400	41.700	62.620	36.040	49.500	51.040	136.200

Table III summarizes the detected volatile organic compounds (VOC's) in the soil samples from the site. The VOC's detected at the site included methylene chloride, acetone, benzene, toluene, ethyl benzene, and total xylenes. All were present at low concentrations.

Table IV summarizes the total detected metals in the soil samples. Most of the metals including the 8 RCRA metals were detected within a normal range of concentrations for background soils except for lead, cadmium, and mercury (Source: USEPA SW-874, Hazardous Waste Land Treatment). Lead was detected at significantly elevated concentrations in most of the samples. Cadmium was detected in three samples, all above the normal range of concentrations. Mercury was also detected in all of the samples at concentrations of several times the normal range for background soils. Zinc, although not a RCRA metal, was detected at elevated concentrations in most of the samples.

No pesticides or PCB's were detected in any of the samples above the Method Detection Limit.

3.3.2 Off-site sampling

Environmental site investigations have also been conducted at the park to the west of the site. The investigations have been conducted by Davis & Floyd, Greenwood, South Carolina. Although the reports were not reviewed for incorporation into this document, the indication was that semi-volatile organic compounds, similar to those found at the NPS site, were detected at concentrations of up to an order of magnitude higher than those detected at the NPS site.

3.4 Circumstantial Evidence

Soils Consultants, Inc., Charleston, South Carolina, conducted a geotechnical investigation of the site in March, 1989. At that time they drilled several borings at the site to evaluate the nature of the subsurface soils for construction purposes. On numerous occasions, they encountered oil odor and "creosote wood content" at depths of down to 21.5 feet. Much of what was encountered was present below the ground-water table. Apparently, samples were not collected for analysis of contaminant compounds.

TABLE III
NATIONAL PARK SERVICE
CHARLESTON, SOUTH CAROLINA
CONCENTRATIONS IN UG/KG (PPB)

VOLATILE ORGANICS COMPOUND	CN-1	CN-2	CN-3	CN-4	CN-5	CN-5R	CN-6	CN-7	CN-8	CN-9	CN-10	CN-11	CN-12	CN-13	CN-14	CN-14R	MAX. VALUE
METHYLENE CHLORIDE	4	2	8		3				7	3							8
ACETONE		11	28		16	16		7		11	6						28
CARBON DISULFIDE			8														8
BENZENE									20								20
TOLUENE			24		5	3	7		33	3	2						33
ETHYL BENZENE			9				5										9
XYLENE (TOTAL)		3	22		7	5	45		29	5					5	2	45
TOTAL VOA'S	4	16	99	0	31	24	57	7	89	22	8	0	0	0	5	2	99
TOTAL TIC'S	25	0	1930	0	94	9	187	60	791	198	0	0	0	0	11	8	1,930

TABLE IV
NATIONAL PARK SERVICE
CHARLESTON, SOUTH CAROLINA
CONCENTRATIONS IN MG/KG (PPM)

METAL	CN-1	CN-2	CN-3	CN-4	CN-5	CN-6	CN-7	CN-8	CN-9	CN-10	CN-11	CN-12	CN-13	CN-14	AVG. VALUE	MAX. VALUE
Aluminum	5,580.00	5,290.00	4,060.00	6,320.00	5,830.00	5,840.00	5,360.00	8,000.00	6,170.00	7,550.00	6,350.00	5,360.00	8,400.00	10,300.00	6,457.86	10,300.00
Antimony	8.40		7.50	8.20				7.60	11.30			6.10		6.80	7.99	11.30
Arsenic	5.30	4.40	6.80	4.40	11.40	3.70	5.70	11.70	10.10	3.60	7.40	8.70	4.40	3.90	6.54	11.70
Barium	61.50	51.40	93.70	58.50	21.10	26.40	62.80	125.00	115.00	24.60	50.70	31.30	31.00	62.30	58.24	125.00
Beryllium									0.28	0.26	0.27	0.26	0.41	0.27	0.29	0.41
Cadmium			1.70					1.50				2.60			1.93	2.60
Calcium	2,750.00	1,740.00	4,780.00	1,830.00	2,580.00	1,590.00	2,530.00	1,370.00	14,700.00	2,560.00	1,740.00	12,400.00	2,850.00	6,920.00	4,310.00	14,700.00
Chromium	24.60	20.60	76.90	33.20	13.80	20.40	46.70	113.00	27.50	13.60	58.00	68.70	19.00	24.20	40.01	113.00
Cobalt	14.30	3.50	15.60	4.20		5.00	5.00	5.70	6.60	2.10	6.10	3.70	3.50	4.30	6.12	15.60
Copper	348.00	605.00	253.00	103.00	30.20	82.10	179.00	449.00	298.00	69.30	485.00	213.00	108.00	156.00	241.33	605.00
Iron	11,000.00	9,730.00	69,400.00	14,700.00	9,360.00	11,300.00	16,000.00	29,800.00	21,600.00	7,250.00	10,900.00	16,300.00	9,580.00	11,900.00	17,772.86	69,400.00
Lead	195.00	343.00	1,680.00	253.00	69.30	61.80	224.00	325.00	975.00	51.70	657.00	292.00	128.00	163.00	386.99	1,680.00
Magnesium	721.00	743.00	1,860.00	715.00	1,020.00	596.00	797.00	540.00	1,330.00	723.00	744.00	1,740.00	566.00	852.00	924.79	1,860.00
Manganese	101.00	80.00	449.00	109.00	120.00	86.70	124.00	162.00	146.00	54.30	81.00	142.00	47.70	88.40	127.94	449.00
Mercury	1.10	0.82	0.33	0.67	0.35	0.26	1.40	3.20	2.30	0.86	1.00	1.20	0.45	0.18	1.01	3.20
Nickel	36.10	11.90	35.20	10.90		12.00	16.90	12.70	26.70	11.20	18.40	23.70	10.50	15.60	18.60	36.10
Potassium	281.00	207.00	209.00	348.00	249.00		236.00		445.00	296.00	290.00	284.00	304.00	479.00	302.33	479.00
Selenium				0.51											0.51	0.51
Silver															ERR	ERR
Sodium	116.00	144.00	122.00	110.00	160.00	91.50	159.00	100.00	338.00	103.00	112.00	47.50	153.00	88.60	131.76	338.00
Thallium		0.50	0.60	0.68											0.59	0.68
Vanadium	20.00	13.70	28.70	47.80	13.70	11.90	118.00	33.20	48.30	18.30	23.40	15.20	15.20	19.10	30.46	118.00
Zinc	580.00	322.00	2,070.00	310.00	128.00	215.00	436.00	1,030.00	738.00	93.20	634.00	587.00	253.00	250.00	546.16	2,070.00
Cyanide				2.60											2.60	2.60
Tin	52.50								48.20		53.50				51.40	53.50

3.5 Source Characterization

The source of the semi-volatile organic compounds in the soils and fill at the site and adjacent properties is believed to be the lumber treating operations active in the general area during the mid-1800's to early 1900's. The presence of these compounds in and around operations such as creosote treating facilities, is well documented in many parts of the country. Their continued persistence in the soils for many years after the operation ceases is explained by their low mobility, low solubility in water, and their resistance to biodegradation.

The presence of several metals in the soils and fill at the site may be the result of the site's use and proximity to dry dock operations during the 1930's and 1940's. Lead, zinc, chromium, cadmium, and mercury were all potentially used in these operations.

The review of the historical study of the site also indicated that a chemical manufacturer was present at the site in the late-1800's. The nature of the chemicals manufactured at the site is unknown, but no chemical compounds have been detected at the site that can not be accounted for by other known operations at the site.

4.0 TARGET POPULATIONS AND RELEASE PATHWAYS

4.1 Target Populations

The target populations are those populations that are impacted or potentially impacted by the release of hazardous substances at the site. The population most affected by the release at the NPS site is the local human population. However, a security fence was constructed to prevent access to the site.

Fish and bird populations indigenous to the Cooper River probably are not impacted by a release of the substances to the surface or ground water. Solubilities of all of the compounds are very low under normal circumstances and any release would be considerably diluted in the river.

4.2 Air Exposure Pathway

The types of organic compounds, semi-volatile organics, present at the site, do not appear to present a threat to disperse into the environment via an air pathway. Their tendency toward volatilization is very low. However, to the extent that dust is raised, the potential exists for inhalation or ingestion of the compounds.

Likewise, the metals detected at the site, do not appear to represent a danger for air exposure. However, as with the semi-volatile compounds, the potential exists for inhalation and ingestion of dust contaminated by the metals.

4.3 Surface Water Exposure Pathway

The potential exists for impact to the surface water by virtue of runoff from the site. However, this potential impact would appear to be minimal in the practical sense because of the enormous dilution that will occur when the runoff enters the Cooper River and the low solubility of the contaminant compounds in water.

4.4 Ground Water Exposure Pathway

The potential exists for impact to the ground water at and adjacent to the NPS site. The contaminant compounds have been detected in the soil immediately overlying the water table, and qualitative information suggests that these compounds may also be present in the soils below the ground-water table. The facts that the ground-water is saline and the contaminant

compounds have very low solubilities in water, minimize the significance of this potential impact. Because the water-table aquifer is not used for the public water supply, any release at the site would not impact the water supply. The direction of the ground-water flow is unknown, but it assumed to exist at a very low gradient because of its proximity to open water and low topographic relief of the area.

4.5 Soil Exposure Pathway

Direct contact with the contaminants in the surficial soils may represent the most serious threat to the public health. Benzo(a)pyrene, identified in the Integrated Risk Information System (IRIS), is a probable carcinogen to humans. Animal studies have shown positive results for oral, dermal, and inhalation routes. The potential exists for other semi-volatile organic compounds detected at the site to produce similar effects. Similarly, the potential also exists for the ingestion and dermal contact with soils impacted by elevated concentrations of lead.

5.0 RECOMMENDATIONS

Based on the results of the studies completed to date, it appears that the ground water at the site may have been impacted. However, the City of Charleston's drinking water supply is not sourced by the shallow ground-water aquifer. The shallow aquifer is probably in communication with the Cooper River in this area and contains saline water. Any contaminants which are transported to the river will be substantially diluted in the river. In the event that this impact is still of concern, a minimum of three ground-water monitoring wells should be installed and sampled for semi-volatile organic compounds.

Because there are no established action levels for the clean up of the hazardous substances detected in the soils, a search of existing Records of Decision (ROD's) from Superfund sites should be performed to evaluate whether similar sites have been previously evaluated. Although ROD's are site-specific, they may provide guidelines for evaluation of whether clean up of the site is warranted. In the absence of such information, it may be appropriate to conduct a risk assessment of the site. Such an assessment should consider the proposed development of the site and identify alternative construction methods for that development.

6.0 LIMITATIONS

This report has been prepared in accordance with generally accepted practices for use by the client for evaluation purposes. Conclusions and recommendations submitted in this report are based upon the information reviewed, site observations, personal communications, and the data obtained from the sampling of soils at selected locations on the site. The interpretation of the nature and extent of subsurface variations across the site may change with additional sampling.

By _____ Reviewed By _____

Richard M. Luce, E.I.T.
Project Geological Engineer

Francis M. Durel
Project Manager

RML/djb

APPENDIX A
EPA FORM 2070-12

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
SC	

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER				
Proposed Tour Boat Facility	Intersection of Concord and Calhoun Streets Northeast Corner				
03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Charleston	SC	29402	Charleston		

09 COORDINATES LATITUDE ___ ___ ___.___ LONGITUDE ___ ___ ___.___

10 DIRECTIONS TO SITE (Starting from nearest public road)

Northeast of the intersection of Concord and Calhoun Streets downtown Charleston

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)		
Ft. Sumter National Monument Site	1214 Middle Street		
03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Sullivan's Island	SC	29482	(803) 577-6073
07 OPERATOR (If known and different from owner)	08 STREET (Business, mailing, residential)		
09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
			( )

13 TYPE OF OWNERSHIP (Check one)

☐ A. PRIVATE ☒ B. FEDERAL: National Park Service (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL

☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)

☐ A. RCRA 3001 DATE RECEIVED: ___ / ___ / ___ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: ___ / ___ / ___ (MONTH DAY YEAR) ☒ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION

☒ YES DATE 9 / 5 / 90 (MONTH DAY YEAR)

☐ NO

BY (Check all that apply)

☐ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR

☐ E. LOCAL HEALTH OFFICIAL ☒ F. OTHER: Consulting Environmental Firm (Specify)

CONTRACTOR NAME(S): Chen-Northern, Inc., Davis & Floyd

02 SITE STATUS (Check one)

☐ A. ACTIVE ☒ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION

1850 (est) (BEGINNING YEAR) | 1950 (est) (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

Volatile and semi-volatile organics and metals in soil. (See attached report).

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

Several of the semi-volatile organics in the soil are potential carcinogens to humans and animals. Elevated heavy metals concentrations in soils may be hazardous to humans and animals.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)

☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☐ C. LOW (Inspection as time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)			03 TELEPHONE NUMBER
Mr. Jay Yanz	National Park Service-Denver, Colorado			(303) 969-2000
04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
			( )	___ / ___ / ___ (MONTH DAY YEAR)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
SC	

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- [X] A. SOLID
- [ ] B. POWDER, FINES
- [ ] C. SLUDGE
- [ ] D. OTHER _____ (Specify)
- [ ] E. SLURRY
- [ ] F. LIQUID
- [ ] G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be mutually exclusive)

TONS _____

CUBIC YARDS Unknown

NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- [X] A. TOXIC
- [ ] B. CORROSIVE
- [ ] C. RADIOACTIVE
- [ ] D. PERSISTENT
- [ ] E. SOLUBLE
- [ ] F. INFECTIOUS
- [ ] G. FLAMMABLE
- [ ] H. IGNITABLE
- [ ] I. HIGHLY VOLATILE
- [ ] J. EXPLOSIVE
- [ ] K. REACTIVE
- [ ] L. INCOMPATIBLE
- [ ] M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	Unknown		
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS	Unknown		

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
	SEE ATTACHED REPORT				

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
SC	

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☒ A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE: 9-5-90) — ☒ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: Yes
04 NARRATIVE DESCRIPTION
Hazardous compounds and elevated levels of heavy metals in subsurface soils. Potential for migration to ground water.

01 ☐ B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE:) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED:
04 NARRATIVE DESCRIPTION

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE:) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED:
04 NARRATIVE DESCRIPTION

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE:) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED:
04 NARRATIVE DESCRIPTION

01 ☒ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE:) — ☒ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: Yes
04 NARRATIVE DESCRIPTION
Hazardous compounds and heavy metals.
The compounds are present in surface as well as subsurface soils. Individuals on site have potential for exposure.

01 ☒ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE: 4-5-90) — ☐ POTENTIAL — ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: 6 (ACRES)
04 NARRATIVE DESCRIPTION
Analytical results relate to the soils in the vadose zone. Soil staining and odors have been reported from the saturated zone, but analysis on samples below the water table have not been performed.

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE:) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED:
04 NARRATIVE DESCRIPTION

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE:) — ☐ POTENTIAL — ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED:
04 NARRATIVE DESCRIPTION

01 ☒ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE:) — ☒ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: No
04 NARRATIVE DESCRIPTION
The area is fenced to prevent access to the site.

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: SC
02 SITE NUMBER:

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include number(s) of species)

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills/runoff/standing liquids/leaking drums) — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☒ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: 9-5-90) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Site appears to be part of a larger area impacted by the contaminant compounds.

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: Unknown

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Chen-Northern report dated: November 16, 1990
Davis & Floyd report dated: November, 1989
Soil Consultants, Inc., report dated: March, 1989

APPENDIX

I. FEEDSTOCKS

CAS Number	Chemical Name
1. 7664-41-7	Ammonia
2. 7440-36-0	Antimony
3. 1309-64-4	Antimony Trioxide
4. 7440-38-2	Arsenic
5. 1327-53-3	Arsenic Trioxide
6. 21109-95-5	Barium Sulfide
7. 7726-95-6	Bromine
8. 106-99-0	Butadiene
9. 7440-43-9	Cadmium
10. 7782-50-5	Chlorine
11. 12737-27-8	Chromite
12. 7440-47-3	Chromium
13. 7440-48-4	Cobalt
14. 1317-38-0	Cupric Oxide
15. 7758-98-7	Cupric Sulfate
16. 1317-39-1	Cuprous Oxide
17. 74-85-1	Ethylene
18. 7647-01-0	Hydrochloric Acid
19. 7664-39-3	Hydrogen Fluoride
20. 1335-25-7	Lead Oxide
21. 7439-97-6	Mercury
22. 74-82-8	Methane
23. 91-20-3	Napthalene
24. 7440-02-0	Nickel
25. 7697-37-2	Nitric Acid
26. 7723-14-0	Phosphorus
27. 7778-50-9	Potassium Dichromate
28. 1310-58-3	Potassium Hydroxide
29. 115-07-1	Propylene
30. 10588-01-9	Sodium Dichromate
31. 1310-73-2	Sodium Hydroxide
32. 7646-78-8	Stannic Chloride
33. 7772-99-8	Stannous Chloride
34. 7664-93-9	Sulfuric Acid
35. 108-88-3	Toluene
36. 1330-20-7	Xylene
37. 7646-85-7	Zinc Chloride
38. 7733-02-0	Zinc Sulfate

II. HAZARDOUS SUBSTANCES

CAS Number	Chemical Name
1. 75-07-0	Acetaldehyde
2. 64-19-7	Acetic Acid
3. 108-24-7	Acetic Anhydride
4. 75-86-5	Acetone Cyanohydrin
5. 506-96-7	Acetyl Bromide
6. 75-36-5	Acetyl Chloride
7. 107-02-8	Acrolein
8. 107-13-1	Acrylonitrile
9. 124-04-9	Adipic Acid
10. 309-00-2	Aldrin
11. 10043-01-3	Aluminum Sulfate
12. 107-18-6	Allyl Alcohol
13. 107-05-1	Allyl Chloride
14. 7664-41-7	Ammonia
15. 631-61-8	Ammonium Acetate
16. 1863-63-4	Ammonium Benzoate
17. 1066-33-7	Ammonium Bicarbonate
18. 7789-09-5	Ammonium Bichromate
19. 1341-49-7	Ammonium Bifluoride
20. 10192-30-0	Ammonium Bisulfite
21. 1111-78-0	Ammonium Carbamate
22. 12125-02-9	Ammonium Chloride
23. 7788-98-9	Ammonium Chromate
24. 3012-65-5	Ammonium Citrate, Dibasic
25. 13826-83-0	Ammonium Fluoborate
26. 12125-01-8	Ammonium Fluoride
27. 1336-21-6	Ammonium Hydroxide
28. 6009-70-7	Ammonium Oxalate
29. 16919-19-0	Ammonium Silicofluoride
30. 7773-06-0	Ammonium Sulfamate
31. 12135-76-1	Ammonium Sulfide
32. 10196-04-0	Ammonium Sulfite
33. 14307-43-8	Ammonium Tartrate
34. 1762-95-4	Ammonium Thiocyanate
35. 7783-18-8	Ammonium Thiosulfate
36. 628-63-7	Amyl Acetate
37. 62-53-3	Aniline
38. 7647-18-9	Antimony Pentachloride
39. 7789-61-9	Antimony Tribromide
40. 10025-91-9	Antimony Trichloride
41. 7783-56-4	Antimony Trifluoride
42. 1309-64-4	Antimony Trioxide
43. 1303-32-8	Arsenic Disulfide
44. 1303-28-2	Arsenic Pentoxide
45. 7784-34-1	Arsenic Trichloride
46. 1327-53-3	Arsenic Trioxide
47. 1303-33-9	Arsenic Trisulfide
48. 542-62-1	Barium Cyanide
49. 71-43-2	Benzene
50. 65-85-0	Benzoic Acid
51. 100-47-0	Benzonitrile
52. 98-88-4	Benzoyl Chloride
53. 100-44-7	Benzyl Chloride
54. 7440-41-7	Beryllium
55. 7787-47-5	Beryllium Chloride
56. 7787-49-7	Beryllium Fluoride
57. 13597-99-4	Beryllium Nitrate
58. 123-86-4	Butyl Acetate
59. 84-74-2	n-Butyl Phthalate
60. 109-73-9	Butylamine
61. 107-92-6	Butyric Acid
62. 543-90-8	Cadimium Acetate
63. 7789-42-6	Cadmium Bromide
64. 10108-64-2	Cadmium Chloride
65. 7778-44-1	Calcium Arsenate
66. 52740-16-6	Calcium Arsenite
67. 75-20-7	Calcium Carbide
68. 13765-19-0	Calcium Chromate
69. 592-01-8	Calcium Cyanide
70. 26264-06-2	Calcium Dodecylbenzene Sulfonate
71. 7778-54-3	Calcium Hypochlorite
72. 133-06-2	Captan
73. 63-25-2	Carbaryl
74. 1563-66-2	Carbofuran
75. 75-15-0	Carbon Disulfide
76. 56-23-5	Carbon Tetrachloride
77. 57-74-9	Chlordane
78. 7782-50-5	Chlorine
79. 108-90-7	Chlorobenzene
80. 67-66-3	Chloroform
81. 7790-94-5	Chlorosulfonic Acid
82. 2921-88-2	Chlorpyrifos
83. 1066-30-4	Chromic Acetate
84. 7738-94-5	Chromic Acid
85. 10101-53-8	Chromic Sulfate
86. 10049-05-5	Chromous Chloride
87. 544-18-3	Cobaltous Formate
88. 14017-41-5	Cobaltous Sulfamate
89. 56-72-4	Coumaphos
90. 1319-77-3	Cresol
91. 4170-30-3	Crotonaldehyde
92. 142-71-2	Cupric Acetate
93. 12002-03-8	Cupric Acetoarsenite
94. 7447-39-4	Cupric Chloride
95. 3251-23-8	Cupric Nitrate
96. 5893-66-3	Cupric Oxalate
97. 7758-98-7	Cupric Sulfate
98. 10380-29-7	Cupric Sulfate Ammoniated
99. 815-82-7	Cupric Tartrate
100. 506-77-4	Cyanogen Chloride
101. 110-82-7	Cyclohexane
102. 94-75-7	2,4-D Acid
103. 94-11-1	2,4-D Esters
104. 50-29-3	DDT
105. 333-41-5	Diazinon
106. 1918-00-9	Dicamba
107. 1194-65-6	Dichlobenil
108. 117-80-6	Dichlone
109. 25321-22-6	Dichlorobenzene (all isomers)
110. 266-38-19-7	Dichloropropane (all isomers)
111. 26952-23-8	Dichloropropene (all isomers)
112. 8003-19-8	Dichloropropene-Dichloropropane Mixture
113. 75-99-0	2-2-Dichloropropionic Acid
114. 62-73-7	Dichlorvos
115. 60-57-1	Dieldrin
116. 109-89-7	Diethylamine
117. 124-40-3	Dimethylamine
118. 25154-54-5	Dinitrobenzene (all isomers)
119. 51-28-5	Dinitrophenol
120. 25321-14-6	Dinitrotoluene (all isomers)
121. 85-00-7	Diquat
122. 298-04-4	Disulfoton
123. 330-54-1	Diuron
124. 27176-87-0	Dodecylbenzenesulfonic Acid
125. 115-29-7	Endosulfan (all isomers)
126. 72-20-8	Endrin and Metabolites
127. 106-89-8	Epichlorohydrin
128. 563-12-2	Ethion
129. 100-41-4	Ethyl Benzene
130. 107-15-3	Ethylenediamine
131. 106-93-4	Ethylene Dibromide
132. 107-06-2	Ethylene Dichloride
133. 60-00-4	EDTA
134. 1185-57-5	Ferric Ammonium Citrate
135. 2944-67-4	Ferric Ammonium Oxalate

II. HAZARDOUS SUBSTANCES

CAS Number	Chemical Name
37. 7783-50-8	Ferric Fluoride
38. 10421-48-4	Ferric Nitrate
39. 10028-22-5	Ferric Sulfate
40. 10045-89-3	Ferrous Ammonium Sulfate
41. 7758-94-3	Ferrous Chloride
42. 7720-78-7	Ferrous Sulfate
43. 206-44-0	Fluoranthene
44. 50-00-0	Formaldehyde
45. 64-18-6	Formic Acid
46. 110-17-8	Fumaric Acid
47. 98-01-1	Furfural
48. 86-50-0	Guthion
49. 76-44-8	Heptachlor
50. 118-74-1	Hexachlorobenzene
51. 87-68-3	Hexachlorobutadiene
52. 67-72-1	Hexachloroethane
53. 70-30-4	Hexachlorophene
54. 77-47-4	Hexachlorocyclopentadiene
55. 7647-01-0	Hydrochloric Acid (Hydrogen Chloride)
56. 7664-39-3	Hydrofluoric Acid (Hydrogen Fluoride)
57. 74-90-8	Hydrogen Cyanide
58. 7783-06-4	Hydrogen Sulfide
59. 78-79-5	Isoprene
60. 42504-46-1	Isopropanolamine Dodecylbenzenesulfonate
61. 115-32-2	Kelthane
143-50-0	Kepone
301-04-2	Lead Acetate
3687-31-8	Lead Arsenate
65. 7758-95-4	Lead Chloride
66. 13814-96-5	Lead Fluoborate
67. 7783-46-2	Lead Fluoride
68. 10101-63-0	Lead Iodide
69. 18256-98-9	Lead Nitrate
70. 7428-48-0	Lead Stearate
71. 15739-80-7	Lead Sulfate
72. 1314-87-0	Lead Sulfide
73. 592-87-0	Lead Thiocyanate
74. 58-89-9	Lindane
75. 14307-35-8	Lithium Chromate
76. 121-75-5	Malthion
77. 110-16-7	Maleic Acid
78. 108-31-6	Maleic Anhydride
79. 2032-65-7	Mercaptodimethur
80. 592-04-1	Mercuric Cyanide
81. 10045-94-0	Mercuric Nitrate
82. 7783-35-9	Mercuric Sulfate
83. 592-85-8	Mercuric Thiocyanate
84. 10415-75-5	Mercurous Nitrate
85. 72-43-5	Methoxychlor
86. 74-93-1	Methyl Mercaptan
87. 80-62-6	Methyl Methacrylate
88. 298-00-0	Methyl Parathion
89. 7786-34-7	Mevinphos
90. 315-18-4	Mexacarbate
75-04-7	Monoethylamine
192. 74-89-5	Monomethylamine
193. 300-76-5	Naled
194. 91-20-3	Naphthalene
195. 1338-24-5	Naphthenic Acid
196. 7440-02-0	Nickel
197. 15699-18-0	Nickel Ammonium Sulfate
198. 37211-05-5	Nickel Chloride
199. 12054-48-7	Nickel Hydroxide
200. 14216-75-2	Nickel Nitrate
201. 7786-81-4	Nickel Sulfate
202. 7697-37-2	Nitric Acid
203. 98-95-3	Nitrobenzene
204. 10102-44-0	Nitrogen Dioxide
205. 25154-55-6	Nitrophenol (all isomers)
206. 1321-12-6	Nitrotoluene
207. 30525-89-4	Paraformaldehyde
208. 56-38-2	Parathion
209. 608-93-5	Pentachlorobenzene
210. 87-86-5	Pentachlorophenol
211. 85-01-8	Phenanthrene
212. 108-95-2	Phenol
213. 75-44-5	Phosgene
214. 7664-38-2	Phosphoric Acid
215. 7723-14-0	Phosphorus
216. 10025-87-3	Phosphorus Oxychloride
217. 1314-80-3	Phosphorus Pentasulfide
218. 7719-12-2	Phosphorus Trichloride
219. 7784-41-0	Potassium Arsenate
220. 10124-50-2	Potassium Arsenite
221. 7778-50-9	Potassium Bichromate
222. 7789-00-6	Potassium Chromate
223. 7722-64-7	Potassium Permanganate
224. 2312-35-8	Propargite
225. 79-09-4	Propionic Acid
226. 123-62-6	Propionic Anhydride
227. 1336-36-3	Polychlorinated Biphenyls
228. 151-50-8	Potassium Cyanide
229. 1310-58-3	Potassium Hydroxide
230. 75-56-9	Propylene Oxide
231. 121-29-9	Pyrethrins
232. 91-22-5	Quinoline
233. 108-46-3	Resorcinol
234. 7446-08-4	Selenium Oxide
235. 7761-88-8	Silver Nitrate
236. 7631-89-2	Sodium Arsenate
237. 7784-46-5	Sodium Arsenite
238. 10588-01-9	Sodium Bichromate
239. 1333-83-1	Sodium Bifluoride
240. 7631-90-5	Sodium Bisulfite
241. 7775-11-3	Sodium Chromate
242. 143-33-9	Sodium Cyanide
243. 25155-30-0	Sodium Dodecylbenzene Sulfonate
244. 7681-49-4	Sodium Fluoride
245. 16721-80-5	Sodium Hydrosulfide
246. 1310-73-2	Sodium Hydroxide
247. 7681-52-9	Sodium Hypochlorite
248. 124-41-4	Sodium Methylate
249. 7632-00-0	Sodium Nitrite
250. 7558-79-4	Sodium Phosphate, Dibasic
251. 7601-54-9	Sodium Phosphate, Tribasic
252. 10102-18-8	Sodium Selenite
253. 7789-06-2	Strontium Chromate
254. 57-24-9	Strychnine and Salts
255. 100-420-5	Styrene
256. 12771-08-3	Sulfur Monochloride
257. 7664-93-9	Sulfuric Acid
258. 93-76-5	2,4,5-T Acid
259. 2008-46-0	2,4,5-T Amines
260. 93-79-8	2,4,5-T Esters
261. 13560-99-1	2,4,5-T Salts
262. 93-72-1	2,4,5-TP Acid
263. 32534-95-5	2,4,5-TP Acid Esters
264. 72-54-8	TDE
265. 95-94-3	Tetrachlorobenzene
266. 127-18-4	Tetrachloroethane
267. 78-00-2	Tetraethyl Lead
268. 107-49-3	Tetraethyl Pyrophosphate
269. 7446-18-6	Thallium (I) Sulfate
270. 108-88-3	Toluene
271. 8001-35-2	Toxaphene
272. 12002-48-1	Trichlorobenzene (all isomers)
273. 52-68-6	Trichlorfon
274. 25323-89-1	Trichloroethane (all isomers)
275. 79-01-6	Trichloroethylene
276. 25167-82-2	Trichlorophenol (all isomers)
277. 27323-41-7	Triethanolamine Dodecylbenzenesulfonate
278. 121-44-8	Triethylamine
279. 75-50-3	Trimethylamine
280. 541-09-3	Uranyl Acetate
281. 10102-06-4	Uranyl Nitrate
282. 1314-62-1	Vanadium Pentoxide
283. 27774-13-6	Vanadyl Sulfate
284. 108-05-4	Vinyl Acetate
285. 75-35-4	Vinylidene Chloride
286. 1300-71-6	Xylenol
287. 557-34-6	Zinc Acetate
288. 52628-25-8	Zinc Ammonium Chloride
289. 1332-07-6	Zinc Borate
290. 7699-45-8	Zinc Bromide
291. 3486-35-9	Zinc Carbonate
292. 7646-85-7	Zinc Chloride
293. 557-21-1	Zinc Cyanide
294. 7783-49-3	Zinc Fluoride
295. 557-41-5	Zinc Formate
296. 7779-86-4	Zinc Hydrosulfite
297. 7779-88-6	Zinc Nitrate
298. 127-82-2	Zinc Phenolsulfonate
299. 1314-84-7	Zinc Phosphide
300. 16871-71-9	Zinc Silicofluoride
301. 7733-02-0	Zinc Sulfate
302. 13746-89-9	Zirconium Nitrate
303. 16923-95-8	Zirconium Potassium Fluoride
304. 14644-61-2	Zirconium Sulfate
305. 10026-11-6	Zirconium Tetrachloride

APPENDIX B
PRELIMINARY ASSESSMENT QUESTIONNAIRE

Name Ft. Sumter National Monument Site **Location** Northeast corner of Concord & Calhoun Sts.

Site Name Proposed Tour Boat Facility **Date** April 17, 1991

PA QUESTIONNAIRE

F08->

MAJOR CONSIDERATIONS

A) DOES ANY QUALITATIVE OR QUANTITATIVE INFORMATION EXIST THAT MAY INDICATE AN OBSERVED RELEASE TO AIR, GROUND WATER, SOIL OR SURFACE WATER? Yes

Describe: Observed soil staining and laboratory analysis of soils from site. The soils are in contact with the ground water.

B) IF THE ANSWER TO #1 IS YES, IS THERE EVIDENCE OF DRINKING WATER SUPPLY CONTAMINATION OR ANY OTHER TARGET CONTAMINATION (i.e. food chain, recreation areas, or sensitive environments)? No

Describe:

C) ARE THERE SENSITIVE ENVIRONMENTS WITHIN A 4-MILE RADIUS OR 15 DOWNSTREAM MILES OF THE SITE? Yes IF YES, DESCRIBE IF ANY OF THE FOLLOWING APPLY:

- Multiple sensitive environments? Yes. Shell fish in harbor and wading bird rookeries; (ibis, egret, and herons).
- Federally designated sensitive environment(s)? Charleston Harbor has been designated sanctuary for fish and wildlife.
- Sensitive environment(s) downstream on a small or slow flowing surface water body? No. Does not apply to this situation, per Harvey Geitner of US Fish & Wildlife Service (803) 724-4707

D) IS THE SITE LOCATED IN AN AREA OF KARST TERRAIN? No

Describe:

E) DOES THE WASTE SOURCE LIE FULLY OR PARTIALLY WITHIN A WELLHEAD PROTECTION AREA AS DESIGNATED ACCORDING TO SECTION 1428 OF THE SAFE DRINKING WATER ACT? No

Describe:

F) DOES ANY QUALITATIVE OR QUANTITATIVE INFORMATION EXIST THAT PEOPLE LIVE OR ATTEND SCHOOL ON ONSITE CONTAMINATED PROPERTY? No

Describe:

SITE INFORMATION

1. **SITE NAME:** Proposed Tour Boat Facility

   ADDRESS: Intersection of Concord and Calhoun Streets

   CITY: Charleston **COUNTY:** Charleston **STATE:** SC **ZIP:** 29402

   EPA ID: --

   LATITUDE: -- **LONGITUDE:** --

2. **DIRECTIONS TO SITE (From nearest public road):** Northeast corner of the intersection of Concord and Calhoun Streets in downtown Charleston.

3. **SITE OWNERSHIP HISTORY (Use additional sheets, if necessary):**

   A. **Name of current owner:** Ft. Sumter National Monument Site

   Address: 1214 Middle Street

   City: Sullivan's Is **County:** **State:** SC **Zip:** 29482

   Dates: From 1986 **To** Present **Phone:** (803) 577-6073

   B. **Name of previous owner:** Campsen & Campsen

   Address: 56 Broad Street, Box 59

   City: Charleston **County:** **State:** SC **Zip:**

   Dates: From Unknown **To** 1986 **Phone:** (803) 722-0123

   Source of ownership data: Historical Study, Ft. Sumter National Monument "Dockside II" by Clark G. Reynolds

4. **TYPE OF OWNERSHIP (Check all that apply):**

   X **Private** (previous) ___ **State** ___ **Municipal**

   X **Federal** (current) ___ **County** ___ **Other (describe):**

10. **DISCUSS EXISTING SAMPLING DATA AND BRIEFLY SUMMARIZE DATA QUALITY (e.g., sample objective, age/comparability, analytical methods, detections limits and QA/QC):** Soil samples were collected for laboratory analysis to determine the nature and extent of contamination. Vertical composite samples were collected from surface to ground water at 14 locations on the site. Sample quality and analysis were good; analysis included EPA Methods 8260, 8270, 8080, 6010, 9010, 7041, 7060, 7421, 7471, 7740 and 7841. Analysis performed at EPA CLP laboratory. Additional samples were collected and analyzed by Davis & Floyd (report date: November, 1989)

Source of information: Chen-Northern, Inc., Site Assessment Report. (see attached report)

WASTE CONTAINMENT/HAZARDOUS SUBSTANCE IDENTIFICATION

11. **FOR EACH SOURCE AT THE SITE, SUMMARIZE ON TABLE 1 (page 12): 1) Methods of hazardous substance disposal, storage or handling; 2) size/volume/area of all features/structures that might contain hazardous waste; 3) condition/integrity of each storage disposal feature or structure; and 4) types of hazardous substances handled.**

12. **BRIEFLY EXPLAIN HOW WASTE QUANTITY WAS ESTIMATED (e.g., historical records or manifests, permit applications, air photo measurements, etc.):**

Not known. The waste is found in the in-place soils and fill at the site.

Source of information: Chen-Northern report, field observations.

13. **DESCRIBE ANY RESTRICTIONS OR BARRIERS ON ACCESSIBILITY TO ONSITE WASTE MATERIALS:**

None at present

Source of information: Site observations.

GROUND WATER CHARACTERISTICS

14. **ANY POSITIVE OR CIRCUMSTANTIAL EVIDENCE OF A RELEASE TO GROUND WATER?** Yes

Describe: Contaminated soil was observed in soil samples at and below ground water.

Source of information: Chen-Northern field observation, in addition to previous reports by Davis & Floyd and Soils Consultants, Inc.

15. **ON TABLE 2 (page 13), GIVE NAMES, DESCRIPTIONS, AND CHARACTERISTICS OF GEOLOGIC/HYDROGEOLOGIC UNITS UNDERLYING THE SITE.**

16. **NET PRECIPITATION:** Annual net precipitation is 47.34"

SURFACE WATER CHARACTERISTICS

17. **ARE THERE SURFACE WATER BODIES WITHIN 2 MILES OF THE SITE?** Yes

____ **Ditches** ____ **Lakes** ____ **Pond**

____ **Creeks** X **Rivers** ____ **Other** ____

18. **DISCUSS THE PROBABLE SURFACE RUNOFF PATTERNS FROM THE SITE TO SURFACE WATERS:**

To the east and northeast directly from the site into the Cooper River.

19. **PROVIDE A SIMPLIFIED SKETCH OF SURFACE RUNOFF AND SURFACE WATER FLOW SYSTEM FOR 15 DOWNSTREAM MILES (see item #36).**

20. **ANY POSITIVE OR CIRCUMSTANTIAL EVIDENCE OF SURFACE WATER CONTAMINATION?**

No **Describe:** ____

Source of information: Visual Observations.

21. **ESTIMATE THE SIZE OF THE UPGRADIENT DRAINAGE AREA FROM THE SITE:** Unknown **acres**

Source of information: Located on the harbor in the City of Charleston; area is flat. See survey with City of Charleston Engineers, City Drainage Plan

22. **DETERMINE THE AVERAGE ANNUAL STREAM FLOW OF DOWNSTREAM SURFACE WATERS**

Water body: Cooper River, Tidal Estuary **Flow:** Unknown, Very High **cfs**

Water body: _____ **Flow:** _____ **cfs**

Water body: _____ **Flow:** _____ **cfs**

Source of information: See Army Corps of Engineers for specific Information

23. **IS THE SITE OR PORTIONS THEREOF LOCATED IN SURFACE WATER?** Yes

24. **IS THE SITE LOCATED IN A FLOODPLAIN (indicate flood frequency)?** Yes, unknown

25. **IDENTIFY AND LOCATE (see item #36) ANY SURFACE WATER RECREATION AREA WITHIN 15 DOWNSTREAM MILES OF THE SITE:** Harbor is used for boating and fishing. Beaches are on the ocean not in immediate area.

Source of information: _____

26. **TWO YEAR 24-HOUR RAINFALL:** 4.60"

TARGETS

27. **DISCUSS GROUND WATER USAGE WITHIN FOUR MILES OF THE SITE:** If water wells are in the area, they are probably used for irrigation since the primary drinking water source is from municipal treatment plant. There is one known artesian well at the park located at Calhoun and Ashley Streets.

Source of information: Charles Richter-State District Hazardous Waste Consultant.

28. **SUMMARIZE THE POPULATION SERVED BY GROUND WATER ON THE TABLE BELOW:**

Distance (miles)	Population
>0 - 1/4	City of Charleston Water Supply
>1/4 - 1/2	
>1/2 - 1	

>1 - 2 _____

>2 - 3 _____

>3 - 4 _____

Source of information: _____

29. IDENTIFY AND LOCATE (see item #36) POPULATION SERVED BY SURFACE WATER INTAKES WITHIN 15 DOWNSTREAM MILES OF THE SITE: NA Water is supplied by the city.

Source of information: _____

30. DESCRIBE AND LOCATE FISHERIES WITHIN 15 DOWNSTREAM MILES OF THE SITE (i.e., provide standing crop of production and acreage, etc.):

Charleston Harbor estuarine is a fishery area. The estuarine has good sport and commercial fishing and shell fishing. Data is not kept on standing crop for estuaries.

Source of information: Harvey Geitner-US Fish & Wildlife Service (803) 724-4707

31. IF SURFACE WATER RECREATION AREAS EXIST, CHOOSE RECREATIONAL USE CATEGORY, AND THEN DETERMINE THE POPULATION WITHIN THE ASSIGNED RADIUS FROM THE RECREATION AREA. (Use GEMS to allocate into distance rings).

a. Capital use and access improvements _____ (assigned radius = 125 miles)
b. Access improvements only _____ (assigned radius = 80 miles)
c. Observed use only _____ (assigned radius = 40 miles)
d. None of the above apply ~~and access is more restricted~~ X (assigned radius = 10 miles)

Cross off 2nd half of d.

X out

Distance (miles)	Population
>0 - 5	90,000
>5 - 10	150,000
>10 - 20	--
>20 - 40	
>40 - 60	
>60 - 80	
>80 - 100	
>100 - 125	

32. DETERMINE THE DISTANCE FROM THE SITE TO THE NEAREST OF EACH OF THE FOLLOWING LAND USES

Description	Distance (miles)
Commercial/Industrial Institutional	less than 1/4, adjacent
Single Family Residential	less than 1/4
Multi-Family Residential	less than 1/4, adjacent
Park	less than 1/4, adjacent
Agricultural	greater than 5

Source of information: Topographic map, site observations

33. SUMMARIZE THE POPULATION WITHIN A FOUR-MILE RADIUS OF THE SITE:

Distance (miles)	Population
onsite	-0-
>0 -1/4	---
>1/4 - 1/2	---

>1/2 - 1	--
>1 - 2	--
>2 - 3	--
>0 - 4	80,440

Source of information: Chamber of Commerce

OTHER REGULATORY INVOLVEMENT

34. DISCUSS ANY PERMITS:

County: None

State: None

Federal: None

Other:

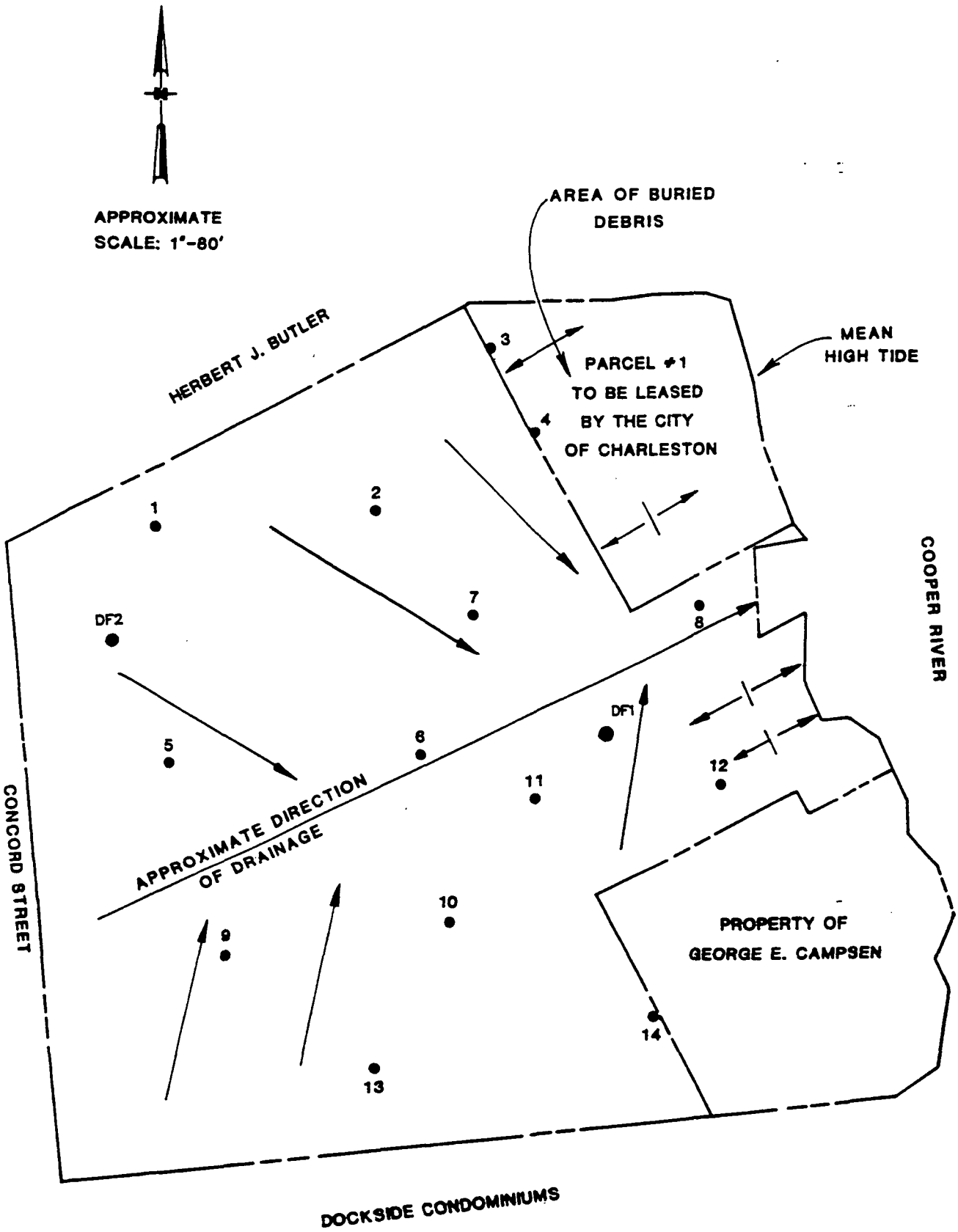
Source of information: Charles R. Richter

35. SKETCH OF SITE

Include all pertinent features, e.g., wells, storage areas, underground storage tanks, waste areas, buildings, access roads, areas of ponded water, etc. Attach additional sheets with sketches of enlarged areas, if necessary.

See Attached Report

N
↑



NOTE: SITE IS VERY LOW RELIEF

6-104-91	Chen Northern, Inc.	SITE DRAINAGE	FIG. 1

36. SURFACE WATER FEATURES

Provide a simplified sketch of surface runoff and surface water flow system for 15 downstream miles. Include all pertinent features, e.g., intakes, recreation areas, fisheries, gauging stations, etc.

See Attached Site Location Map

N
↑

TABLE 1

WASTE CONTAINMENT AND HAZARDOUS SUBSTANCE IDENTIFICATION[1]

SOURCE TYPE	SIZE (Volume/Area)	ESTIMATED WASTE QUANTITY	SPECIFIC COMPOUNDS	CONTAINMENT[2]	SOURCES OF INFORMATION
See attached report - laboratory analysis					

1 Use additional sheets if necessary.

2 Evaluate containment of each source from the perspective of each migration pathway (e.g., ground water pathway - non-existent, natural or synthetic liner, corroding underground storage tank; surface water - inadequate freeboard, corroding bulk tanks; air - unstabilized slag piles, leaking drums, etc.)

FOR->>

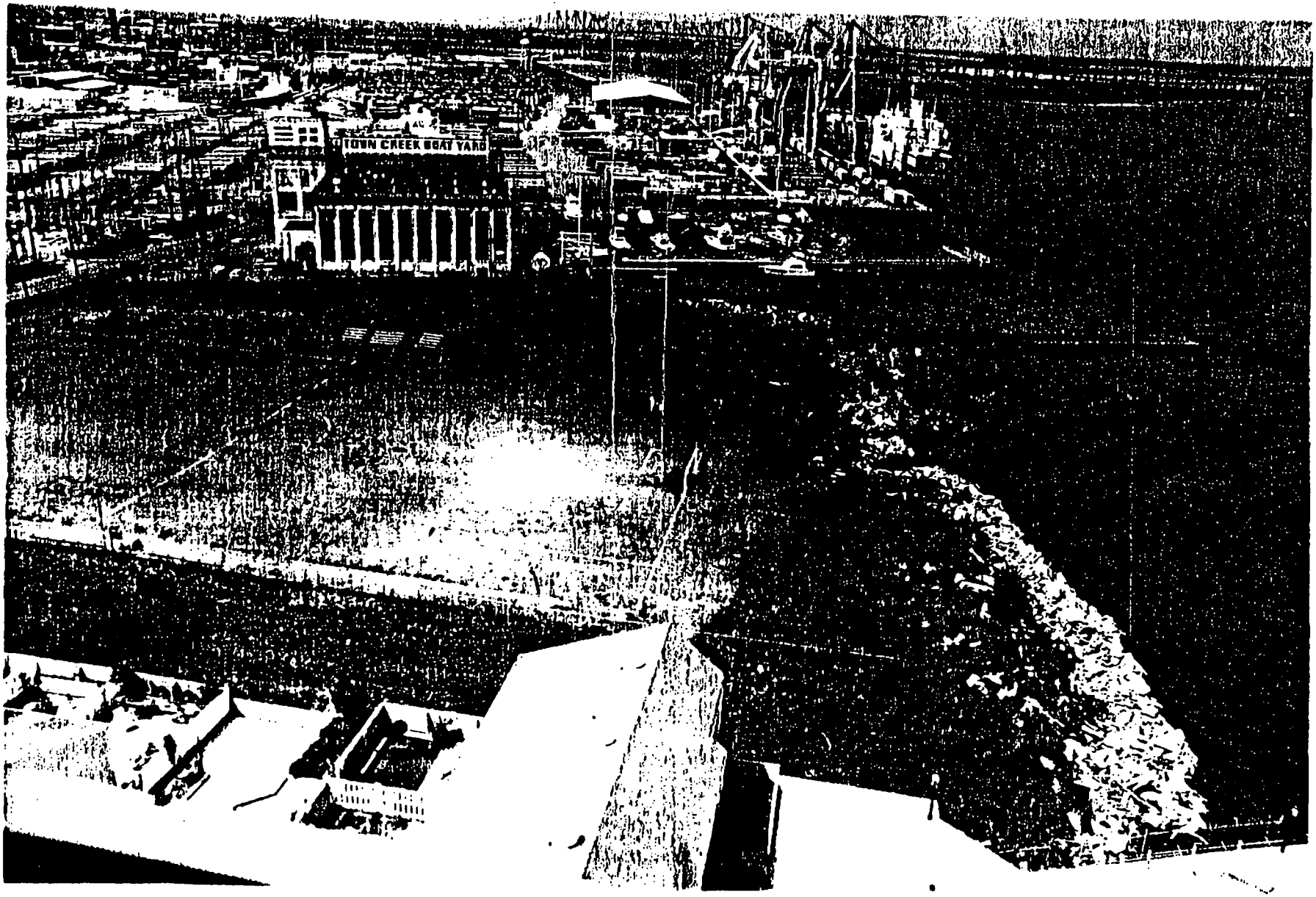
TABLE 2
HYDROGEOLOGIC INFORMATION [1]

STRATA NAME/DESCRIPTION	THICKNESS (ft.)	HYDRAULIC CONDUCTIVITY(cm/sec)	TYPE OF DISCONTINUITY [2]	SOURCE OF INFORMATION
Fill/Sand, Debris	Greater than 3.0'	10^{-5} to 10^{-3} cm/sec (est. from estimated grain size and grain distribution	Cooper River borders site	Chen-Northern report (attached) Applied Hydrogeology, by C.W. Fetter, 1988 page 80

1 Use additional sheets if necessary.

2 Identify the type of discontinuity within four-miles from the site (e.g., river, strata "pinches out", etc.)

APPENDIX C
PHOTOGRAPH OF THE SITE


TOWN CREEK BOAT YARD

APPENDIX VI

OCTOBER 1991 ANALYSIS OF SOIL AND AIR SAMPLES
CHARLESTON HARBOR SITE

GENERAL ENGINEERING LABORATORIES

Environmental Engineering and Analytical Services

Holly F. 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
TN	02934
WI	99988779

October 2, 1991

Mr. Steve Livingston, Director
Department of Parks
City of Charleston
30 Mary Murry Boulevard
Charleston, South Carolina 29403

Re: South Carolina Aquarium Site
Soil and Air Sampling and Analysis

Dear Mr. Livingston:

The analyses of the soil and air samples collected from the test pits excavated at the South Carolina Aquarium (Aquarium) site on July 29, 1991 have been completed. Two composite soil samples were analyzed for Target Compound List (TCL) organic constituents and lead, hazardous waste characteristics, and other parameters necessary to determine proper offsite disposal of the soils. The TCL analysis identified compounds indicative of impact similar to that identified on adjoining sites. The analysis for hazardous waste characteristics determined that the soils are not a characteristic hazardous waste. No compounds were detected in the air samples indicating that the compounds detected in the soil do not readily volatilize into the air.

The Aquarium site is a portion of the National Park Service Tour Boat Facility site which has been leased to the City of Charleston. Five test pits were excavated on July 29, 1991 as part of the pre-bid activities for the test pile program to be conducted at the Aquarium site. The test pits were excavated to demonstrate to prospective bidders the type and typical concentrations of debris contained in subsurface soils at the site. This debris could require excavation prior to commencing pile driving. The pits were excavated at the locations shown on Figure 1 by City of Charleston employees using a track-hoe. Test pits TP-20 and TP-21 were excavated to a depth of approximately five feet below land surface on the west side of a spoil pile and rip-rap area. Little debris was encountered in these pits and no groundwater was detected entering the excavations. No discoloration or odors indicative of impact were detected in the soils removed from these excavations. Test pits TP-22, TP-23, and TP-24 were excavated to a depth of approximately six feet below land surface adjacent to the Cooper River on the east side of the spoil pile and rip-rap area. Debris was encountered in these pits from a depth just below the land surface to the depth of completion. The soils in these pits were saturated due to their proximity to the Cooper River. Odors and discoloration indicative of impact were encountered in all three pits.

Because of the similarity of the soils encountered in test pits TP-20 and TP-21, soil samples collected from these two pits were composited into a single sample, "TP-20-21 Composite." Discreet samples were collected from approximately eight locations in each stockpile of excavated soils and placed into a stainless steel bowl. These discreet samples were then composited into a single sample by gently mixing them together in the bowl.

P. O. Box 30712 • Charleston, SC 29417
Phone (803) 556-8171 • FAX (803) 766-1178

The composited soils were then placed into a sample container. Because of the similarity of the soils encountered in test pits TP-22, TP-23 and TP-24, discreet soil samples collected from the stockpile of excavated soils from each of these pits were composited into a second sample, "TP-22-23-24 Composite" in a similar manner. Three sets of analyses were performed on each of the two composite soil samples as described below.

The two composite samples were analyzed for the Target Compound List (TCL) organic compounds and lead. The TCL is a list compiled by the Environmental Protection Agency (EPA) of compounds commonly used in industrial applications. The TCL includes compounds which have been identified on sites adjoining the Aquarium site. The samples were also analyzed for lead since it has also been identified at elevated concentrations in samples collected on nearby sites. The enclosed Certificates of Analysis show that the following compounds were identified:

	TP-20-21 Composite	TP-22-23-24 Composite
Acenaphthene, ppb	5830	<3300
Fluoranthene, ppb	11000	<3300
Fluorene, ppb	4230	<3300
Phenanthrene, ppb	12200	<3300
Pyrene, ppb	7830	<3300
Lead, ppm	448	954

ppb - parts per billion
ppm - parts per million

The compounds identified in sample "TP-20-21 Composite" are similar to those compounds identified in other portions of the National Park Service property. The absence of these compounds at concentrations above the method detection limit in the sample collected from the pits adjacent to the Cooper River may indicate that these compounds have not migrated to these test pit locations or that the tidal action of the river has flushed the compounds from the soils. Note, however, that evidence of elevated hydrocarbon concentrations were identified by laboratory analysts during the analysis of both samples. The evidence of hydrocarbons was most evident in the sample collected from the pits located adjacent to the Cooper River where physical evidence of impact was noted in the soils.

The two soil samples were also analyzed for ignitability, corrosivity, reactivity, and for the constituents included on the EPA's Toxicity Characteristic (TC) list. If the soils are ignitable, corrosive, or reactive, or if the maximum contaminant level (MCL) of a compound on the TC list is exceeded when the sample is analyzed using the Toxicity Characteristic Leaching Procedure (TCLP), then the material is classified as a characteristic hazardous waste. As shown on the enclosed Certificate of Analysis, the soils were not ignitable (flash point <140°F), corrosive (pH<2 or >12.5), reactive (contains sufficient cyanide or sulphide to product a toxic gas), and none of the TC compounds were detected in the TCLP analysis. These results show that the soils are not a characteristic hazardous waste.

The two composite soil samples were also analyzed for constituents and characteristics which are typically required for disposal of materials either by landfilling or incineration. These analyses included tests for selected metals, polychlorinated biphenyls (PCBs), cyanide, total halogens, heating value, and organically bound nitrogen. These analyses identified no noteworthy parameter or constituent concentration in the soils except for PCBs at a concentration of 1000 ppb and 780 ppb in samples "TP-20-21 Composite" and "TP-22-23-24 Composite", respectively.

Air samples were collected from two of the excavations. The purpose of the air samples was to determine if vapors emanating from the soils could pose a health risk to workers during the test pile program or during the subsequent construction of the aquarium. Based on the similarity of soils encountered in test pits TP-20 and TP-21, and those encountered in test pits TP-22, TP-23 and TP-24, an air sample was collected from the pit in each of these two areas that exhibited the greatest physical evidence of impact. Of the two test pits west of the spoil pile and rip-rap area, air in test pit TP-20 was selected for analysis. Of the three test pits excavated in the area east of the spoil pile and rip-rap area, air in test pit TP-23 was selected for analysis.

The air samples from the two test pits were collected using NIOSH Method 1501 as a broad spectrum screening technique for hydrocarbon compounds. In addition, an ambient background sample and a field blank were collected to insure quality control. The ambient background sample was collected from a site located approximately twenty yards southeast and upwind of test pit TP-20. The pit samples were collected from a location within each pit excavation approximately twenty-four inches above the bottom of the excavation. These samples were collected for a period of two hours beginning approximately one-half hour after completion of the excavations. The same sampling techniques were employed for the test pits and the background samples.

The air samples were analyzed for the EPA Method 8270 compound list, which includes the organic compounds detected in the composite soil samples collected from the pits. In addition, the chromatogram of each sample was scanned for peaks associated with organic compounds not included on the list. No compounds were detected in any of the samples. These results indicate that the toxic organic compounds identified in the soils should not be a significant vapor phase hazard during the excavation activities anticipated during the test pile program.

We appreciate the opportunity to assist the City with this project. If you have questions concerning this material, please call me.

Yours very truly,

Thomas Hutto, P.G.
Senior Hydrogeologist

fc: city090391

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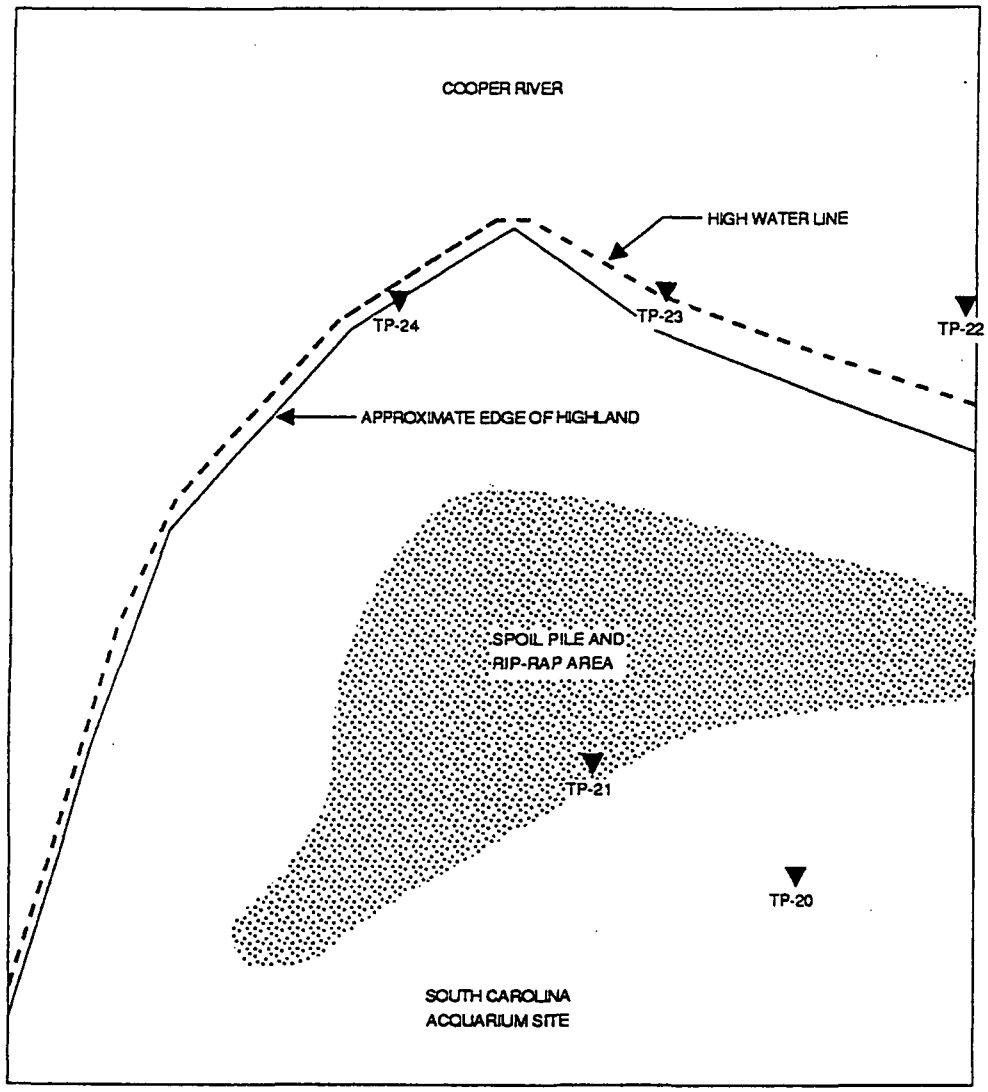

LUDEN'S
MARINE
EQUIPMENT

NATIONAL PARK
SERVICE SITE

APPROXIMATE SCALE: 1"=40'

0' 20' 40' 80'

LEGEND

TP-20 TEST PIT LOCATIONS

GENERAL ENGINEERING LABORATORIES engineering consulting • chemical analysis P.O. BOX 30712 CHARLESTON, SC 29417 (803) 556-8171	PROJECT: city00391		Sheet
	CITY OF CHARLESTON SOUTH CAROLINA ACQUARIUM SITE	TEST PIT LOCATIONS	FIGURE 1
	DATE: September 11, 1991	DRAWN BY: JAM / APPRV. BY: T.H.	Of 1

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ice President
SC Registration No. 9103

Laboratory Certifications:

FL	E87156/87294
NC	235
SC	10120
VA	00151
TN	02934

CERTIFICATE OF ANALYSIS

Client: City of Charleston
116 Meeting Street
Charleston, South Carolina 29401
Contact: Ms. Rhett Wilson

Date: 09/30/91

Released by: QA/QC Officer

cc: CITY00391 Project Manager: Tom Hutto Page No.: 1

Sample ID	: TP-22-23-24 Composite
Lab ID	: 9108326-04
Matrix	: Soil
Date Collected	: 07/29/91
Date Received	: 08/21/91
Priority	: Routine
Collector	: Client

Extractable Organics

PCB analysis

PCB-1016	< 300 ppb
PCB-1221	< 300 ppb
PCB-1232	< 300 ppb
PCB-1242	< 300 ppb
PCB-1248	< 300 ppb
PCB-1254	< 300 ppb
PCB-1260	780 ppb
PCB-1262	< 300 ppb

Metals Analysis

Silver	< 2.50 ppm
Arsenic	< 2.50 ppm
Barium	210 ppm
Cadmium	< 2.50 ppm
Chromium	82.3 ppm
Mercury	3380 ppb
Nickel	65.8 ppm
Lead	949 ppm
Selenium	< 2.50 ppm

General Chemistry

Ash, Percent (@ 750 C)	52.9 wt%
Heating Value	360 Btu/lb
Cyanide, Total	0.320 ppm
Release of Cyanide	< 250 ppm
Flash Point, closed cup	> 140 F
Release of Sulfide	< 500 ppm
Total Halogens	0.340 wt%
Nitrogen, Organically Bound	27.2 ppm

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cc: CITY00391 Project Manager: Tom Hutto

Date: 09/30/91

Page No.: 2

Sample ID	: TP-22-23-24 Composite
Lab ID	: 9108326-04
Matrix	: Soil
Date Collected	: 07/29/91
Date Received	: 08/21/91
Priority	: Routine
Collector	: Client

pH	
pH	8.25 SU
pH Temperature	22.4 C
Specific Gravity	1.63

The following preparation procedures were performed:
Acid Digestion Prep for Metals
Mercury Prep
Ext. & Conc. - PCBs

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CERTIFICATE OF ANALYSIS

Client: City of Charleston
116 Meeting Street
Charleston, South Carolina 29401
Contact: Ms. Rhett Wilson

Date: 09/06/91

Released by: [illegible]
QA/QC Officer

cc: CITY00391 Project Manager: Tom Hutto Page No.: 1

Sample ID	: TP-20-21 Composite (tclp)
Lab ID	: 9108326-05
Matrix	: TCLP
Date Collected	: 07/29/91
Date Received	: 08/21/91
Priority	: Routine
Collector	: Client

1,1-Dichloroethylene	< .07 ppm
1,2-Dichloroethane	< .05 ppm
1,4-Dichlorobenzene	< .75 ppm
[illegible]-Butanone	< 20 ppm
[illegible]enzene	< .05 ppm
Carbon Tetrachloride	< .05 ppm
Chlorobenzene	< 10 ppm
Chloroform	< .6 ppm
Tetrachloroethylene	< .07 ppm
Trichloroethylene	< .05 ppm
Vinyl chloride	< .02 ppm
2,4,5-Trichlorophenol	< 40 ppm
2,4,6-Trichlorophenol	< .2 ppm
Pentachlorophenol	< 10 ppm
m-Cresol	< 20 ppm
o-Cresol	< 20 ppm
p-Cresol	< 20 ppm
2,4-Dinitrotoluene	< .13 ppm
Hexachlorobenzene	< .13 ppm
Hexachlorobutadiene	< .1 ppm
Hexachloroethane	< .3 ppm
Nitrobenzene	< .2 ppm
Pyridine	< .5 ppm
2,4,5-TP	< .1 ppm
2,4-D	< 1 ppm
Chlordane	< .003 ppm
Endrin	< .002 ppm
Heptachlor & Hep. Epoxide	< .0008 ppm
Methoxychlor	< 1 ppm
[illegible]oxaphene	< .05 ppm
[illegible]amma-BHC	< .04 ppm
Silver	< 0.5 ppm

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Client: City of Charleston
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Charleston, South Carolina 29401
Contact: Ms. Rhett Wilson
cc: CITY00391 Project Manager: Tom Hutto

Date: 09/06/91

Page No.: 2

Sample ID	: TP-20-21 Composite (tclp)
Lab ID	: 9108326-05
Matrix	: TCLP
Date Collected	: 07/29/91
Date Received	: 08/21/91
Priority	: Routine
Collector	: Client

Arsenic	< 0.5 ppm
Barium	< 10 ppm
Cadmium	< 0.1 ppm
Chromium	< 0.5 ppm
Lead	< 0.5 ppm
elenium	< 0.1 ppm
ercury	< 0.2 ppm

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116 Meeting Street
Charleston, South Carolina 29401
Contact: Ms. Rhett Wilson

Date: 09/06/91

Released by: QA/QC Officer

cc: CITY00391 Project Manager: Tom Hutto Page No.: 1

Sample ID	: TP-22-23-24 Composite (tclp)
Lab ID	: 9108326-06
Matrix	: TCLP
Date Collected	: 07/29/91
Date Received	: 08/21/91
Priority	: Routine
Collector	: Client

1,1-Dichloroethylene	< .07 ppm
1,2-Dichloroethane	< .05 ppm
1,4-Dichlorobenzene	< .75 ppm
[illegible]-Butanone	< 20 ppm
[illegible]enzene	< .05 ppm
Carbon Tetrachloride	< .05 ppm
Chlorobenzene	< 10 ppm
Chloroform	< .6 ppm
Tetrachloroethylene	< .07 ppm
Trichloroethylene	< .05 ppm
Vinyl chloride	< .02 ppm
2,4,5-Trichlorophenol	< 40 ppm
2,4,6-Trichlorophenol	< .2 ppm
Pentachlorophenol	< 10 ppm
m-Cresol	< 20 ppm
o-Cresol	< 20 ppm
p-Cresol	< 20 ppm
2,4-Dinitrotoluene	< .13 ppm
Hexachlorobenzene	< .13 ppm
Hexachlorobutadiene	< .1 ppm
Hexachloroethane	< .3 ppm
Nitrobenzene	< .2 ppm
Pyridine	< .5 ppm
2,4,5-TP	< .1 ppm
2,4-D	< 1 ppm
Chlordane	< .003 ppm
Endrin	< .002 ppm
Heptachlor & Hep. Epoxide	< .0008 ppm
Methoxychlor	< 1 ppm
[illegible]xaphene	< .05 ppm
[illegible]mma-BHC	< .04 ppm
Silver	< 0.5 ppm

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Client: City of Charleston
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cc: CITY00391 Project Manager: Tom Hutto

Date: 09/06/91

Page No.: 2

Sample ID	: TP-22-23-24 Composite (tclp)
Lab ID	: 9108326-06
Matrix	: TCLP
Date Collected	: 07/29/91
Date Received	: 08/21/91
Priority	: Routine
Collector	: Client

Arsenic	< 0.5 ppm
Barium	< 10 ppm
Cadmium	< 0.1 ppm
Chromium	< 0.5 ppm
Lead	< 0.5 ppm
Selenium	< 0.1 ppm
Mercury	< 0.2 ppm

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CERTIFICATE OF ANALYSIS

Client: City of Charleston
116 Meeting Street
Charleston, South Carolina 29401
Contact: Ms. Rhett Wilson

Date: 09/04/91

Released by: Robert Williams
QA/QC Officer

cc: CITY00391 Project Manager: Tom Hutto Page No.: 1

Sample ID	: Field Blank
Lab ID	: 9108473-01
Matrix	: Misc.
Date Collected	: 07/29/91
Date Received	: 08/30/91
Priority	: Rush
Collector	: Client

1,2,4-Trichlorobenzene	< 330 ppb
1,2-Diphenylhydrazine	< 330 ppb
2,4-Dinitrotoluene	< 330 ppb
2,6-Dinitrotoluene	< 330 ppb
2-Chloroethylvinyl ether	< 330 ppb
2-Chloronaphthalene	< 330 ppb
3,3'-Dichlorobenzidine	< 660 ppb
4,4'-DDD	< 330 ppb
4,4'-DDE	< 330 ppb
4,4'-DDT	< 330 ppb
4-Bromophenyl phenyl ether	< 330 ppb
4-Chlorophenyl phenyl ether	< 330 ppb
Acenaphthene	< 330 ppb
Acenaphthylene	< 330 ppb
Aldrin	< 330 ppb
Anthracene	< 330 ppb
Benzidine	< 330 ppb
Benzo(a)anthracene	< 330 ppb
Benzo(a)pyrene	< 330 ppb
Benzo(b)fluoranthene	< 330 ppb
Benzo(ghi)perylene	< 330 ppb
Benzo(k)fluoranthene	< 330 ppb
Butyl benzyl phthalate	< 330 ppb
Chlordane	< 330 ppb
Chrysene	< 330 ppb
Di-n-butyl phthalate	< 330 ppb
Di-n-octyl phthalate	< 330 ppb
Dibenzo(a,h)anthracene	< 330 ppb
Dieldrin	< 330 ppb
Diethyl phthalate	< 330 ppb
Dimethyl phthalate	< 330 ppb
Endosulfan I	< 330 ppb

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Client: City of Charleston
116 Meeting Street
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Contact: Ms. Rhett Wilson
cc: CITY00391 Project Manager: Tom Hutto

Date: 09/04/91

Page No.: 2

Sample ID	: Field Blank
Lab ID	: 9108473-01
Matrix	: Misc.
Date Collected	: 07/29/91
Date Received	: 08/30/91
Priority	: Rush
Collector	: Client

Endosulfan II	< 330 ppb
Endosulfan sulfate	< 330 ppb
Endrin	< 330 ppb
Endrin aldehyde	< 330 ppb
Fluoranthene	< 330 ppb
Fluorene	< 330 ppb
Heptachlor	< 330 ppb
Heptachlor epoxide	< 330 ppb
Hexachlorobenzene	< 330 ppb
Hexachlorobutadiene	< 330 ppb
Hexachlorocyclopentadiene	< 330 ppb
Hexachloroethane	< 330 ppb
Indeno(1,2,3-c,d)pyrene	< 330 ppb
Isophorone	< 330 ppb
N-Nitrosodimethylamine	< 330 ppb
N-Nitrosodiphenylamine	< 330 ppb
N-Nitrosodipropylamine	< 330 ppb
Naphthalene	< 330 ppb
Nitrobenzene	< 330 ppb
PCB-1016	< 4950 ppb
PCB-1221	< 4950 ppb
PCB-1232	< 4950 ppb
PCB-1242	< 4950 ppb
PCB-1248	< 4950 ppb
PCB-1254	< 4950 ppb
PCB-1260	< 4950 ppb
Phenanthrene	< 330 ppb
Pyrene	< 330 ppb
Toxaphene	< 330 ppb
alpha-BHC	< 330 ppb
beta-BHC	< 330 ppb
bis(2-Chloroethoxy)methane	< 330 ppb
bis(2-Chloroethyl) ether	< 330 ppb
bis(2-Chloroisopropyl)ether	< 330 ppb
bis(2-Ethylhexyl)phthalate	< 330 ppb

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Client: City of Charleston
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cc: CITY00391 Project Manager: Tom Hutto

Date: 09/04/91

Page No.: 3

Sample ID	: Field Blank
Lab ID	: 9108473-01
Matrix	: Misc.
Date Collected	: 07/29/91
Date Received	: 08/30/91
Priority	: Rush
Collector	: Client

delta-BHC	< 330 ppb
gamma-BHC	< 330 ppb

A Tentatively Identified Compound (TIC) search detected no compounds in addition to those listed above.

These values typically correspond to an air concentration of approximately <0.3 mg/m³.

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Client: City of Charleston
116 Meeting Street
Charleston, South Carolina 29401
Contact: Ms. Rhett Wilson

Date: 09/04/91

Released by: Robert L. Williams
QA/QC Officer

cc: CITY00391 Project Manager: Tom Hutto Page No.: 1

Sample ID	: Back Ditch LV-4B
Lab ID	: 9108473-02
Matrix	: Misc.
Date Collected	: 07/29/91
Date Received	: 08/30/91
Priority	: Rush
Collector	: Client

1,2,4-Trichlorobenzene	< 330 ppb
1,2-Diphenylhydrazine	< 330 ppb
2,4-Dinitrotoluene	< 330 ppb
2,6-Dinitrotoluene	< 330 ppb
2-Chloroethylvinyl ether	< 330 ppb
2-Chloronaphthalene	< 330 ppb
3,3'-Dichlorobenzidine	< 660 ppb
4,4'-DDD	< 330 ppb
4,4'-DDE	< 330 ppb
4,4'-DDT	< 330 ppb
4-Bromophenyl phenyl ether	< 330 ppb
4-Chlorophenyl phenyl ether	< 330 ppb
Acenaphthene	< 330 ppb
Acenaphthylene	< 330 ppb
Aldrin	< 330 ppb
Anthracene	< 330 ppb
Benzidine	< 330 ppb
Benzo(a)anthracene	< 330 ppb
Benzo(a)pyrene	< 330 ppb
Benzo(b)fluoranthene	< 330 ppb
Benzo(ghi)perylene	< 330 ppb
Benzo(k)fluoranthene	< 330 ppb
Butyl benzyl phthalate	< 330 ppb
Chlordane	< 330 ppb
Chrysene	< 330 ppb
Di-n-butyl phthalate	< 330 ppb
Di-n-octyl phthalate	< 330 ppb
Dibenzo(a,h)anthracene	< 330 ppb
Dieldrin	< 330 ppb
Diethyl phthalate	< 330 ppb
Dimethyl phthalate	< 330 ppb
Endosulfan I	< 330 ppb

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Date: 09/04/91

Page No.: 2

Sample ID	: Back Ditch LV-4B
Lab ID	: 9108473-02
Matrix	: Misc.
Date Collected	: 07/29/91
Date Received	: 08/30/91
Priority	: Rush
Collector	: Client

Endosulfan II	< 330 ppb
Endosulfan sulfate	< 330 ppb
Endrin	< 330 ppb
Endrin aldehyde	< 330 ppb
Fluoranthene	< 330 ppb
Fluorene	< 330 ppb
Heptachlor	< 330 ppb
Heptachlor epoxide	< 330 ppb
Hexachlorobenzene	< 330 ppb
Hexachlorobutadiene	< 330 ppb
Hexachlorocyclopentadiene	< 330 ppb
Hexachloroethane	< 330 ppb
Indeno(1,2,3-c,d)pyrene	< 330 ppb
Isophorone	< 330 ppb
N-Nitrosodimethylamine	< 330 ppb
N-Nitrosodiphenylamine	< 330 ppb
N-Nitrosodipropylamine	< 330 ppb
Naphthalene	< 330 ppb
Nitrobenzene	< 330 ppb
PCB-1016	< 4950 ppb
PCB-1221	< 4950 ppb
PCB-1232	< 4950 ppb
PCB-1242	< 4950 ppb
PCB-1248	< 4950 ppb
PCB-1254	< 4950 ppb
PCB-1260	< 4950 ppb
Phenanthrene	< 330 ppb
Pyrene	< 330 ppb
Toxaphene	< 330 ppb
alpha-BHC	< 330 ppb
beta-BHC	< 330 ppb
bis(2-Chloroethoxy)methane	< 330 ppb
bis(2-Chloroethyl) ether	< 330 ppb
bis(2-Chloroisopropyl)ether	< 330 ppb
bis(2-Ethylhexyl)phthalate	< 330 ppb

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Page No.: 3

Sample ID	: Back Ditch LV-4B
Lab ID	: 9108473-02
Matrix	: Misc.
Date Collected	: 07/29/91
Date Received	: 08/30/91
Priority	: Rush
Collector	: Client

delta-BHC	< 330 ppb
gamma-BHC	< 330 ppb

A Tentatively Identified Compound (TIC) search detected no compounds in addition to those listed above.

These values typically correspond to an air concentration of approximately <0.3 mg/m³.

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Client: City of Charleston
116 Meeting Street
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Contact: Ms. Rhett Wilson

Date: 09/04/91

Released by: Robert L. Pullano
QA/QC Officer

cc: CITY00391 Project Manager: Tom Hutto Page No.: 1

Sample ID	: Front Ditch LV-5B
Lab ID	: 9108473-03
Matrix	: Misc.
Date Collected	: 07/29/91
Date Received	: 08/30/91
Priority	: Rush
Collector	: Client

1,2,4-Trichlorobenzene	< 330 ppb
1,2-Diphenylhydrazine	< 330 ppb
2,4-Dinitrotoluene	< 330 ppb
2,6-Dinitrotoluene	< 330 ppb
2-Chloroethylvinyl ether	< 330 ppb
2-Chloronaphthalene	< 330 ppb
3,3'-Dichlorobenzidine	< 660 ppb
4,4'-DDD	< 330 ppb
4,4'-DDE	< 330 ppb
4,4'-DDT	< 330 ppb
4-Bromophenyl phenyl ether	< 330 ppb
4-Chlorophenyl phenyl ether	< 330 ppb
Acenaphthene	< 330 ppb
Acenaphthylene	< 330 ppb
Aldrin	< 330 ppb
Anthracene	< 330 ppb
Benzidine	< 330 ppb
Benzo(a)anthracene	< 330 ppb
Benzo(a)pyrene	< 330 ppb
Benzo(b)fluoranthene	< 330 ppb
Benzo(ghi)perylene	< 330 ppb
Benzo(k)fluoranthene	< 330 ppb
Butyl benzyl phthalate	< 330 ppb
Chlordane	< 330 ppb
Chrysene	< 330 ppb
Di-n-butyl phthalate	< 330 ppb
Di-n-octyl phthalate	< 330 ppb
Dibenzo(a,h)anthracene	< 330 ppb
Dieldrin	< 330 ppb
Diethyl phthalate	< 330 ppb
Dimethyl phthalate	< 330 ppb
Endosulfan I	< 330 ppb

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Client: City of Charleston
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cc: CITY00391 Project Manager: Tom Hutto

Date: 09/04/91

Page No.: 2

Sample ID	: Front Ditch LV-5B
Lab ID	: 9108473-03
Matrix	: Misc.
Date Collected	: 07/29/91
Date Received	: 08/30/91
Priority	: Rush
Collector	: Client

Endosulfan II	< 330 ppb
Endosulfan sulfate	< 330 ppb
Endrin	< 330 ppb
Endrin aldehyde	< 330 ppb
Fluoranthene	< 330 ppb
Fluorene	< 330 ppb
Heptachlor	< 330 ppb
Heptachlor epoxide	< 330 ppb
Hexachlorobenzene	< 330 ppb
Hexachlorobutadiene	< 330 ppb
Hexachlorocyclopentadiene	< 330 ppb
Hexachloroethane	< 330 ppb
Indeno(1,2,3-c,d)pyrene	< 330 ppb
Isophorone	< 330 ppb
N-Nitrosodimethylamine	< 330 ppb
N-Nitrosodiphenylamine	< 330 ppb
N-Nitrosodipropylamine	< 330 ppb
Naphthalene	< 330 ppb
Nitrobenzene	< 330 ppb
PCB-1016	< 4950 ppb
PCB-1221	< 4950 ppb
PCB-1232	< 4950 ppb
PCB-1242	< 4950 ppb
PCB-1248	< 4950 ppb
PCB-1254	< 4950 ppb
PCB-1260	< 4950 ppb
Phenanthrene	< 330 ppb
Pyrene	< 330 ppb
Toxaphene	< 330 ppb
alpha-BHC	< 330 ppb
beta-BHC	< 330 ppb
bis(2-Chloroethoxy)methane	< 330 ppb
bis(2-Chloroethyl) ether	< 330 ppb
bis(2-Chloroisopropyl)ether	< 330 ppb
bis(2-Ethylhexyl)phthalate	< 330 ppb

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Vice President
SC Registration No. 9103

Laboratory Certifications:

FL	E87156/87294
NC	233
SC	10120
VA	00151
TN	02934

CERTIFICATE OF ANALYSIS

Client: City of Charleston
116 Meeting Street
Charleston, South Carolina 29401
Contact: Ms. Rhett Wilson
cc: CITY00391 Project Manager: Tom Hutto

Date: 09/04/91

Page No.: 3

Sample ID	: Front Ditch LV-5B
Lab ID	: 9108473-03
Matrix	: Misc.
Date Collected	: 07/29/91
Date Received	: 08/30/91
Priority	: Rush
Collector	: Client

delta-BHC	< 330 ppb
gamma-BHC	< 330 ppb

A Tentatively Identified Compound (TIC) search detected no compounds in addition to those listed above.

[illegible]hese values typically correspond to an air concentration of approximately <0.3 mg/m^3.

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CERTIFICATE OF ANALYSIS

Client: City of Charleston
116 Meeting Street
Charleston, South Carolina 29401
Contact: Ms. Rhett Wilson

Date: 09/04/91

Released by: Robert L. Pullano
QA/QC Officer

cc: CITY00391 Project Manager: Tom Hutto Page No.: 1

Sample ID	: Ambient Background
Lab ID	: 9108473-04
Matrix	: Misc.
Date Collected	: 07/29/91
Date Received	: 08/30/91
Priority	: Rush
Collector	: Client

1,2,4-Trichlorobenzene	< 330 ppb
1,2-Diphenylhydrazine	< 330 ppb
2,4-Dinitrotoluene	< 330 ppb
2,6-Dinitrotoluene	< 330 ppb
2-Chloroethylvinyl ether	< 330 ppb
2-Chloronaphthalene	< 330 ppb
3,3'-Dichlorobenzidine	< 660 ppb
4,4'-DDD	< 330 ppb
4,4'-DDE	< 330 ppb
4,4'-DDT	< 330 ppb
4-Bromophenyl phenyl ether	< 330 ppb
4-Chlorophenyl phenyl ether	< 330 ppb
Acenaphthene	< 330 ppb
Acenaphthylene	< 330 ppb
Aldrin	< 330 ppb
Anthracene	< 330 ppb
Benzidine	< 330 ppb
Benzo(a)anthracene	< 330 ppb
Benzo(a)pyrene	< 330 ppb
Benzo(b)fluoranthene	< 330 ppb
Benzo(ghi)perylene	< 330 ppb
Benzo(k)fluoranthene	< 330 ppb
Butyl benzyl phthalate	< 330 ppb
Chlordane	< 330 ppb
Chrysene	< 330 ppb
Di-n-butyl phthalate	< 330 ppb
Di-n-octyl phthalate	< 330 ppb
Dibenzo(a,h)anthracene	< 330 ppb
Dieldrin	< 330 ppb
Diethyl phthalate	< 330 ppb
Dimethyl phthalate	< 330 ppb
Endosulfan I	< 330 ppb

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Client: City of Charleston
116 Meeting Street
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Contact: Ms. Rhett Wilson
cc: CITY00391 Project Manager: Tom Hutto

Date: 09/04/91

Page No.: 2

Sample ID	: Ambient Background
Lab ID	: 9108473-04
Matrix	: Misc.
Date Collected	: 07/29/91
Date Received	: 08/30/91
Priority	: Rush
Collector	: Client

Endosulfan II	< 330 ppb
Endosulfan sulfate	< 330 ppb
Endrin	< 330 ppb
Endrin aldehyde	< 330 ppb
Fluoranthene	< 330 ppb
Fluorene	< 330 ppb
Heptachlor	< 330 ppb
Heptachlor epoxide	< 330 ppb
Hexachlorobenzene	< 330 ppb
Hexachlorobutadiene	< 330 ppb
Hexachlorocyclopentadiene	< 330 ppb
Hexachloroethane	< 330 ppb
Indeno(1,2,3-c,d)pyrene	< 330 ppb
Isophorone	< 330 ppb
N-Nitrosodimethylamine	< 330 ppb
N-Nitrosodiphenylamine	< 330 ppb
N-Nitrosodipropylamine	< 330 ppb
Naphthalene	< 330 ppb
Nitrobenzene	< 330 ppb
PCB-1016	< 4950 ppb
PCB-1221	< 4950 ppb
PCB-1232	< 4950 ppb
PCB-1242	< 4950 ppb
PCB-1248	< 4950 ppb
PCB-1254	< 4950 ppb
PCB-1260	< 4950 ppb
Phenanthrene	< 330 ppb
Pyrene	< 330 ppb
Toxaphene	< 330 ppb
alpha-BHC	< 330 ppb
beta-BHC	< 330 ppb
bis(2-Chloroethoxy)methane	< 330 ppb
bis(2-Chloroethyl) ether	< 330 ppb
bis(2-Chloroisopropyl)ether	< 330 ppb
bis(2-Ethylhexyl)phthalate	< 330 ppb

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Date: 09/04/91

Page No.: 3

Sample ID	: Ambient Background
Lab ID	: 9108473-04
Matrix	: Misc.
Date Collected	: 07/29/91
Date Received	: 08/30/91
Priority	: Rush
Collector	: Client

delta-BHC	< 330 ppb
gamma-BHC	< 330 ppb

A Tentativly Identified Compound (TIC) search detected no compounds in addition to those listed above.

These values typically correspond to an air concentration of approximately <0.3 mg/m³.

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Contact: Ms. Rhett Wilson

Date: 09/30/91

Released by: QA/QC Officer

cc: CITY00391 Project Manager: Tom Hutto Page No.: 1

Sample ID	: TP-20-21 Composite
Lab ID	: 9108326-03
Matrix	: Soil
Date Collected	: 07/29/91
Date Received	: 08/21/91
Priority	: Routine
Collector	: Client

Extractable Organics

PCB analysis

PCB-1016	< 300 ppb
PCB-1221	< 300 ppb
PCB-1232	< 300 ppb
PCB-1242	< 300 ppb
PCB-1248	< 300 ppb
PCB-1254	< 300 ppb
PCB-1260	1000 ppb
PCB-1262	< 300 ppb

Metals Analysis

Silver	< 2.50 ppm
Arsenic	94.9 ppm
Barium	124 ppm
Cadmium	< 2.50 ppm
Chromium	63.6 ppm
Mercury	1930 ppb
Nickel	32.2 ppm
Lead	443 ppm
Selenium	< 2.50 ppm

General Chemistry

Ash, Percent (@ 750 C)	80.6 wt%
Heating Value	370 Btu/lb
Cyanide, Total	0.113 ppm
Release of Cyanide	< 250 ppm
Flash Point, closed cup	> 140 F
Release of Sulfide	< 500 ppm
Total Halogens	0.0300 wt%
Nitrogen, Organically Bound	19.6 ppm

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Client: City of Charleston
116 Meeting Street
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Contact: Ms. Rhett Wilson
cc: CITY00391 Project Manager: Tom Hutto

Date: 09/04/91

Page No.: 3

Sample ID	: TP-22-23-24 Composite
Lab ID	: 9108326-02
Matrix	: Soil
Date Collected	: 07/29/91
Date Received	: 08/21/91
Priority	: Routine
Collector	: Client

Benzo(a)pyrene	< 3300 ppb
Benzo(b)fluoranthene	< 3300 ppb
Benzo(ghi)perylene	< 3300 ppb
Benzo(k)fluoranthene	< 3300 ppb
Butyl benzyl phthalate	< 3300 ppb
Chrysene	< 3300 ppb
Di-n-butyl phthalate	< 3300 ppb
Di-n-octyl phthalate	< 3300 ppb
Dibenzo(a,h)anthracene	< 3300 ppb
Dibenzofuran	< 3300 ppb
Diethyl phthalate	< 3300 ppb
Dimethyl phthalate	< 3300 ppb
Fluoranthene	< 3300 ppb
Fluorene	< 3300 ppb
Hexachlorobenzene	< 3300 ppb
Hexachlorobutadiene	< 3300 ppb
Hexachlorocyclopentadiene	< 3300 ppb
Hexachloroethane	< 3300 ppb
Indeno(1,2,3-c,d)pyrene	< 3300 ppb
Isophorone	< 3300 ppb
N-Nitrosodiphenylamine	< 3300 ppb
N-Nitrosodipropylamine	< 3300 ppb
Naphthalene	< 3300 ppb
Nitrobenzene	< 3300 ppb
Phenanthrene	< 3300 ppb
Pyrene	< 3300 ppb
bis(2-Chloroethoxy)methane	< 3300 ppb
bis(2-Chloroethyl) ether	< 3300 ppb
bis(2-Chloroisopropyl)ether	< 3300 ppb
bis(2-Ethylhexyl)phthalate	< 3300 ppb
m-Nitroaniline	< 3300 ppb
o-Nitroaniline	< 3300 ppb
p-Nitroaniline	< 3300 ppb
Lead	954 ppm

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Contact: Ms. Rhett Wilson
cc: CITY00391 Project Manager: Tom Hutto

Date: 09/30/91

Page No.: 2

Sample ID	: TP-20-21 Composite
Lab ID	: 9108326-03
Matrix	: Soil
Date Collected	: 07/29/91
Date Received	: 08/21/91
Priority	: Routine
Collector	: Client

pH	
pH	7.56 SU
pH Temperature	22.3 C
Specific Gravity	1.78

The following preparation procedures were performed:
Acid Digestion Prep for Metals
Mercury Prep
Ext. & Conc. - PCBs

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Client: City of Charleston
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Contact: Ms. Rhett Wilson

Date: 09/04/91

Released by: Robert T. Williams
QA/QC Officer

cc: CITY00391 Project Manager: Tom Hutto Page No.: 1

Sample ID	: TP-20-21 Composite
Lab ID	: 9108326-01
Matrix	: Soil
Date Collected	: 07/29/91
Date Received	: 08/21/91
Priority	: Routine
Collector	: Client

1,1,1-Trichloroethane	< 1200 ppb
1,1,2,2-Tetrachloroethane	< 1200 ppb
1,1,2-Trichloroethane	< 1200 ppb
1,1-Dichloroethane	< 1200 ppb
1,1-Dichloroethylene	< 1200 ppb
1,2-Dichloroethane	< 1200 ppb
1,2-Dichloropropane	< 1200 ppb
1,2-cis-Dichloroethylene	< 1200 ppb
1,2-trans-Dichloroethylene	< 1200 ppb
2-Butanone	< 6000 ppb
2-Hexanone	< 1200 ppb
4-Methyl-2-pentanone	< 1200 ppb
Acetone	< 6000 ppb
Benzene	< 1200 ppb
Bromoform	< 1200 ppb
Carbon Disulfide	< 1200 ppb
Carbon Tetrachloride	< 1200 ppb
Chlorobenzene	< 1200 ppb
Chlorodibromomethane	< 1200 ppb
Chloroethane	< 1200 ppb
Chloroform	< 1000 ppb
Dichlorobromomethane	< 1200 ppb
Ethylbenzene	< 1200 ppb
Methyl Bromide	< 1200 ppb
Methyl Chloride	< 1200 ppb
Methylene Chloride	< 1200 ppb
Styrene	< 1200 ppb
Tetrachloroethylene	< 1200 ppb
Toluene	< 1200 ppb
Trichloroethylene	< 1200 ppb
Vinyl Acetate	< 1200 ppb
Vinyl chloride	< 1200 ppb

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CERTIFICATE OF ANALYSIS

Client: City of Charleston
116 Meeting Street
Charleston, South Carolina 29401
Contact: Ms. Rhett Wilson
cc: CITY00391 Project Manager: Tom Hutto

Date: 09/04/91

Page No.: 2

Sample ID	: TP-20-21 Composite
Lab ID	: 9108326-01
Matrix	: Soil
Date Collected	: 07/29/91
Date Received	: 08/21/91
Priority	: Routine
Collector	: Client

Xylenes (TOTAL)	< 2400 ppb
cis-1,3-Dichloropropylene	< 1200 ppb
trans-1,3-Dichloropropylene	< 1200 ppb
2,4,5-Trichlorophenol	< 3300 ppb
2,4,6-Trichlorophenol	< 3300 ppb
2,4-Dichlorophenol	< 3300 ppb
2,4-Dimethylphenol	< 3300 ppb
2,4-Dinitrophenol	< 14850 ppb
2-Chlorophenol	< 3300 ppb
2-Nitrophenol	< 3300 ppb
2-methyl-4,6-dinitrophenol	< 16500 ppb
4-Nitrophenol	< 3300 ppb
4-chloro-3-methyl phenol	< 3300 ppb
Benzoic Acid	< 3300 ppb
Benzyl Alcohol	< 3300 ppb
Pentachlorophenol	< 3300 ppb
Phenol	< 3300 ppb
o-Cresol	< 3300 ppb
p-Cresol	< 3300 ppb
1,2,4-Trichlorobenzene	< 3300 ppb
1,2-Dichlorobenzene	< 3300 ppb
1,3-Dichlorobenzene	< 3300 ppb
1,4-Dichlorobenzene	< 3300 ppb
2,4-Dinitrotoluene	< 3300 ppb
2,6-Dinitrotoluene	< 3300 ppb
2-Chloronaphthalene	< 3300 ppb
2-Methylnaphthalene	< 3300 ppb
3,3'-Dichlorobenzidine	< 6600 ppb
4-Bromophenyl phenyl ether	< 3300 ppb
4-Chloroaniline	< 3300 ppb
4-Chlorophenyl phenyl ether	< 3300 ppb
Acenaphthene	5830 ppb
Acenaphthylene	< 3300 ppb
Anthracene	< 3300 ppb
Benzo(a)anthracene	< 3300 ppb

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Client: City of Charleston
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Contact: Ms. Rhett Wilson
cc: CITY00391 Project Manager: Tom Hutto

Date: 09/04/91

Page No.: 3

Sample ID	: TP-20-21 Composite
Lab ID	: 9108326-01
Matrix	: Soil
Date Collected	: 07/29/91
Date Received	: 08/21/91
Priority	: Routine
Collector	: Client

Benzo(a)pyrene	< 3300 ppb
Benzo(b)fluoranthene	< 3300 ppb
Benzo(ghi)perylene	< 3300 ppb
Benzo(k)fluoranthene	< 3300 ppb
Butyl benzyl phthalate	< 3300 ppb
Chrysene	< 3300 ppb
Di-n-butyl phthalate	< 3300 ppb
Di-n-octyl phthalate	< 3300 ppb
Dibenzo(a,h)anthracene	< 3300 ppb
Dibenzofuran	< 3300 ppb
Diethyl phthalate	< 3300 ppb
Dimethyl phthalate	< 3300 ppb
Fluoranthene	11000 ppb
Fluorene	4230 ppb
Hexachlorobenzene	< 3300 ppb
Hexachlorobutadiene	< 3300 ppb
Hexachlorocyclopentadiene	< 3300 ppb
Hexachloroethane	< 3300 ppb
Indeno(1,2,3-c,d)pyrene	< 3300 ppb
Isophorone	< 3300 ppb
N-Nitrosodiphenylamine	< 3300 ppb
N-Nitrosodipropylamine	< 3300 ppb
Naphthalene	< 3300 ppb
Nitrobenzene	< 3300 ppb
Phenanthrene	12200 ppb
Pyrene	7830 ppb
bis(2-Chloroethoxy)methane	< 3300 ppb
bis(2-Chloroethyl) ether	< 3300 ppb
bis(2-Chloroisopropyl)ether	< 3300 ppb
bis(2-Ethylhexyl)phthalate	< 3300 ppb
m-Nitroaniline	< 3300 ppb
o-Nitroaniline	< 3300 ppb
p-Nitroaniline	< 3300 ppb
Lead	448 ppm

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CERTIFICATE OF ANALYSIS

Client: City of Charleston
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Contact: Ms. Rhett Wilson

Date: 09/04/91

Released by: QA/QC Officer

cc: CITY00391 Project Manager: Tom Hutto Page No.: 1

Sample ID	: TP-22-23-24 Composite
Lab ID	: 9108326-02
Matrix	: Soil
Date Collected	: 07/29/91
Date Received	: 08/21/91
Priority	: Routine
Collector	: Client

1,1,1-Trichloroethane	< 4170 ppb
1,1,2,2-Tetrachloroethane	< 4170 ppb
1,1,2-Trichloroethane	< 4170 ppb
1,1-Dichloroethane	< 4170 ppb
,1-Dichloroethylene	< 4170 ppb
1,2-Dichloroethane	< 4170 ppb
1,2-Dichloropropane	< 4170 ppb
1,2-cis-Dichloroethylene	< 4170 ppb
1,2-trans-Dichloroethylene	< 4170 ppb
2-Butanone	< 20850 ppb
2-Hexanone	< 4170 ppb
4-Methyl-2-pentanone	< 4170 ppb
Acetone	< 20850 ppb
Benzene	< 4170 ppb
Bromoform	< 4170 ppb
Carbon Disulfide	< 4170 ppb
Carbon Tetrachloride	< 4170 ppb
Chlorobenzene	< 4170 ppb
Chlorodibromomethane	< 4170 ppb
Chloroethane	< 4170 ppb
Chloroform	< 4170 ppb
Dichlorobromomethane	< 4170 ppb
Ethylbenzene	< 4170 ppb
Methyl Bromide	< 4170 ppb
Methyl Chloride	< 4170 ppb
Methylene Chloride	< 4170 ppb
Styrene	< 4170 ppb
Tetrachloroethylene	< 4170 ppb
Toluene	< 4170 ppb
Trichloroethylene	< 4170 ppb
inyl Acetate	< 4170 ppb
Vinyl chloride	< 4170 ppb

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Date: 09/04/91

Contact: Ms. Rhett Wilson
cc: CITY00391 Project Manager: Tom Hutto

Page No.: 2

Sample ID	: TP-22-23-24 Composite
Lab ID	: 9108326-02
Matrix	: Soil
Date Collected	: 07/29/91
Date Received	: 08/21/91
Priority	: Routine
Collector	: Client

Xylenes (TOTAL)	< 8340 ppb
cis-1,3-Dichloropropylene	< 4170 ppb
trans-1,3-Dichloropropylene	< 4170 ppb
2,4,5-Trichlorophenol	< 3300 ppb
2,4,6-Trichlorophenol	< 3300 ppb
2,4-Dichlorophenol	< 3300 ppb
2,4-Dimethylphenol	< 3300 ppb
2,4-Dinitrophenol	< 14850 ppb
2-Chlorophenol	< 3300 ppb
2-Nitrophenol	< 3300 ppb
2-methyl-4,6-dinitrophenol	< 16500 ppb
4-Nitrophenol	< 3300 ppb
4-chloro-3-methyl phenol	< 3300 ppb
Benzoic Acid	< 3300 ppb
Benzyl Alcohol	< 3300 ppb
Pentachlorophenol	< 3300 ppb
Phenol	< 3300 ppb
o-Cresol	< 3300 ppb
p-Cresol	< 3300 ppb
1,2,4-Trichlorobenzene	< 3300 ppb
1,2-Dichlorobenzene	< 3300 ppb
1,3-Dichlorobenzene	< 3300 ppb
1,4-Dichlorobenzene	< 3300 ppb
2,4-Dinitrotoluene	< 3300 ppb
2,6-Dinitrotoluene	< 3300 ppb
2-Chloronaphthalene	< 3300 ppb
2-Methylnaphthalene	< 3300 ppb
3,3'-Dichlorobenzidine	< 6600 ppb
4-Bromophenyl phenyl ether	< 3300 ppb
4-Chloroaniline	< 3300 ppb
4-Chlorophenyl phenyl ether	< 3300 ppb
Acenaphthene	< 3300 ppb
Acenaphthylene	< 3300 ppb
Anthracene	< 3300 ppb
Benzo(a)anthracene	< 3300 ppb

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APPENDIX VII

LITHOLOGIC LOGS

PRELIMINARY SOIL INVESTIGATION AND FOUNDATION INVESTIGATIONS

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
SCOPE I.D.:
PROJECT: CHARLESTON HARBOR SITE
PAGE: 1
PREPARED BY: T. HUTTO
DATE: 07/09/92
CHECKED BY:
DATE:

FIELD LOG OF TEST BORING

TEST BORING NO: A-1

START DATE: 07/09/92
LOCATION: CHARLESTON HARBOR SITE-NW CORNER

COMPLETION DATE: 07/09/92
SURFACE ELEVATION:
BORING DEPTH: 9'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
3			0.6	SAND; FILL WITH WOODEN PILINGS AND FAINT CREOSOTE ODOR
4			2.2	SAME AS ABOVE; STRONGER ODOR
5			14	SAME AS ABOVE; POTENTIAL CREOSOTE/COAL TAR FREE PRODUCT; STRONG ODOR
6			40	SAME AS ABOVE
7.5			22	SAME AS ABOVE; DECREASING ODOR
8			40	CLAY; GRAY; PLASTIC AND COHESIVE; MODERATE ODOR; NO EVIDENCE OF FREE PRODUCT
9			-	SAME AS 8'; FAINT ODOR

DRILLING METHOD: BACK-HOE
RIG:
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: CITY OF CHARLESTON
DRILLER: T. HUTTO
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
SCOPE I.D.:
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FIELD LOG OF TEST BORING

TEST BORING NO: A-2

START DATE: 07/09/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/09/92
SURFACE ELEVATION:
BORING DEPTH: 10'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
3			N/A	SAND; FILL WITH OYSTER SHELLS, WOOD, GRAVEL; NO ODOR
5			N/A	SAME AS ABOVE; MODERATE TO STRONG PETROLEUM ODOR
7			0	SANDY CLAY, FILL WITH WOOD, COBBLES, BRICKS, SAWDUST; GRAY; MODERATE PETROLEUM ODOR
8			0	CLAY; GRAY; PLASTIC AND COHESIVE; NO SIGNIFICANT ODORS
10			0	CLAY; GRAY; PLASTIC AND COHESIVE; NO SIGNIFICANT ODORS

DRILLING METHOD: BACK-HOE
RIG:
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: CITY OF CHARLESTON
DRILLER: T. HUTTO
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
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FIELD LOG OF TEST BORING

TEST BORING NO: A-3

START DATE: 07/09/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/09/92
SURFACE ELEVATION:
BORING DEPTH: 12'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
~3			1.2	SAND; FILL WITH WOOD, BRICK, GRAVEL; NO ODOR
~5			55	SAME AS ABOVE; MODERATE TO STRONG PETROLEUM, WOOD PRODUCT (NOT CREOSOTE) ODOR
~7			45	CLAY; GRAY; CONTAINS WOOD AND GRAVEL; SAME ODOR
~8			70	CLAY; GRAY; WOOD FIBERS; SAME ODOR
9			1.6	CLAY; GRAY WITH WOOD FIBERS; MODERATE ODOR
10			3.5	SAME AS ABOVE - FAINT ODOR
11			0	CLAY - NO ODOR
12			0	CLAY - NO ODOR

DRILLING METHOD: BACK-HOE
RIG:
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: CITY OF CHARLESTON
DRILLER: T. HUTTO
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
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FIELD LOG OF TEST BORING

TEST BORING NO: A-4

START DATE: 07/09/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/09/92
SURFACE ELEVATION:
BORING DEPTH: 10'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
3-5			0	SAND WITH WOODEN PILINGS; GRAVEL; NO ODOR
6			0	CLAY; GRAY WITH BRICK AND WOOD FRAGMENTS; NO ODOR
7			0	SAND WITH SAWDUST; NO ODOR
8			0	SAWDUST WITH CLAY; NO ODOR
9			0	SAWDUST WITH CLAY; NO ODOR
10			0	CLAY; GRAY; PLASTIC AND COHESIVE; MINOR WOOD FRAGMENTS; NO ODOR

DRILLING METHOD: BACK-HOE
RIG:
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: CITY OF CHARLESTON
DRILLER: T. HUTTO
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
SCOPE I.D.:
PROJECT: CHARLESTON HARBOR SITE
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PREPARED BY: T. HUTTO
DATE: 06/30/92
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FIELD LOG OF TEST BORING

TEST BORING NO: B-1

START DATE: 06/30/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 06/30/92
SURFACE ELEVATION:
BORING DEPTH: 16'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
0-2		100	0	TOP SOIL TO 6", THEN COARSE SAND - NO ODORS OR DISCOLORATION
2-4		100	0	CLAYEY SAND; GRAY, SAND 60-90%; CLAY 10-40%; MODERATELY COHESIVE TO INCOHESIVE (COARSE SAND IN ~2")
4-6		100	0	CLAYEY SAND; VARYING PERCENTAGES; BOTTOM 2" TIGHT GRAY CLAY; SLIGHT CREOSOTE ODOR
6-8		100	16	CLAY; GRAY; TIGHT AND PLASTIC; FORMER MARSH; STRONG CREOSOTE ODOR - POSSIBLE PRODUCT IN UPPER 2"
8-10		100	4.5	CLAY; GRAY; PLASTIC AND COHESIVE; SLIGHT CREOSOTE ODOR
10-12		100	9.2	CLAY; GRAY; PLASTIC AND COHESIVE; SLIGHT CREOSOTE ODOR
12-14		100	5.6	SAME AS ABOVE, EXCEPT GRAY-GREEN AT 14'
14-16		100	5.4	SAME AS ABOVE EXCEPT SLIGHT SHELL CONTENT

DRILLING METHOD: HOLLOW STEM AUGER
RIG: DR 2K
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: GEL
DRILLER: HUTTO, RUCKER
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
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FIELD LOG OF TEST BORING

TEST BORING NO: B-2

START DATE: 06/30/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 06/30/92
SURFACE ELEVATION:
BORING DEPTH: 20'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
0-2		50	0	SANDY FILL - NO ODOR; CLAY <10%, WHITE, GRAY, BROWN
2-4		50	0	SAND; TAN, FINE GRAIN TO MEDIUM GRAINED; FAINT CREOSOTE ODOR
4-6		50	0	SAND; TAN, FINE GRAIN TO MEDIUM GRAINED; FAINT CREOSOTE ODOR
6-8		50	0	SAND; GRAY, FINE GRAIN TO MEDIUM GRAINED; FAINT CREOSOTE ODOR
8-10		50	N/A	SAND; TAN, FINE GRAIN TO MEDIUM GRAINED; FAINT CREOSOTE ODOR
10-12		50	0	SAND; TAN, FINE GRAIN TO MEDIUM GRAINED; FAINT CREOSOTE ODOR
12-14		80	0.8	SAME IN UPPER 6" THEN CLAY; BLACK TO GRAY; VERY PLASTIC AND COHESIVE; SLIGHT CREOSOTE ODOR
14-16			0	MISSED INTERVAL
16-18			-	CLAY; GRAY, VERY PLASTIC AND COHESIVE (FORMER MARSH); FAINT CREOSOTE ODOR
18-20			0.2	CLAY; GRAY, VERY PLASTIC AND COHESIVE (FORMER MARSH); NO ODOR
18-20			0	

DRILLING METHOD: HOLLOW STEM AUGER
RIG: DR 2K
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: GEL
DRILLER: HUTTO, RUCKER
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
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FIELD LOG OF TEST BORING

TEST BORING NO: B-3

START DATE: 07/09/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/09/92
SURFACE ELEVATION:
BORING DEPTH: 16'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
0-2		50	0	SAND; BROWN; NO ODOR
2-4		50	0	SAND; BROWN TO GRAY; CONTAINS BRICK; NO ODOR
4-6		10	0	SAND; BROWN TO GRAY, CONTAINS BRICK; NO ODOR
6-8		100	0.8	UPPER 1.5' SAND; BROWN TO GRAY, CONTAINS BRICK; NO ODOR. LOWER 6"; COARSE SAND (LOOKS LIKE CINDERS) MIXED WITH BRICK; BLACK, FAINT CREOSOTE ODOR; WOOD IN BOTTOM 2"
8-10		80	1.2	CLAY; BLACK; PLASTIC AND COHESIVE; MODERATE CREOSOTE ODOR, BRICK IN UPPER FOOT, SPARSE SHELL IN LOWER 1'
10-12		~100	0	CLAY; GRAY; EXTREMELY PLASTIC AND COHESIVE; SLIGHT SAND CONTENT; SLIGHT CREOSOTE ODOR
12-14		~40	0.8	CLAY; GRAY; EXTREMELY PLASTIC AND COHESIVE; SLIGHT SAND CONTENT; SLIGHT CREOSOTE ODOR
14-16		~40	0	CLAY; GRAY; EXTREMELY PLASTIC AND COHESIVE; SLIGHT SAND CONTENT; SLIGHT CREOSOTE ODOR

DRILLING METHOD: HOLLOW STEM AUGER;
RIG: DR 2K
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: GEL
DRILLER: HUTTO, RUCKER
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
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FIELD LOG OF TEST BORING

TEST BORING NO: B-5

START DATE: 07/01/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/02/92
SURFACE ELEVATION:
BORING DEPTH: 19'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
0-2		50	0	SANDY CLAY; YELLOW TO TAN; DENSE
2-4		50	0	UPPER 1.5'; SAME. LOWER 6"; CLAYEY SAND, DARK BROWN TO BLACK, WOOD AND GLASS FRAGMENTS
4-6		20	0	GRAY SAND WITH LARGE BRICK FRAGMENTS; NO ODOR
6-8		80	20	CLAYEY SAND; BLACK AND BROWN, FINE TO COARSE GRAINED, WOOD FRAGMENTS; EXTREMELY DENSE; TURPENTINE/RESIN ODOR
8-10		100	5	CLAY; DARK GRAY, PLASTIC AND COHESIVE; MODERATE TURPENTINE/RESIN ODOR
11-13		100	0.6	CLAY; DARK GRAY, PLASTIC AND COHESIVE; SLIGHT TURPENTINE/RESIN ODOR
13-15		100	1.8	CLAY; DARK GRAY, PLASTIC AND COHESIVE; SLIGHT TURPENTINE/RESIN ODOR
15-17		20	0.2	CLAY; DARK GRAY, PLASTIC AND COHESIVE; SLIGHT TURPENTINE/RESIN ODOR
17-19		80	0	CLAY; DARK GRAY, PLASTIC AND COHESIVE; NO ODOR

DRILLING METHOD: HOLLOW STEM AUGER
RIG: DR 2K
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: GEL
DRILLER: HUTTO, RUCKER
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

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FIELD LOG OF TEST BORING

TEST BORING NO: C-1

START DATE: 07/07/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/07/92
SURFACE ELEVATION:
BORING DEPTH: 18'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
0-2		90	0	UPPER 6"; SAND; TAN, FINE TO MEDIUM GRAINED; LOWER PORTION; CLAYEY GRAVEL; RED TO BLACK, CONTAINS COAL CHIPS, PUMICE, ROCK FRAGMENTS; NO ODOR
2-4		50	0	UPPER 3" - SAME. BALANCE - LIGHT BLUE/GRAY SAND; NO ODOR
4-6		<5	-	SAND; NO ODOR
6-8		40	0	SAND; FINE TO MEDIUM GRAINED; GRAY TO BROWN; NO ODOR
8-10		100	0.4	UPPER 8" - SAND; FINE TO MEDIUM GRAINED; BLACK; NO ODOR. LOWER 1'4" - CLAY; GRAY, PLASTIC AND COHESIVE; FAINT CREOSOTE ODOR.
10-12		100	9.8	CLAY; BLACK, PLASTIC AND COHESIVE; CONTAINS WOOD FRAGMENTS; MODERATE TO STRONG CREOSOTE ODOR POTENTIAL FREE PRODUCT IN BOTTOM 2".
12-14		100	4.2	SAME EXCEPT BOTTOM 4" WHICH CHANGES TO GRAY; NO EVIDENCE OF FREE PRODUCT
14-16		70	1.7	CLAY; BLACK, PLASTIC AND COHESIVE; FAINT TO MODERATE CREOSOTE ODOR; NO EVIDENCE OF PRODUCT
16-18		100	1.6	CLAY; UPPER 1' SAME WITH FAINT CREOSOTE ODOR; LOWER 1' - SANDY CLAY; GRAY; PLASTIC AND COHESIVE; MARSH MUD ODOR

DRILLING METHOD: HOLLOW STEM AUGER
RIG: DR 2K
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: GEL
DRILLER: RUCKER/HUTTO
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
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FIELD LOG OF TEST BORING

TEST BORING NO: C-2

START DATE: 07/06/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/06/92
SURFACE ELEVATION:
BORING DEPTH: 20'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
0-2		50	0.1	UPPER 8" - SAND; TAN; INCOHESIVE. LOWER 4" - GRAY, GRANITE AGGREGATE (GRAVEL); NO ODOR
2-4		80	0	SAND; TAN TO GRAY; NO ODOR
4-6		90	0	SAND; TAN TO GRAY; NO ODOR
6-8		90	0	UPPER ~1' - SAND; TAN TO GRAY; NO ODOR. LOWER 1' - CLAY; GRAY; PLASTIC AND COHESIVE; FAINT CREOSOTE ODOR
8-10		20	0.1	CLAYEY SAND; TAN TO GRAY; MODERATELY PLASTIC AND COHESIVE; FAINT CREOSOTE ODOR
10-12		80	0.1	UPPER 1' - CLAYEY SAND; TAN TO GRAY; MODERATELY PLASTIC AND COHESIVE; FAINT ODOR. LOWER 1' - GRAY CLAY WITH SHELL. BOTH WITH FAINT CREOSOTE ODOR.
12-14		30	0.1	SAME AS 8'-10'
14-16		30	0.1	SANDY CLAY; GRAY; MODERATELY PLASTIC AND COHESIVE; SAND (~40%); NO ODOR
16-18		80	0.2	SAME EXCEPT SAND CONTENT DECREASED; SOME SHELL; MARSH MUD ODOR (SULFER)
18-20		100	1.8	SAME EXCEPT SAND CONTENT ~30%; SOME SHELL; MARSH MUD ODOR (SULFER)

DRILLING METHOD: HOLLOW STEM AUGER
RIG: DR 2K
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: GEL
DRILLER: RUCKER, HUTTO
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
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FIELD LOG OF TEST BORING

TEST BORING NO: C-3

START DATE: 07/06/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/06/92
SURFACE ELEVATION:
BORING DEPTH: 18'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
0-2		60	.2	SAND; TAN TO GRAY; MEDIUM GRAINED; 2" LAYER OF COARSE GRAVEL; NO ODOR
2-4		50	.4	SAND; BLUE/GRAY; FINE TO MEDIUM GRAINED; NO ODOR
4-6		40	.2	SAND; BLUE/GRAY; FINE TO MEDIUM GRAINED; NO ODOR
6-8		5	0	SAND; BLUE/GRAY; FINE TO MEDIUM GRAINED; NO ODOR
8-10		70	0	SAND; BLUE/GRAY; FINE TO MEDIUM GRAINED; NO ODOR
10-12		70	0	SAND; BLUE/GRAY; FINE TO MEDIUM GRAINED; EXTREMELY FAINT CREOSOTE ODOR
12-14		100	2.2	UPPER 1' - SAME. LOWER 1' - CLAY; GRAY, PLASTIC AND COHESIVE ; FAINT TO MODERATE CREOSOTE ODOR
14-16		70	1.4	CLAY; GRAY, PLASTIC AND COHESIVE; FAINT TO MODERATE CREOSOTE ODOR
16-18		80	0.6	CLAY; GRAY, PLASTIC AND COHESIVE; SLIGHT SAND CONTENT; FAINT CREOSOTE ODOR

DRILLING METHOD: HOLLOW STEM AUGER
RIG: DR 2K
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: GEL
DRILLER: HUTTO, RUCKER
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
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FIELD LOG OF TEST BORING

TEST BORING NO: C-5

START DATE: 07/02/92 LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/02/92 SURFACE ELEVATION: BORING DEPTH: 18'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
0-2		50	*	CLAYEY SAND; (50% SAND, 50% CLAY); TAN TO LIGHT BROWN; DENSE; NO ODOR
2-4		100	*	UPPER 4" - SAME AS ABOVE NEXT 1' - SAND, LIGHT BROWN, MEDIUM GRAINED; NEXT 4" - COARSE SAND; BOTTOM 4" - CLAYEY SAND; BLACK; SAND AND SHELL; INCOHESIVE
4-6		50	*	UPPER 6" - SAME EXCEPT MORE CLAY - RICH AND ~1/2" LAYER OF WOOD CHIPS LOWER 6" - BROWN CLAYEY SAND; INCOHESIVE; FAINT ODOR OF RESIN
6-8		30	*	SAME WITH WOOD CHIPS AND WOOD FIBERS
8-10		0		NO RECOVERY - RESIN ODORS OUT OF HOLE
10-12		40	*	CLAY; DARK GRAY; SLIGHT SAND CONTENT, EXTREMELY COHESIVE AND PLASTIC; FAINT ODORS OF RESIN
13-15		10		SAME; FAINT ODOR
16-18		90		SANDY CLAY (50% CLAY AND 50% SAND); GRAY; MODERATELY DENSE AND COHESIVE; NO ODOR
* OVA NOT OPERATING				

DRILLING METHOD: HOLLOW STEM AUGER RIG: DR 2K DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: GEL DRILLER: HUTTO, RUCKER HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
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FIELD LOG OF TEST BORING

TEST BORING NO: D-1

START DATE: 07/07/92
LOCATION: CHARLESTON HARBOR SITE - D-1

COMPLETION DATE: 07/07/92
SURFACE ELEVATION:
BORING DEPTH: 25'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
0-2		50	0.1	SAND; TAN TO BROWN; NO ODOR
2-4		50	0.1	SAND; GRAY; NO ODOR
4-6		0	-	LIKELY SAND
6-8		80	0.2	SAME AS 2'-4'; NO ODOR
8-10		100	0.7	SAME; NO ODOR
10-12		15	0.6	SAME; EXTREMELY FAINT CREOSOTE ODOR
12-14		60	0.2	SAME; FAINT CREOSOTE ODOR
14-16		90	0.2	SAME EXCEPT LOCALLY BROWN, GRAY; NO ODOR
16-18		60	0.3	SAME
18-20		80	0.2	SAME
20-22		90	0	SAME
23-25		100	0.3	UPPER 2"-3" = SAME AS ABOVE; REMAINDER - CLAY; GRAY, DENSE, COHESIVE; EXTREMELY FAINT CREOSOTE ODOR

DRILLING METHOD: HOLLOW STEM AUGER
RIG: DR 2K
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: GEL
DRILLER: HUTTO, RUCKER
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

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FIELD LOG OF TEST BORING

TEST BORING NO: D-2

START DATE: 07/07/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/07/92
SURFACE ELEVATION:
BORING DEPTH: 23'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
0-2		60	0	SAND; TAN TO BROWN; MEDIUM GRAINED; SOME WOOD FRAGMENTS; SPARSE GRAVEL; NO ODOR
2-4		90	0.2	SAND; GRAY; FINE TO MEDIUM GRAINED; NO ODOR
4-6		80	0	SAME WITH FAINT CREOSOTE ODOR
6-8		20	0.1	SAME; SPARSE WOOD CHIPS; NO ODOR
8-10		40	0	SAME; NO ODOR OR WOOD CHIPS
10-12		70	0	SAME
12-14		80	0	SAME EXCEPT GRAY/BLUE WITH LOCALIZED BLACK DISCOLORATION AND FAINT CREOSOTE ODOR
14-16		5	0.1	SAME; FAINT ODOR; NO DISCOLORATION
16-18		100	0.1	SAME; FAINT ODOR; LOCALIZED BROWN DISCOLORATION
18-20		15	0.2	SAME; EXCEPT MODERATE ODOR AND POTENTIAL PRODUCT IN 1" AREA
21-23		100	2.3 0.8	SAME UPPER 3"; POTENTIAL PRODUCT IN UPPER PORTION LOWER PART = CLAY; GRAY TO BLACK; MODERATE TO STRONG CREOSOTE ODOR IN UPPER PORTION, DECREASING WITH DEPTH

DRILLING METHOD: HOLLOW STEM AUGER
RIG: DR 2K
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: GEL
DRILLER: HUTTO, RUCKER
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
PROJECT: CHARLESTON HARBOR SITE
PREPARED BY: T. HUTTO
CHECKED BY:
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FIELD LOG OF TEST BORING

TEST BORING NO: D-3

START DATE: 07/08/92 LOCATION: CHARLESTON HARBOR SITE - D-3

COMPLETION DATE: 07/08/92 SURFACE ELEVATION: BORING DEPTH: 25'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
0-2		60	0.1	SAND; TAN, MEDIUM TO COARSE GRAINED; NO ODOR
2-4		70	0.2	UPPER 4" = GRAVELLY SAND; BROWN WITH COARSE GRAVEL REMAINDER = SAND; BLUE TO GRAY; FINE TO MEDIUM GRAINED; NO ODOR
4-6		60	0.2	SAME; NO ODOR
6-8		20	0.2	SAME
8-10		70	0.3	SAME WITH SPARSE WOOD FRAGMENTS; NO ODOR
10-12		20	0.2	SAME; NO WOOD FRAGMENTS OR ODOR
12-14		100	0.4	UPPER 6" = SAME REMAINDER = CLAY; GRAY TO BLACK; PLASTIC AND COHESIVE; FAINT ODOR OF CREOSOTE
14-16		100	0.9	SAME WITH MODERATE CREOSOTE ODOR
17-19		0	-	LIKELY SAND
19-21		5	0.6	SAND; FAINT CREOSOTE ODOR
23-25		100	0.6	CLAY; GRAY TO BLACK; DENSE AND COHESIVE; FAINT CREOSOTE ODOR

DRILLING METHOD: HOLLOW STEM AUGER RIG: DR 2K DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: GEL DRILLER: HUTTO, RUCKER HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
SCOPE I.D.:
PROJECT: CHARLESTON HARBOR SITE
PAGE: 1
PREPARED BY: T. HUTTO
DATE: 07/08/92
CHECKED BY:
DATE:

FIELD LOG OF TEST BORING

TEST BORING NO: D-4

START DATE: 07/08/92
LOCATION: CHARLESTON HARBOR SITE - D-4

COMPLETION DATE: 07/08/92
SURFACE ELEVATION:
BORING DEPTH: 18'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
0-2		50	5	SAND; BROWN; NO ODOR
2-4		60	120	SAND MIXED WITH GRAVEL, WOOD, BRICK, CONCRETE
4-6		-	-	NO SAMPLE TAKEN; WOOD FILL
6-8		~1	-	NO SIGNIFICANT RECOVERY - LIKELY SAND
8-10		10	35	FILL; WOOD FIBERS AND GRAY CLAY; MODERATE RESIN ODOR
10-12		10	2	SAME; 50% WOOD
12-14		15	2.4	SAME; 40% WOOD; FAINT RESIN ODOR
14-16		15	4.2	SAME
16-18		100	2.8	CLAY; GRAY; PLASTIC AND COHESIVE; SLIGHT RESIN ODOR; NO WOOD FRAGMENTS

DRILLING METHOD: HOLLOW STEM AUGER
RIG: DR 2K
DEPTH OF WATER AT COMPLETION:
DRILLING CONTRACTOR: GEL
DRILLER: HUTTO, RUCKER
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
SCOPE I.D.:
PROJECT: CHARLESTON HARBOR SITE
PAGE: 1
PREPARED BY: T. HUTTO
DATE: 07/10/92
CHECKED BY:
DATE:

FIELD LOG OF TEST BORING

TEST BORING NO: E-1

START DATE: 07/10/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/10/92
SURFACE ELEVATION:
BORING DEPTH: 13'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
3			0.6	SANDY CLAY FILL; SLIGHT CREOSOTE ODOR
5			0	SAND; GRAY; NO ODOR
7			1.2	CLAYEY SAND; BLACK; MODERATE TO STRONG CREOSOTE (NAPTHALENE) ODOR
8			1.4	GRAVELLY SAND; BLACK; CONTAINS SHELL, BRICK FRAGMENTS, AND COARSE SAND
9			0.9	SAME
10			0.9	SAME WITH INCREASED CLAY CONTENT
11			1.0	SAME AS 10'
13			0.2	SANDY CLAY; BLACK; MODERATELY DENSE AND COHESIVE; FAINT CREOSOTE ODOR

DRILLING METHOD: BACK-HOE
RIG:
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: CITY OF CHARLESTON
DRILLER: T. HUTTO
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
SCOPE I.D.:
PROJECT: CHARLESTON HARBOR SITE
PAGE: 1
PREPARED BY: T. HUTTO
DATE: 07/10/92
CHECKED BY:
DATE:

FIELD LOG OF TEST BORING

TEST BORING NO: E-2

START DATE: 07/10/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/10/92
SURFACE ELEVATION:
BORING DEPTH: 9.5'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
2			0	SAND; TAN TO GRAY; NO ODOR UPPER 2' CONTAINED NUMEROUS RAILROAD TIES AND GRAVEL
4			0	SAME
5			0	SAME
6			0	SAME
8			0	SAME
9			0	SAME; BLACK
9.5			1.5	SAND; BLACK WITH SHELLS AND GRAVEL; MODERATE ODOR OF FUEL/CREOSOTE

DRILLING METHOD: BACK-HOE
RIG:
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: CITY OF CHARLESTON
DRILLER: T. HUTTO
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
SCOPE I.D.:
PROJECT: CHARLESTON HARBOR SITE
PAGE: 1
PREPARED BY: T. HUTTO
DATE: 07/10/92
CHECKED BY:
DATE:

FIELD LOG OF TEST BORING

TEST BORING NO: E-3

START DATE: 07/10/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/10/92
SURFACE ELEVATION:
BORING DEPTH: 14'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
5			0	CLAYEY SAND; TAN; MODERATELY COHESIVE; NO ODOR
7			0.2	SAME; GRAY; FAINT ODOR (CREOSOTE, NAPTHALENE); BRICK FRAGMENTS; BRICK
9			0	CLAYEY SAND; GRAY; COARSE SAND AND SAWDUST WITH LOW CLAY CONCENTRATIONS; RELATIVELY INCOHESIVE; FAINT CREOSOTE/NAPTHALENE ODOR
10			0	CLAYEY SAND WITH SAWDUST; NO ODOR
11			0	CLAY; GRAY; PLASTIC AND COHESIVE; MINOR SAWDUST; NO ODOR
14			0	SAME AS 11' WITH NO SAWDUST

DRILLING METHOD: BACK-HOE
RIG:
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: CITY OF CHARLESTON
DRILLER: T. HUTTO
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
SCOPE I.D.:
PROJECT: CHARLESTON HARBOR SITE
PAGE: 1
PREPARED BY: T. HUTTO
DATE: 07/09/92
CHECKED BY:
DATE:

FIELD LOG OF TEST BORING

TEST BORING NO: X-1

START DATE: 07/09/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/09/92
SURFACE ELEVATION:
BORING DEPTH: 8'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
3			0.8	SAND; TAN TO GRAY; CONTAINS WOOD AND GRAVEL; NO ODOR
5			1.4	SAME EXCEPT NO WOOD OR GRAVEL
6			0.4	SAME
8			-	SAME - CANNOT EXCAVATE BELOW 8' DUE TO CAVING

DRILLING METHOD: BACK-HOE
RIG:
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: CITY
DRILLER: T. HUTTO
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
SCOPE I.D.:
PROJECT: CHARLESTON HARBOR SITE
PAGE: 1
PREPARED BY: T. HUTTO
DATE: 07/09/92
CHECKED BY:
DATE:

FIELD LOG OF TEST BORING

TEST BORING NO: X-2

START DATE: 07/09/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/09/92
SURFACE ELEVATION:
BORING DEPTH: 8'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
3			1.8	SAND; TAN; FAINT NAPTHALENE (CREOSOTE) ODOR ; FILL WITH TIMBERS TO ~2.5-3'
5			1.6	SAND; GRAY; FAINT TO NO CREOSOTE ODORS
6			1.8	CLAY; GRAY; PLASTIC AND COHESIVE; FAINT CREOSOTE ODOR HOLE CAVED BADLY AT ~ 6'
8			2.8	SAME - CANNOT EXCAVATE BELOW 8' DUE TO CAVING

DRILLING METHOD: BACK-HOE
RIG: DR 2K
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: CITY
DRILLER: T. HUTTO
HOUR LATER:

GENERAL ENGINEERING LABORATORIES

CLIENT: CITY / NPS
SCOPE I.D.:
PROJECT: CHARLESTON HARBOR SITE
PAGE: 1
PREPARED BY: T. HUTTO
DATE: 07/09/92
CHECKED BY:
DATE:

FIELD LOG OF TEST BORING

TEST BORING NO: X-3

START DATE: 07/09/92
LOCATION: CHARLESTON HARBOR SITE

COMPLETION DATE: 07/09/92
SURFACE ELEVATION:
BORING DEPTH: 9'

DEPTH FROM LND. SURFACE	SOIL DIVISION	AMT. REC.	OVA	DESCRIPTION OF MATERIAL
5			0.4	SAND; GRAY; MEDIUM GRAINED; WOOD AND GRAVEL; NO ODOR
6			9	SAND; BLACK; WOOD FIBERS AND GRAVEL; MODERATE CREOSOTE ODOR
7			2.4	CLAY; GRAY; PLASTIC AND COHESIVE; FAINT TO MODERATE CREOSOTE ODOR
9			0.1	SAME; NO ODOR

DRILLING METHOD: BACK-HOE
RIG:
DEPTH OF WATER AT COMPLETION:

DRILLING CONTRACTOR: CITY
DRILLER: T. HUTTO
HOUR LATER:

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, SC

Boring No. B 1 S. C. I. Project No. 8937 Date 3-10-89

Ground Surface Elev. Assumed 0'0" Datum _____ Gr. Water Elev. 2'1"
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE To	STRATUM Elev. - Feet & Inches From	STRATUM To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	0'0"	1'6"	0'0"		Medium brown fine sand with slight	5-6-9
					inorganic clay. Root, brick and gravel	
					content. (SM W/Debris)*	
2	2'6"	4'0"			Medium brown fine sand with brick,	7-7-10
					gravel and cinder content.(SM W/Debris)*	
3	5'0"	6'6"			Medium black fine sand with brick,	8-20-10
				7'0"	gravel & cinder content. (SM W/Debris)*	
4	7'6"	9'0"	7'0"		Very loose black fine sand with high	1-1-1
					cinder. (SM W/Debris)*	
5	10'0"	11'6"			Very loose black fine sand with high	1-2-2
				12'0"	cinder. (SM W/Debris)*	
6	12'6"	14'0"	12'0"		Loose black fine sand with high gravel,	2-3-4
				14'6"	brick and cinder. (SM W/Debris)*	
7	15'0"	16'6"	14'6"		Medium black organic clay with brick,	4-4-5
					gravel, cinder & creosote wood content.	
				17'0"	(CL W/Debris)*	
8	17'6"	19'0"	17'0"		Very soft gray organic clay with slight	1-1-1
					shell and sand content. (OL)*	
9	20'0"	21'6"			Very soft gray organic clay with slight	1-1-1
					shell & sand content. (OL)*	
10	25'0"	26'6"			Very soft gray organic clay with slight	1/18"
					sand & shell content. (OL)*	
11	30'0"	31'6"			Very soft gray organic clay with slight	1/18"
					sand & shell content. (OL)*	
12	35'0"	36'6"			Very soft gray organic clay with slight	1/18"
				39'0"	sand content. (OL)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

continued

Remarks: *VISUAL UNIFIED SOIL CLASSIFICATION
**LOCALLY CALLED MARL.

OFFSET 20' WEST BECAUSE OF LARGE CONCRETE SLAB IN AREA. TRIED 3 TIMES IN AREA. USED HOLLOW STEM FLIGHT AUGER TO 15' DEPTH AS CASING.

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, SC

Boring No. B-1 (Cont.) S. C. I. Project No. 8937 Date 3-10-89

Ground Surface Elev. Assumed 0'0" Datum _____ Gr. Water Elev. 2'1"
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
13	40'0"	41'6"	39'0"	44'0"	Very loose gray fine sand. (SM)*	1-1-3
14	45'0"	46'6"	44'0"		Very soft gray organic clay with slight	1-1-1
					sand & shell content. (OL)*	
15	50'0"	51'6"			Very soft gray organic clay with slight	1-1-2
				54'0"	sand & shell content. (OL)*	
16	55'0"	56'6"	54'0"		Medium gray inorganic clay with slight	2-2-3
				59'0"	sand & shell content. (CL)*	
17	60'0"	61'6"	59'0"		Stiff gray inorganic clay with slight	3-4-5
					sand content. (CL)*	
18	65'0"	66'6"			Stiff gray inorganic clay with very	3-5-5
					slight sand content. (CL)*	
19	70'0"	71'6"			Stiff gray inorganic clay with slight	4-7-7
					sand content. (CL)*	
20	75'0"	76'6"			Stiff gray inorganic clay with slight	5-7-8
				79'0"	sand content. (CL)*	
21	80'0"	81'6"	79'0'		Very stiff brownish green calcareous	6-8-10
					clay with slight sand content. **(MH)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: _____

SOIL CONSULTANTS, INC.

TLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: Fort Sumter Tour Facility, Cooper River, Charleston, SC

Boring No. B-2 S. C. I. Project No. 8937 Date 3-2-89

Ground Surface Elev. Assumed 0'0" Datum Gr. Water Elev. 3'2"
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE To	STRATUM Elev. - Feet & Inches From	STRATUM To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	0'0"	1'6"	0'0"		Loose brown fine sand with root content.	2-2-3
				1'0"	(SM W/Root)*	
2	2'6"	4'0"	1'0"		Loose brown fine to coarse sand with	2-3-6
				4'6"	slight shell content. (SM-SP)*	
3	5'0"	6'6"	4'6"		Loose gray fine to coarse sand with	3-4-3
					creosote wood, gravel & cinder content.	
				7'0"	(SM-SP W/Debris)*	
4	7'6"	9'0"	7'0"		Very soft gray organic clay with high	1/18"
					gravel & slight sand content.	
				10'0"	(OL W/Debris)*	
5	10'0"	11'6"	10'0"		Very soft gray inorganic clay with very	1/18"
					slight sand content. (OL)*	
6	12'6"	14'0"			Very soft gray organic clay with very	2/18"
					slight sand content. (OL)*	
7	15'0"	16'6"			Very soft gray organic clay with very	1-1-1
					slight sand content. (OL)*	
8	17'6"	19'0"			Very soft gray organic clay with very	1/18"
					slight sand content. (OL)*	
9	20'0"	21'6"			Very soft gray organic clay with very	1/18"
					slight sand content. (OL)*	
10	25'0"	26'6"			Very soft gray organic clay with very	1/18"
					slight sand content. (OL)*	
11	30'0"	31'6"			Very soft gray organic clay with very	1/18"
					slight sand content. (OL)*	
12	35'0"	36'6"			Very soft gray organic clay with very	1-1-1
				39'6"	slight sand content. (OL)*	

Te[illegible] and Sampling in accordance with ASTM D. 1586-67 (1974)

continued

R[illegible]ks: *VISUAL UNIFIED SOIL CLASSIFICATION
**LOCALLY CALLED MARL
SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED VARYING ROOT CONTENT TO A DEPTH OF APPROXIMATELY 8"
USED HOLLOW STEM FLIGHT AUGER TO 12'6" DEPTH AS CASING

SOIL CONSULTANTS, INC.

TLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, SC

Boring No. B-2 (Cont.) S. C. I. Project No. 8937 Date 3-2-89

Ground Surface Elev. Assumed 0'0" Datum Gr. Water Elev. 3'2" (Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
13	40'0"	41'6"	39'6"	44'6"	Very loose gray fine sand. (SM)*	1-1-2
14	45'0"	46'6"	44'6"		Very soft gray inorganic clay with	1-1-1
				50'6"	slight shell & sand content. (CL)*	
15	50'0"	51'6"	50'6"		Soft gray inorganic clay with slight	1-1-2
				54'0"	sand & shell content. (CL)*	
16	55'0"	56'6"	54'0"		Medium gray inorganic clay with slight	2-2-3
				59'6"	shell & sand content. (CL)*	
17	60'0"	61'6"	59'6"		Stiff inorganic clay with slight shell	3-4-6
					& sand content. (CL)*	
[illegible]	65'0"	66'6"			Stiff gray inorganic clay with very	3-4-5
					slight sand content. (CL)*	
19	70'0"	71'6"			Stiff gray inorganic clay with very	4-7-8
					slight sand content. (CL)*	
20	75'0"	76'6"			Stiff gray inorganic clay with slight	5-5-7
				79'6"	sand content. (CL)*	
21	80'0"	81'6"	79'6"		Very stiff borwnish green calcareous	10-12-15
					clay with slight sand content.**(MH)*	
22	85'0"	86'6"			Very stiff brownish green calcareous	6-10-12
					clay with slight sand content.**(MH)*	
23	90'0"	91'6"			Very stiff brownish green calcareous	4-8-11
					clay w/slight sand content.**(MH)*	
24	95'0"	96'6"			Very stiff brownish green calcareous	6-11-11
					clay w/slight sand content.**(MH)*	
25	100'0"	101'6"			Very stiff brownish green calcareous	8-11-12
					clay w/slight sand content.**(MH)*	

Tes[illegible] and Sampling in accordance with ASTM D. 1586-67 (1974)

continued

R[illegible]ks: *VISUAL UNIFIED SOIL CLASSIFICATION

SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED VARYING ROOT CONTENT TO A DEPTH OF APPROXIMATELY 8".

**LOCALLY CALLED MARL.

SOIL CONSULTANTS, INC.

TLE BEACH, S.C CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, SC

Boring No. B-2 (Cont.) S. C. I. Project No. 8937 Date 3-2-89

Ground Surface Elev. Assumed 0'0" Datum Gr. Water Elev. 3'2"
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
26	105'0"	106'6"			Very stiff brownish green calcareous	9-9-12
					clay w/slight sand content.**(MH)*	
27	110'0"	111'6"			Very stiff brownish green calcareous	8-10-12
					clay w/slight sand content.**(MH)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks:

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, SC

Boring No. B-3 S. C. I. Project No. 8937 Date 3-7-89

Ground Surface Elev. Assumed 0'0" Datum _____ Gr. Water Elev. 3'5"
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	0'0"	1'6"	0'0"		Medium brown fine sand with slight	6-7-8
				2'0"	brick, gravel & root content.	
					(SM W/Root & Debris)*	
2	2'6"	4'0"	2'0"		Loose gray fine sand with slight wood	1-2-3
					& high inorganic clay content. (SC)*	
3	5'0"	6'6"			Loose gray fine sand with wood, gravel	2-4-4
					& high inorganic clay content.	
					(SC W/Debris)*	
4	7'6"	9'0"			Loose gray fine sand with slight wood,	4-3-3
				9'6"	gravel & high inorganic clay content.	
					(SC W/Debris)*	
5	10'0"	10'4"	9'6"	12'0"	Creosote Wood	50/4"
6	12'6"	14'0"	12'0"		Soft gray organic clay with creosote	1-1-2
				14'6"	wood content. (OL W/Wood)*	
7	15'0"	16'6"	14'6"		Very soft gray organic clay with	1-1-1
					creosote wood content. (OL W/Wood)*	
8	17'6"	19'0"			Very soft gray organic clay with	1-1-1
					creosote wood content. (OL W/Wood)*	
9	20'0"	21'6"			Very soft gray organic clay with	1/18"
					creosote wood content. (OL W/Wood)*	
10	25'0"	26'6"			Very soft gray organic clay with	1/18"
				28'6"	creosote wood content. (OL W/Wood)*	
11	30'0"	31'6"	28'6"		Very soft gray organic clay with slight	1/18"
					sand content. (OL)*	
12	35'0"	36'6"			Very soft gray organic clay with slight	1/18"
				39'6"	sand content. (OL)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

continued

Remarks: *VISUAL UNIFIED SOIL CLASSIFICATION

SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED VARYING ROOT CONTENT TO A DEPTH OF APPROXIMATELY 4".

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, SC

Boring No. B-3 (Cont.) S. C. I. Project No. 8937 Date 3-7-89

Ground Surface Elev. Assumed 0'0" Datum _____ Gr. Water Elev. 3'5"
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
13	40'0"	41'6"	39'6"		Medium gray fine sand with slight shell	4-6-8
					content. (SM)*	
14	45'0"	46'6"			Medium gray fine sand. (SM)*	4-5-6
15	50'0"	51'6"	49'6"		Very soft gray inorganic clay with	1-1-1
					slight sand & shell content. (CL)*	
16	55'0"	56'6"			Very soft gray inorganic clay with	1-1-1
					slight sand & shell content. (CL)*	
17	60'0"	61'6"			Very soft gray inorganic clay with	1-1-1
				64'6"	slight sand & shell content. (CL)*	
18	65'0"	66'6"	64'6"		Stiff gray inorganic clay with very	3-4-6
					slight sand content. (CL)*	
19	70'0"	71'6"			Stiff gray inorganic clay with very	4-4-5
					slight sand content. (CL)*	
20	75'0"	76'6"			Stiff gray inorganic clay with very	3-4-5
				79'6"	slight sand content. (CL)*	
21	80'0"	81'6"	79'6"		Very stiff brownish green calcareous	6-8-9
					clay with slight sand content. **(MH)*	
22	85'0"	86'6"			Very stiff brownish green calcareous	5-10-10
					clay with slight sand content. **(MH)*	
23	90'0"	91'6"			Very stiff brownish green calcareous	4-8-11
					clay with slight sand content. **(MH)*	
24	95'0"	96'6"			Very stiff brownish green calcareous	5-7-12
					clay with slight sand content. **(MH)*	
25	100'0"	101'6"			Very stiff brownish green calcareous	6-8-13
					clay with slight sand content. **(MH)*	
					continued	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: *VISUAL UNIFIED SOIL CLASSIFICATION
**LOCALLY CALLED MARL..

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, SC

Boring No. B-3 (Cont.) S. C. I. Project No. 8937 Date 3-7-89

Ground Surface Elev. Assumed 0'0" Datum Gr. Water Elev. 3'5"
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
26	105'0"	106'6"			Very stiff brownish green calcareous	4-8-12
					clay with slight sand content. **(MH)*	
27	110'0"	111'6"			Very stiff brownish green calcareous	5-10-11
					clay with slight sand content. **(MH)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: *VISUAL UNIFIED SOIL CLASSIFICATION
**LOCALLY CALLED MARL.

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, sC

Boring No. B-4 S. C. I. Project No. 8937 Date 3-4-89

Ground Surface Elev. Assumed 0'0" Datum _____ Gr. Water Elev. 2'9"
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	0'0"	1'6"	0'0"		Medium dark brown fine sand with brick	2-5-6
				2'0"	and root content. (SM W/Root & Debris)8	
2	2'6"	4'0"	2'0"		Loose gray fine sand with slight shell	3-3-4
					content. (SM)*	
3	5'0"	6'6"			Loose gray fine sand with slight shell	2-3-5
					content. (SM)*	
4	7'6"	9'0"			Loose gray fine sand. (SM)*	3-3-3
5	10'0"	11'6"			Loose gray fine sand. (SM)*	2-3-4
6	12'6"	14'0"			Loose gray fine sand with slight shell	2-2-2
					content. (SM)*	
7	15'0"	16'6"			Loose gray fine sand with slight shell	1-2-3
				17'0"	content. (SM)*	
8	17'6"	19'0"	17'0"		Very soft gray organic clay with slight	1/18"
					shell content. (OL)*	
9	20'0"	21'6"			Very soft gray organic clay with slight	1/18"
					shell content. (OL)*	
10	25'0"	26'6"			Very soft gray organic clay with slight	1/18
					shell content. (OL)*	
11	30'0"	31'6"			Very soft gray organic clay with slight	1/18"
					sand content. (OL)*	
12	35'0"	36'6"			Very soft gray organic clay with slight	1/18"
				39'0"	sand content. (OL)*	
13	40'0"	41'6"	39'0"		Medium gray fine sand with slight shell	4-4-7
					shell content. (SM)*	
14	45'0"	46'6"			Medium gray fine sand with slight shell	5-7-7
					content. (SM)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

continued

Remarks: *VISUAL UNIFIED SOIL CLASSIFICATION
**LOCALLY CALLED MARL
SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED VARYING ROOT CONTENT TO A DEPTH OF APPROXIMATELY 6".
USED HOLLOW STEM FLIGHT AUGER TO 12'6" DEPTH.

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, SC

Boring No. B-4 (Cont.) S. C. I. Project No. 8937 Date 3-4-89

Ground Surface Elev. Assumed 0'0" Datum _____ Gr. Water Elev. 2'9"
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
15	50'0"	51'6"			Medium gray fine sand with slight shell	1-2-2
				54'0"	and high inorganic clay content.(SC)*	
16	55'0"	56'6"	54'0"		Stiff gray inorganic clay with very	3-4-5
					slight sand content. (CL)*	
17	60'0"	61'6"			Stiff gray inorganic clay with slight	4-5-6
					sand content. (CL)*	
18	65'0"	66'6"			Stiff gray inorganic clay with slight	3-5-5
					sand content. (CL)*	
19	70'0"	71'6"			Stiff gray inorganic clay with slight	5-5-7
					sand content. (CL)*	
20	75'0"	76'6"			Stiff gray inorganic clay with slight	4-5-7
				79'0"	sand content. (CL)*	
21	80'0"	81'6"	79'0"		Very stiff brownish green calcareous	10-13-15
					clay with slight sand content.**(MH)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks:

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, SC

Boring No. B-5 S. C. I. Project No. 8937 Date 3-6-89

Ground Surface Elev. Assumed 0'0" Datum Gr. Water Elev. 3'2"
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	0'0"	1'6"	0'0"		Medium brown fine sand with creosote	3-5-6
				2'0"	wood & root content. (SM W/Root & Wood)*	
2	2'6"	4'0"	2'0"		Loose gray fine sand with creosote	2-3-3
					wood content. (SM W/Wood)*	
3	5'0"	6'6"			Loose gray fine sand with creosote	2-3-5
				7'0"	wood content. (SM W/Wood)*	
4	7'6"	9'0"	7'0"		Medium gray fine sand. (SM)*	2-5-6
5	10'0"	11'6"		12'0"	Medium gray fine sand. (SM)*	3-5-4
6	12'6"	14'0"	12'0"		Loose gray fine sand. (SM)*	2-2-3
7	15'0"	16'6"		17'0"	Loose gray fine sand. (SM)*	2-3-5
8	17'6"	19'0"	17'0"	19'6"	Medium gray fine sand. (SM)*	5-5-7
9	20'0"	21'6"	19'6"		Medium gray organic clay with slight	3-3-2
					creosote wood content. (OL W/Wood)*	
10	25'0"	26'6"	24'0"		Very soft inorganic clay with slight	1-2-2
				29'0"	sand content. (OL)*	
11	30'0"	31'6"	29'0"		Loose gray fine sand with slight shell	1-2-3
				34'6"	content. (SM)*	
12	35'0"	36'6"	34'0"		Medium gray fine sand. (SM)*	8-7-10
13	40'0"	41'6"			Medium gray fine sand with slight	4-6-6
				44'0"	shell content. (SM)*	
14	45'0"	46'6"	44'0"		Loose gray fine sand with slight in-	3-4-6
				49'0"	organic clay & shell content. (SM)*	
15	50'0"	51'6"	49'0"		Medium gray inorganic clay with slight	2-3-5
				54'0"	sand & shell content. (CL)*	
16	55'0"	56'6"	54'0"		Stiff gray inorganic clay with slight	3-4-5
					sand & shell content. (CL)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

continued

Remarks: *VISUAL UNIFIED SOIL CLASSIFICATION
**LOCALLY CALLED MARL.
USED HOLLOW STEM FLIGHT AUGER TO 5'0" DEPTH AS CASING.

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, SC

Boring No. B-5 (Cont.) S. C. I. Project No. 8937 Date 3-6-89

Ground Surface Elev. Assumed 0'0" Datum _____ Gr. Water Elev. 3'2"
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
17	60'0"	61'6"			Stiff gray inorganic clay with slight	4-3-7
					sand & shell content. (CL)*	
18	65'0"	66'6"			Stiff gray inorganic clay with slight	4-5-5
					sand content. (CL)*	
19	70'0"	71'6"			Stiff gray inorganic clay with slight	3-4-7
					sand content. (CL)*	
20	75'0"	76'6"			Stiff gray inorganic clay with slight	4-4-5
				79'0"	sand content. (CL)*	
21	80'0"	81'6"	79'0"		Very stiff brownish green calcareous	7-10-15
					clay with slight sand content. **(MH)*	
22	85'0"	86'6"			Very stiff brownish green calcareous	10-10-13
					clay with slight sand content. **(MH)*	
23	90'0"	91'6"			Very stiff brownish green calcareous	13-15-15
					clay with slight sand content. **(MH)*	
24	95'0"	96'6"			Very stiff brownish green calcareous	7-10-10
					clay with slight sand content. **(MH)*	
25	100'0"	101'6"			Very stiff brownish green calcareous	7-10-9
					clay with slight sand content. **(MH)*	
26	105'0"	106'6"			Very stiff brownish green calcareous	8-8-12
					clay with slight sand content. **(MH)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: *VISUAL UNIFIED SOIL CLASSIFICATION

**LOCALLY CALLED MARL.

USED HOLLOW STEM FLIGHT AUGER TO 5'0" DEPTH AS CASING.

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. | CHARLESTON, S.C. | SAVANNAH, GA

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, S.C.

Boring No. P-1 S. C. I. Project No. 8937 Date 4/7/89

Ground Surface Elev. Assumed 0'0" Datum Gr. Water Elev. (Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE To	STRATUM Elev. - Feet & Inches From	STRATUM To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	0'0"	1'6"	0'0"		Very loose light brown fine sand with	1-2-2
				2'0"	cinder content. (SM w/debris)*	
2	2'6"	4'0"	2'0"	4'6"	Loose tan fine sand with oil odor. (SM)*	3-6-4
3	5'0"	6'6"	4'6"		Medium gray organic clay with high	2-4-4
				7'0"	sand, cinder content & oil odor.	
					(OL w/debris)*	
4	7'6"	9'0"	7'0"		Soft gray organic clay with slight	1-1-2
					shell, slight sand & oil odor. (OL)*	
5	10'0"	11'6"			Soft gray organic clay with slight	1-3-1
					shell, slight sand & oil odor. (OL)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: *Visual Unified Soil Classification

SOIL CONSULTANTS, INC.

MYRTLE BEACH S.C | CHARLESTON, S.C. | SAVANNAH, GA.

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, S.C.

Boring No. P-2 S. C. I. Project No. 8937 Date 4/7/89

Ground Surface Elev. Assumed 0'0" Datum Gr. Water Elev.
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	0'0"	1'6"	0'0"		Medium tan fine sand with creosote	3-4-7
					wood content. (SM w/debris)*	
2	2'6"	4'0"			Medium tan fine sand with cinder	9-9-8
				4'6"	content. (SM w/debris)*	
3	5'0"	6'6"	4'6"		Soft green organic clay with cinder	1-2-2
				7'0"	& high sand content. (OL w/debris)*	
4	7'6"	9'0"	7'0"		Very soft gray organic clay with	1/18"
					slight sand content & oil odor. (OL)*	
5	10'0"	11'6"			Very soft gray organic clay with	1-1-1
					slight sand, wood & oil odor.	
					(OL w/debris)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: *Visual Unified Soil Classification

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, S.C.

Boring No. P-3 S. C. I. Project No. 8937 Date 4/7/89

Ground Surface Elev. Assumed 0'0" Datum _____ Gr. Water Elev. _____
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	0'0"	1'6"	0'0"	2'0"	Loose tan fine sand. (SM)*	3-3-7
2	2'6"	4'0"	2'0"	4'6"	Medium gray fine sand with oil odor.	4-9-8
					(SM)*	
3	5'0"	6'6"	4'6"		Loose light green fine sand with oil	4-4-6
				7'0"	odor. (SM)*	
4	7'6"	9'0"	7'0"		Very soft gray organic clay with wood,	1/18"
					high sand content & oil odor.	
					(OL w/debris)*	
5	10'0"	11'6"			Very soft gray organic clay with	2/18"
					slight sand content & oil odor. (OL)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: *Visual Unified Soil Classification

SOIL CONSULTANTS, INC.

MYRTLE BEACH S.C. CHARLESTON, S.C. SAVANNAH GA

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, S.C.

Boring No. P-4 S. C. I. Project No. 8937 Date 4/5/89

Ground Surface Elev. Assumed 0'0" Datum Gr. Water Elev.
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	To	STRATUM Elev. - Feet & Inches From	To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	0'0"	1'6"	0'0"		Medium light brown fine sand with	2-7-9
				2'0"	slight cinder content & oil odor.	
					(SM w/debris)*	
2	2'6"	4'0"	2'0"		Medium light greenish tan fine sand	6-6-9
				4'6"	with slight clay content. (SM)*	
3	5'0"	6'6"	4'6"		Very loose green fine sand with high	1-1-1
				7'0"	clay content. (SC)*	
4	7'6"	9'0"	7'0"		Very soft gray organic clay with high	1/18"
					sand content & oil odor. (OL)*	
5	10'0"	11'6"			Very soft gray organic clay with	1/18"
					slight sand content & oil odor. (OL)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

*Visual Unified Soil Classification

Remarks:

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C | CHARLESTON, S.C. | SAVANNAH, GA

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, S.C.

Boring No. P-5 S. C. I. Project No. 8937 Date 4/5/89

Ground Surface Elev. Assumed 0'0" Datum Gr. Water Elev. (Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	0'0"	1'6"	0'0"		Medium tan fine sand. (SM)*	2-4-7
2	2'6"	4'0"			Medium greenish tan fine sand with	5-5-7
				4'6"	oil odor. (SM)*	
3	5'0"	6'6"	4'6"		Very soft gray organic clay with medium	1-1-1
					sand, decaying marsh grass root content	
					& oil odor. (OL w/debris)*	
4	7'6"	9'0"			Very soft gray organic clay with medium	1/18"
					sand content & oil odor. (OL)*	
5	10'0"	11'6"			Very soft gray organic clay with medium	1/18"
					sand content & oil odor. (OL)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: *Visual Unified Soil Classification

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C | CHARLESTON, S.C. | SAVANNAH, GA

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, S.C.

Boring No. P-6 S. C. I. Project No. 8937 Date 4/5/89

Ground Surface Elev. Assumed 0'0" Datum _____ Gr. Water Elev. _____
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	0'0"	1'6"	0'0"		Very loose tan fine sand with medium	2-1-1
				2'0"	clay & creosote wood content.	
					(SM w/debris)*	
2	2'6"	4'0"	2'0"		Loose tan fine sand with slight clay	3-3-3
					& creosote wood content. (SM w/debris)*	
3	5'0"	6'6"			Loose gray medium to coarse sand with	1-2-3
					slight clay, creosote wood & oil	
					odor. (SM w/debris)*	
4	7'6"	9'0"			Loose gray medium to coarse sand with	3-4-4
					slight clay, creosote wood content &	
				9'6"	oil odor. (SM w/debris)*	
5	10'0"	11'6"	9'6"		Very soft gray organic clay with slight	1/18"
					sand content & oil odor. (OL)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: *Visual Unified Soil Classification

SOIL CONSULTANTS, INC.

MYRTLE BEACH S.C — CHARLESTON, S.C. — SAVANNAH, GA

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, S.C.

Boring No. P-7 S. C. I. Project No. 8937 Date 4/7/89

Ground Surface Elev. Assumed 0'0" Datum _____ Gr. Water Elev. _____
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	0'0"	1'6"	0'0"	2'0"	Medium brown fine sand. (SM)*	2-3-9
2	2'6"	4'0"	2'0"		Loose gray fine sand with slight brick,	6-4-2
					creosote wood content & oil odor.	
					(SM w/debris)*	
3	5'0"	6'6"			Loose brown fine sand with high brick,	4-4-4
				7'0"	slight creosote wood content & oil	
					odor. (SM w/debris)*	
4	7'6"	9'0"	7'0"		Medium gray organic clay with slight	3-4-3
					sand, medium creosote wood content &	
				9'6"	oil odor. (OL w/debris)*	
5	10'0"	11'6"	9'6"		Very soft gray organic clay with slight	1/18"
					sand content & oil odor. (OL w/debris)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: *Visual Unified Soil Classification

SOIL CONSULTANTS, INC.

MYRTLE BEACH S C — CHARLESTON, S.C. — SAVANNAH, GA

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, S.C.

Boring No. P-8 S. C. I. Project No. 8937 Date 4/7/89

Ground Surface Elev. Assumed 0'0" Datum _____ Gr. Water Elev. _____
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	0'0"	1'6"	0'0"		Medium light brown fine sand with	1-4-9
				2'0"	slight brick content. (SM w/debris)*	
2	2'6"	4'0"	2'0"		Loose gray fine sand with high brick	1-2-4
				4'6"	content. (SM w/debris)*	
3	5'0"	6'6"	4'6"		Very loose fine gray & tan sand with	1-2-1
				7'0"	high brick content. (SM w/debris)*	
4	7'6"	9'0"	7'0"		Medium gray organic clay with slight	6-4-2
				9'6"	sand, high shell & brick content.	
					(OL w/debris)*	
5	10'0"	11'6"	9'6"		Soft gray organic clay with slight	1-2-2
					sand content. (OL)*	

Test... and Sampling in accordance with ASTM D. 1586-67 (1974)

*Visual Unified Soil Classification

Remarks: _____

SOIL CONSULTANTS, INC.

MYRTLE BEACH S.C. — CHARLESTON, S.C. — SAVANNAH, GA

LOG of BORING

Project: Fort Sumter Tour Boat Facility, Cooper River, Charleston, S.C.

Boring No. P-9 S. C. I. Project No. 8937 Date 4/7/89

Ground Surface Elev. Assumed 0'0" Datum Gr. Water Elev. (Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	0'0"	1'6"	0'0"		Loose tan fine sand. (SM)*	1-2-3
2	2'6"	4'0"			Loose brown fine sand with shell	1-3-4
				4'6"	content. (SM)*	
3	5'0"	6'6"	4'6"		Very loose brown fine sand with shell,	1-1-1
				7'0"	cinder & brick content. (SM w/debris)*	
4	7'6"	9'0"	7'0"		Medium tan fine sand with cinder,	5-3-8
				9'6"	brick & high saw-dust content.	
					(SM w/debris)*	
5	10'0"	11'6"	9'6"		Loose tan fine sand with high brick	2-2-2
					& saw-dust content. (SM w/debris)*	

Te[illegible]nd Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: *Visual Unified Soil Classification

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SOUTH CAROLINA

Boring No. 1 S. C. I. Project No. 90108 Date 4/24 & 25/90

Ground Surface Elev. 5.5 *** Datum M.S.L. Gr. Water Elev. 1.25
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	5.5	4.0	5.5		MEDIUM DARK BROWN FINE SAND WITH ROOT	2-9-12
				4.0	CONTENT. (SM W/ROOTS)*	
2	3.0	1.5	4.0	1.0	LOOSE TAN FINE SAND WITH OIL ODOR.(SM)*	2-3-5
3	0.5	-1.0	1.0		VERY LOOSE TAN FINE SAND WITH OIL	2/18"
					ODOR. (SM)*	
4	-2.0	-3.5			VERY LOOSE TAN FINE SAND WITH OIL	1-2-1
					ODOR. (SM)*	
5	-4.5	-6.0			VERY LOOSE TAN FINE SAND WITH OIL	1-1-1
				-6.5	ODOR. (SM)*	
6	-7.0	-8.5	-6.5	-9.0	VERY LOOSE GRAY FINE SAND. (SM)*	1-2-2
7	-9.5	-11.0	-9.0	-11.5	MEDIUM TAN FINE SAND. (SM)*	2-4-7
8	-12.0	-13.5	-11.5		LOOSE TAN FINE SAND. (SM)*	2-3-4
9	-14.5	-16.0		-19.0	LOOSE TAN AND GRAY FINE SAND. (SM)*	2-3-3
10	-19.5	-21.0	-19.0	→	VERY SOFT GRAY ORGANIC CLAY WITH	2/18"
				-24.0	SLIGHT SHELL AND SAND CONTENT. (OL)*	
11	-24.5	-26.0	-24.0		MEDIUM GRAY FINE SAND. (SM)*	5-4-7
12	-29.5	-31.0		-34.0	MEDIUM GRAY FINE SAND. (SM)*	4-8-9
13	-34.5	-36.0	-34.0	-39.0	LOOSE GRAY FINE SAND. (SM)*	3-3-6
14	-39.5	-41.0	-39.0	-44.0	VERY LOOSE GRAY FINE SAND. (SM)*	1-2-1
15	-44.5	-46.0	-44.0		LOOSE GRAY FINE SAND WITH SLIGHT	1-2-4
				-49.0	INORGANIC CLAY AND SHELL CONTENT. (SM)*	
16	-49.5	-51.0	-49.0		VERY LOOSE GRAY FINE SAND WITH HIGH	2-1-2
				-54.0	SHELL CONTENT. (SM W/SHELL)*	
17	-54.5	-56.0	-54.0		LOOSE GRAY FINE SAND WITH HIGH	1-2-3
				-59.0	INORGANIC CLAY CONTENT. (SC)*	
					CONTINUED	

ating and Sampling in accordance with ASTM D. 1586-67 (1974)

emarks: *VISUAL UNIFIED SOIL CLASSIFICATION

**LOCALLY CALLED MARL

SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED VARYING ROOT CONTENT TO A DEPTH OF APPROXIMATELY 9".

***GROUND SURFACE ELEVATION ESTIMATED FROM DAVIS AND FLOYD, INC. DRAWING ENTITLED TOPOGRAPHIC SURVEY FOR AQUARIUM SITE, DATED FEBRAURY 13, 1990.

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SOUTH CAROLINA

Boring No. 1 (CONT) S. C. I. Project No. 90108 Date 4/24 & 25/90

Ground Surface Elev. 5.5 Datum M.S.L. Gr. Water Elev. 1.25
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
18	-59.5	-61.0	-59.0		STIFF GRAY INORGANIC CLAY WITH SLIGHT	4-7-7
					SAND CONTENT. (CH)*	
19	-64.5	-66.0			STIFF GRAY INORGANIC CLAY WITH SLIGHT	5-6-9
					SAND CONTENT. (CH)*	
20	-69.5	-71.0			STIFF GRAY INORGANIC CLAY WITH SLIGHT	4-4-8
				-72.5	SHELL AND SAND CONTENT. (CH)*	
21	-74.5	-76.0	-72.5		STIFF BROWNISH GREEN CALCAREOUS CLAY	5-7-8
				-79.0	WITH SLIGHT SAND CONTENT.** (MH)*	
22	-79.5	-81.0	-79.0		VERY STIFF BROWNISH GREEN CALCAREOUS	3-11-13
					WITH SLIGHT SAND CONTENT.** (MH)*	
23	-84.5	-86.0			VERY STIFF BROWNISH GREEN CALCAREOUS	5-12-14
				-89.0	CLAY WITH SLIGHT SAND CONTENT.** (MH)*	
24	-89.5	-91.0	-89.0		STIFF BROWNISH GREEN CLACAREOUS CLAY	4-6-7
					WITH SLIGHT SAND CONTENT.** (MH)*	
25	-94.5	-96.0			STIFF BROWNISH GREEN CALCAREOUS CLAY	4-5-8
					WITH SLIGHT SAND CONTENT.** (MH)*	
26	-99.5	-101.0			STIFF BROWNISH GREEN CALCAREOUS CLAY	4-5-10
					WITH SLIGHT SAND CONTENT.** (MH)*	
27	-104.5	-106.0			STIFF BROWNISH GREEN CALCAREOUS CLAY	3-6-6
					WITH SLIGHT SAND CONTENT.** (MH)*	
28	-109.5	-111.0			STIFF BROWNISH GREEN CALCAREOUS CLAY	4-4-7
				-114.0	WITH SLIGHT SAND CONTENT.** (MH)*	
29	-114.5	-116.0	-114.0		VERY STIFF BROWNISH GREEN CALCAREOUS	4-5-11
					CLAY WITH SLIGHT SAND CONTENT.** (MH)*	

ting and Sampling in accordance with ASTM D. 1586-67 (1974)

emarks:

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SC

Boring No. 2 S. C. I. Project No. 90108 Date 5-8-90

Ground Surface Elev. 2.0 *** Datum M.S.L. Gr. Water Elev. TIDAL
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
			2.0	-3.0	STONE, METAL, WOOD, GLASS, GRAVEL, ETC.	
					(DEBRIS)	
1	-3.0	-4.5	-3.0		VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT BRICK FRAGMENT, GRAVEL, GLASS,	
					AND WOOD CONTENT. (OL W/DEBRIS)*	
2	-8.0	-9.5			VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT BRICK FRAGMENT, GRAVEL AND	
					WOOD CONTENT. (OL W/DEBRIS)*	
3	-13.0	-14.5			VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT BRICK FRAGMENT AND GRAVEL	
					CONTENT. (OL W/DEBRIS)*	
4	-18.0	-19.5			VERY SOFT GRAY ORGANIC CLAY WITH BRICK	1/18"
				-21.5	FRAGMENT, SAND AND WOOD CONTENT.	
					(OL W/DEBRIS)*	
5	-23.0	-24.5	-21.5		VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT SAND AND OIL ODOR. (OL)*	
6	-28.0	-29.5			VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
				-31.0	SLIGHT SAND AND OIL ODOR. (OL)*	
7	-33.0	-34.5	-31.0		VERY SOFT GRAY ORGANIC CLAY WITH	2/18"
					HIGH SAND AND SLIGHT SHELL CONTENT.	
					(OL)*	
8	-38.0	-39.5			VERY SOFT GRAY ORGANIC CLAY WITH	2/18"
				-42.5	HIGH SAND AND SLIGHT SHELL CONTENT. (OL)*	
9	-43.0	-44.5	-42.5		SOFT GRAY ORGANIC CLAY WITH SLIGHT	2-1-2
				-47.5	SHELL CONTENT. (OL)*	
					CONTINUED	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: *VISUAL UNIFIED SOIL CLASSIFICATION

**LOCALLY CALLED MARL

*** GROUND SURFACE ELEVATION ESTIMATED FROM DAVIS AND FLOYD, INC. DRAWING ENTITLED TOPOGRAPHIC SURVEY FOR AQUARIUM SITE, DATED FEBRUARY 13, 1990

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SC

Boring No. 2 (CONT) S. C. I. Project No. 90108 Date 5-8-90

Ground Surface Elev. 2.0 Datum M.S.L. Gr. Water Elev. TIDAL
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
10	-48.0	-49.5	-47.5		MEDIUM GRAY FINE TO COARSE SAND WITH	1-3-10
					SLIGHT PHOSPHATIC NODULE CONTENT.	
					(SM-SP)*	
11	-53.0	-54.5			MEDIUM GRAY FINE TO COARSE SAND WITH	2-5-7
					SLIGHT PHOSPHATIC NODULES CONTENT.	
					(SM-SP)*	
12	-58.0	-59.5			MEDIUM GRAY FINE TO COARSE SAND WITH	4-4-8
				-67.5	SLIGHT PHOSPHATIC NODULE CONTENT.	
					(SM-SP)*	
13	-63.0	-64.5	-67.5		MEDIUM GRAY INORGANIC CLAY WITH SLIGHT	3-4-3
					SAND AND SLIGHT SHELL CONTENT. (CH)*	
14	-68.0	-69.5			MEDIUM GRAY INORGANIC CLAY WITH SLIGHT	2-3-5
				-72.5	SAND AND SLIGHT SHELL CONTENT. (CH)*	
15	-73.0	-74.5	-72.5		STIFF GRAY INROGANIC CLAY WITH SLIGHT	3-5-10
				-77.5	SAND AND SLIGHT SHELL CONTENT. (CH)*	
16	-78.0	-79.5	-77.5		VERY STIFF BROWNISH GREEN CALCAREOUS	3-7-9
					CLAY WITH SLIGHT SAND CONTENT.** (MH)*	

esting and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks:

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SC

Boring No. 3 S. C. I. Project No. 90108 Date 4-27 & 30-90 5-07-90

Ground Surface Elev. 4.0 *** Datum M.S.L. Gr. Water Elev. 2.17 (Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	4.0	2.5	4.0		MEDIUM TAN FINE SAND WITH HIGH BRICK	4-8-9
					FRAGMENT, SHELL, WOOD, METAL, GLASS	
					AND ROOT CONTENT. (SM W/DEBRIS)*	
2	1.5	0.0			MEDIUM DARK TAN FINE SAND WITH HIGH	5-7-10
					BRICK FRAGMENT, WOOD, METAL AND GLASS	
					CONTENT. (SM W/DEBRIS)*	
3	-1.0	-2.5			MEDIUM DARK TAN FINE SAND WITH HIGH	4-4-8
					BRICK FRAGMENT, WOOD, METAL, AND GLASS	
					CONTENT. (SM W/DEBRIS)*	
4	-3.5	-4.0			MEDIUM DARK TAN FINE SAND WITH HIGH	3-6-12
					BRICK FRAGMENT, WOOD, GRAVEL AND	
					METAL CONTENT. (SM W/DEBRIS)*	
5	-6.0	-7.5			MEDIUM DARK TAN FINE SAND WITH HIGH	8-11-15
					BRICK FRAGMENT, WOOD, GRAVEL AND	
				-8.0	METAL CONTENT. (SM W/DEBRIS)*	
6	-8.5	-10.0	-8.0		VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SAND AND OIL ODOR. (OL)*	
7	-11.0	-12.5			VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT SAND AND OIL ODOR. (OL)*	
8	-13.5	-15.0			VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
				-15.5	SLIGHT SAND AND OIL ODOR. (OL)*	
9	-16.0	-16.67	-15.5		VERY SOFT GRAY ORGANIC CLAY WITH	1/2" 54/2"
				-17.0	WOOD CONTENT. (OL W/WOOD)*	
10	-21.0	-22.5	-17.0		VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT SAND CONTENT. (OL)*	
					CONTINUED	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: *VISUAL UNIFIED SOIL CLASSIFICATION

**LOCALLY CALLED MARL

DRILL RIG MOVED 15 TIMES TO ADVANCE DRILL HOLE.

*** GROUND SURFACE ELEVATION ESTIMATED FROM DAVIS & FLOYD, INC. DRAWING ENTITLED TOPOGRAPHIC SURVEY FOR AQUARIUM SITE, DATED FEBRUARY 13, 1990.

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SC

Boring No. 3 (CONT) S. C. I. Project No. 90108 Date 4-27 & 30-90 5-07-90

Ground Surface Elev. 4.0 Datum M.S.L. Gr. Water Elev. 2.17
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
11	-26.0	-27.5			VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT SAND CONTENT. (OL)*	
12	-31.0	-32.5			VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT SAND CONTENT. (OL)*	
13	-36.0	-37.5			VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT SAND CONTENT. (OL)*	
14	-41.0	-42.5			VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
				-45.0	SLIGHT SAND CONTENT. (OL)*	
15	-46.0	-47.5	-45.0		MEDIUM GRAY INORGANIC CLAY WITH SLIGHT	2-2-3
					SAND CONTENT. (CH)*	
16	-51.0	-52.5			MEDIUM GRAY INORGANIC CLAY WITH MEDIUM	2-3-3
				-55.0	SAND CONTENT. (CH)*	
17	-56.0	-57.5	-55.0		LOOSE GRAY FINE SAND WITH MEDIUM	2-3-2
					INORGANIC CLAY CONTENT. (SC)*	
18	-61.0	-62.5			LOOSE GRAY FINE SAND WITH INORGANIC	3-3-3
				-65.0	CLAY CONTENT. (SC)*	
19	-66.0	-67.5	-65.0		VERY SOFT GRAY INORGANIC CLAY WITH	1-1-1
				-70.0	SLIGHT SAND CONTENT. (CH)*	
20	-71.0	-72.5	-70.0		SOFT GRAY INORGANIC CLAY WITH SLIGHT	1-1-2
				-75.0	SAND CONTENT. (CH)*	
21	-76.0	-77.5	-75.0		STIFF BROWNISH GREEN CALCAREOUS CLAY	5-8-8
					WITH SLIGHT SAND CONTENT.** (MH)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks:

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SOUTH CAROLINA

Boring No. 4 S. C. I. Project No. 90108 Date 4/24 & 25/90

Ground Surface Elev. 6.0 *** Datum M.S.L. Gr. Water Elev. 2.0
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
1	6.0	4.5	6.0		MEDIUM BROWN FINE SAND WITH SLIGHT	3-15-10
					BRICK, CONCRETE FRAGMENT AND ROOT	
				4.0	CONTENT. (SM W/ROOTS AND DEBRIS)*	
2	3.5	2.0	4.0		MEDIUM BROWN FINE TO COARSE SAND WITH	5-6-7
				1.5	OIL ODOR. (SM-SP)*	
3	1.0	-0.5	1.5		LOOSE GRAY FINE TO COARSE SAND WITH	3-4-4
				-1.0	OIL ODOR. (SM-SP)*	
4	-1.5	-3.0	-1.0		LOOSE GRAY FINE SAND WITH OIL ODOR.(SM)*	3-3-2
5	-4.0	-5.5			LOOSE GRAY FINE SAND WITH OIL ODOR.(SM)*	2-3-3
6	-6.5	-8.0		-8.5	LOOSE TAN FINE SAND. (SM)*	2-2-3
7	-9.0	-10.5	-8.5	→	VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1-1-1
					SAND AND OIL ODOR. (OL)*	
8	-11.5	-13.0			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1-1-1
				-13.5	SAND AND OIL ODOR. (OL)*	
9	-14.0	-15.5	-13.5		VERY STIFF GRAY INORGANIC CLAY WITH	8-10-16
					DECAYED WOOD AND SLIGHT SAND	
				-18.5	CONTENT. (CL)*	
10	-19.0	-20.5	-18.5		VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1-1-1
					SAND AND DECAYED WOOD CONTENT. (OL)*	
11	-24.0	-25.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1-1-1
					SAND AND DECAYED WOOD CONTENT. (OL)*	
12	-29.0	-30.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1/18"
					SAND CONTENT. (OL)	
13	-34.0	-35.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1/18"
					SAND CONTENT. (OL)*	
					CONTINUED	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: *VISUAL UNIFIED SOIL CLASSIFICATION

**LOCALLY CALLED MARL

SHOVEL SAMPLE TAKEN ADJACENT TO BORING INDICATED VARYING ROOT CONTENT TO A DEPTH OF APPROXIMATELY 6".

*** GROUND SURFACE ELEVATION ESTIMATED FROM DAVIS AND FLOYD, INC. DRAWING ENTITLED TOPOGRAPHIC SURVEY FOR AQUARIUM SITE, DATED FEBRUARY 13,1990.

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SOUTH CAROLINA

Boring No. 4 (CONT) S. C. I. Project No. 90108 Date 4/24 & 25/90

Ground Surface Elev. 6.0 Datum M.S.L. Gr. Water Elev. 2.0
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
14	-39.0	-40.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1-1-1
				-44.0	SAND CONTENT. (OL)*	
15	-44.0	-45.5	-44.0		MEDIUM GRAY INORGANIC CLAY WITH SLIGHT	1-2-3
					SAND AND SLIGHT SHELL CONTENT. (CL)*	
16	-49.0	-50.5			MEDIUM GRAY INORGANIC CLAY WITH SLIGHT	2-2-3
				-53.5	SAND AND SLIGHT SHELL CONTENT. (CL)*	
17	-54.0	-55.5	-53.5		STIFF GRAY INORGANIC CLAY WITH SLIGHT	4-5-7
				-58.5	SAND CONTENT. (CH)*	
18	-59.0	-60.5	-58.5		VERY STIFF GRAY INORGANIC CLAY WITH	6-8-9
				-63.5	SLIGHT SAND CONTENT. (CH)*	
19	-64.0	-65.5	-63.5		STIFF GRAY INORGANIC CLAY WITH SLIGHT	4-6-9
					SAND CONTENT. (CH)*	
20	-69.0	-70.5			STIFF GRAY INORGANIC CLAY WITH SLIGHT	5-8-7
				-72.0	SAND CONTENT. (CH)*	
21	-74.0	-75.5	-72.0		STIFF BROWNISH GREEN CLACAREOUS CLAY	5-8-6
					WITH SLIGHT SAND CONTENT.** (MH)*	

ting and Sampling in accordance with ASTM D. 1586-67 (1974)

:marks:

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SC

Boring No. 5 S. C. I. Project No. 90108 Date 5-3-90

Ground Surface Elev. -2.0 *** Datum M.S.L. Gr. Water Elev. TIDAL (Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
					TIME BORING STARTED 0900	
			-1.0	-2.0	WATER	
1	-2.0	-3.5	-2.0		VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1/18"
					SAND AND OIL ODOR. (OL)*	
2	-6.0	-7.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1/18"
					SAND AND OIL ODOR. (OL)*	
3	-11.0	-12.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1/18"
					SAND AND OIL ODOR. (OL)*	
4	-16.0	-17.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1/18"
					SAND AND OIL ODOR. (OL)*	
5	-21.0	-22.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	2/18"
				-25.0	SAND AND OIL ODOR. (OL)*	
6	-26.0	-27.5	-25.0		VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1-1-1
				-30.0	SAND, HIGH WOOD AND OIL ODOR. (OL)*	
7	-31.0	-32.5	-30.0		VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1-1-1
					SAND AND SHELL CONTENT. (OL)*	
8	-36.0	-37.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	2/18"
				-39.5	SAND AND SHELL CONTENT. (OL)*	
9	-41.0	-42.5	-39.5		SOFT GRAY INORGANIC CLAY WITH SLIGHT	2-2-2
				-45.0	SAND AND SHELL CONTENT. (CH)*	
10	-46.0	-47.5	-45.0		MEDIUM GRAY INORGANIC CLAY WITH SLIGHT	2-2-3
				-50.0	SAND AND SHELL CONTENT. (CH)*	
11	-51.0	-52.5	-50.0		STIFF GRAY INORGANIC CLAY WITH SLIGHT	2-3-6
					SAND AND SHELL CONTENT. (CH)*	
12	-56.0	-57.5			STIFF GRAY INORGANIC CLAY WITH SLIGHT	2-4-6
					SAND AND SHELL CONTENT. (CH)*	(CONTINUED)

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: *VISUAL UNIFIED SOIL CLASSIFICATION

**LOCALLY CALLED MARL

SURFACE DEBRIS WAS EVIDENT IN THE VICINITY OF THIS BORING LOCATION.

*** GROUND SURFACE ELEVATION ESTIMATED FROM DAVIS AND FLOYD, INC. DRAWING ENTITLED TOPOGRAPHIC SURVEY FOR AQUARIUM SITE, DATED FEBRUARY 13, 1990.

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SC

Boring No. 5 (CONT) S. C. I. Project No. 90108 Date 5-3-90

Ground Surface Elev. -2.0 Datum M.S.L. Gr. Water Elev. TIDAL
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
13	-61.0	-62.5			STIFF GRAY INORGANIC CLAY WITH SLIGHT	3-5-5
					SAND AND SHELL CONTENT. (CH)*	
14	-66.0	-67.5			STIFF GRAY INORGANIC CLAY WITH SLIGHT	3-4-5
					SAND AND SHELL CONTENT. (CH)*	
15	-71.0	-72.5			STIFF GRAY INORGANIC CLAY WITH SLIGHT	5-5-6
				-73.5	SAND AND SHELL CONTENT. (CH)*	
16	-76.0	-77.5	-73.5		VERY STIFF BROWNISH GREEN CALCAREOUS	7-12-18
					CLAY WITH SLIGHT SAND CONTENT.** (MH)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks:

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SOUTH CAROLINA

Boring No. 6 S. C. I. Project No. 09108 Date 4/26/ & 4/27/90

Ground Surface Elev. -7.0 *** Datum M.S.L. Gr. Water Elev. TIDAL
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
					TIME BORING STARTED 1053	
			0.0	-7.0	WATER	
1	-7.0	-8.5	-7.0		VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1/18"
					SAND CONTENT. (OL)*	
2	-12.0	-13.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1/18"
					SAND CONTENT. (OL)*	
3	-17.0	-18.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1/18"
					SAND CONTENT. (OL)*	
4	-22.0	-23.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1-1-1
					SAND CONTENT. (OL)*	
5	-27.0	-28.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1/18"
					SAND CONTENT. (OL)*	
6	-32.0	-33.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1/18"
					SAND CONTENT. (OL)*	
7	-37.0	-38.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1/18"
					SAND AND SHELL CONTENT. (OL)*	
8	-42.0	-43.5			VERY SOFT GRAY ORGANIC CLAY WITH SLIGHT	1/18"
				-45.5	SAND AND SHELL CONTENT. (OL)*	
9	-47.0	-48.5	-45.5		SOFT GRAY INORGANIC CLAY WITH SLIGHT	2-2-2
					SAND CONTENT. (CH)*	
10	-52.0	-53.5			SOFT GRAY INORGANIC CLAY WITH SLIGHT	2-2-2
				-56.0	SAND CONTENT. (CH)*	
11	-57.0	-58.5	-56.0		VERY STIFF GRAY INORGANIC CLAY WITH	3-8-8
					SLIGHT SAND AND SHELL CONTENT. (CH)*	
12	-62.0	-63.5			VERY STIFF GRAY INORGANIC CLAY WITH	5-8-9
				-66.0	SLIGHT SAND CONTENT. (CH)*	(CONTINUED)

ting and Sampling in accordance with ASTM D. 1586-67 (1974)

emarks: *VISUAL UNIFIED SOIL CLASSIFICATION

**LOCALLY CALLED MARL

*** GROUND SURFACE ELEVATION ESTIMATED FROM DAVIS AND FLOYD, INC. DRAWING ENTITLED TOPOGRAPHIC SURVEY FOR AQUARIUM SITE, DATED FEBRUARY 13,1990.

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SOUTH CAROLINA

Boring No. 6 (CONT) S. C. I. Project No. 90108 Date 4/26 & 27/90

Ground Surface Elev. -7.0 *** Datum M.S.L. Gr. Water Elev. TIDAL
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches		STRATUM Elev. - Feet & Inches		VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
	From	To	From	To		
13	-67.0	-68.5	-66.0		STIFF GRAY INORGANIC CLAY WITH SLIGHT	4-6-8
					SAND CONTENT. (CH)*	
14	-72.0	-73.5			STIFF GRAY INORGANIC CLAY WITH SLIGHT	4-5-5
				-74.5	SAND CONTENT. (CH)*	
15	-77.0	-78.5	-74.5		VERY STIFF BROWNISH GREEN CALCAREOUS	5-9-14
					CLAY WITH SLIGHT SAND CONTENT.** (MH)*	
16	-82.0	-83.5			VERY STIFF BROWNISH GREEN CALCAREOUS	4-7-11
				-85.0	CLAY WITH SLIGHT SAND CONTENT.** (MH)*	
17	-87.0	-88.5	-85.0		STIFF BROWNISH GREEN CALCAREOUS CLAY	5-6-9
					WITH SLIGHT SAND CONTENT.** (MH)*	
18	-92.0	-93.5			STIFF BROWNISH GREEN CALCAREOUS CLAY	4-7-7
					WITH SLIGHT SAND CONTENT.** (MH)*	
19	-97.0	-98.5			STIFF BROWNISH GREEN CALCAREOUS CLAY	4-4-6
					WITH SLIGHT SAND CONTENT.** (MH)*	
20	-102.0	-103.5			STIFF BROWNISH GREEN CALCAREOUS CLAY	5-6-8
					WITH SLIGHT SAND CONTENT.** (MH)*	
21	-107.0	-108.5			STIFF BROWNISH GREEN CALCAREOUS CLAY	4-5-10
					WITH SLIGHT SAND CONTENT.** (MH)*	
22	-112.0	-113.5			STIFF BROWNISH GREEN CALCAREOUS CLAY	3-4-8
					WITH SLIGHT SAND CONTENT.** (MH)*	
23	-117.0	-118.5			STIFF BROWNISH GREEN CALCAREOUS CLAY	5-5-7
					WITH SLIGHT SAND CONTENT.** (MH)*	

ting and Sampling in accordance with ASTM D. 1586-67 (1974)

marks:

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SOUTH CAROLINA

Boring No. 7 S. C. I. Project No. 90108 Date 5/1 & 2/90

Ground Surface Elev. -8.0 *** Datum M.S.L. Gr. Water Elev. TIDAL
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
					TIME BORING STARTED 1000	
			-4.0	-8.0	WATER	
1	-8.0	-9.5	-8.0		VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
				-12.0	SLIGHT SAND CONTENT. (OL)*	
2	-16.0	-17.5	-12.0		VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT SAND AND OIL ODOR. (OL)*	
3	-21.0	-22.5			VERY SOFT GRAY ORGANC CLAY WITH	1/18"
				-24.5	SLIGHT SAND AND OIL ODOR. (OL)*	
4	-26.0	-27.5	-24.5		VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT SAND CONTENT. (OL)*	
5	-31.0	-32.5			VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT SAND AND SHELL CONTENT. (OL)*	
6	-36.0	-37.5			VERY SOFT GRAY ORGANIC CLAY WITH	1-1-1
					SLIGHT SAND AND SHELL CONTENT. (OL)*	
7	-41.0	-42.5			VERY SOFT GRAY ORGANIC CLAY WITH	1-1-1
				-44.5	SLIGHT SAND AND SHELL CONTENT. (OL)*	
8	-46.0	-47.5	-44.5		SOFT GRAY ORGANIC CLAY WITH SLIGHT	2-2-2
				-50.0	SAND AND SHELL CONTENT. (OL)*	
9	-51.0	-52.5	-50.0		VERY LOOSE GRAY FINE SAND WITH SLIGHT	2/18"
				-55.0	ORGANIC CLAY AND SHELL CONTENT. (SM)*	
10	-56.0	-57.5	-55.0		LOOSE FINE SAND WITH SLIGHT SHELL	5-5-5
				-60.0	CONTENT. (SM)*	
11	-61.0	-62.5	-60.0		STIFF GRAY INORGANIC CLAY WITH SLIGHT	3-4-5
					SAND AND SHELL CONTENT. (CH)*	
12	-66.0	-67.5			STIFF GRAY INORGANIC CLAY WITH SLIGHT	4-5-6
					SAND AND SHELL CONTENT. (CL)*	(CONTINUED)

sting and Sampling in accordance with ASTM D. 1586-67 (1974)

emarks: *VISUAL UNIFIED SOIL CLASSIFICATION

**LOCALLY CALLED MARL

*** GROUND SURFACE ELEVATION ESTIMATED FROM DAVIS AND FLOYD, INC. DRAWING ENTITLED TOPOGRAPHIC SURVEY FOR AQUARIUM SITE, DATED FEBRUARY 13, 1990.

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SOUTH CAROLINA

Boring No. 7 (CONT) S. C. I. Project No. 90108 Date 5/1 & 2/90

Ground Surface Elev. -8.0*** Datum M.S.L. Gr. Water Elev. TIDAL
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
13	-71.0	-72.5			STIFF GRAY INORGANIC CLAY WITH SLIGHT	4-6-7
					SAND AND SHELL CONTENT. (CL)*	
14	-76.0	-77.5			STIFF GRAY INORGANIC CLAY WITH SLIGHT	3-4-5
				-79.5	SAND AND SHELL CONTENT. (CL)*	
15	-81.0	-82.5	-79.5		VERY STIFF BROWNISH GREEN CALCAREOUS	6-12-15
					CLAY WITH SLIGHT SAND CONTENT.** (MH)*	
16	-86.0	-87.5			VERY STIFF BROWNISH GREEN CALCAREOUS	5-8-10
					CLAY WITH SLIGHT SAND CONTENT.** (MH)*	
17	-91.0	-92.5			VERY STIFF BROWNISH GREEN CALCAREOUS	4-8-12
					CLAY WITH SLIGHT SAND CONTENT.** (MH)*	
18	-96.0	-97.5			VERY STIFF BROWNISH GREEN CALCAREOUS	5-5-14
					CLAY WITH SLIGHT SAND CONTENT.** (MH)*	
19	-101.0	-102.5			VERY STIFF BROWNISH GREEN CALCAREOUS	4-6-12
					CLAY WITH SLIGHT SAND CONTENT.** (MH)*	
20	-106.0	-107.5			VERY STIFF BROWNISH GREEN CALCAREOUS	3-5-11
				-109.5	CLAY WITH SLIGHT SAND CONTENT.** (MH)*	
21	-111.0	-112.5	-109.5		STIFF BROWNISH GREEN CALCAREOUS CLAY	5-5-10
				-115.0	WITH SLIGHT SAND CONTENT.** (MH)*	
22	-116.0	-117.5	-115.0		VERY STIFF BROWNISH GREEN CALCAREOUS	4-5-11
				-119.5	CLAY WITH SLIGHT SAND CONTENT.** (MH)*	
23	-121.0	-122.5	-119.5		STIFF BROWNISH GREEN CALCAREOUS CLAY	6-7-8
					WITH SLIGHT SAND CONTENT.** (MH)*	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks:

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SOUTH CAROLINA

Boring No. 8 S. C. I. Project No. 90108 Date 5/9 & 10/90

Ground Surface Elev. 2.0 *** Datum M.S.L. Gr. Water Elev. TIDAL
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
			2.0	-3.0	STEEL, RIP-RAP, CABLE, DEBRIS, ETC.	
1	-3.0	-4.5	-3.0		VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT SAND AND OIL ODOR. (OL)*	
2	-8.0	-9.5			VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT SAND AND OIL ODOR. (OL)*	
3	-13.0	-14.5			VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT SAND AND OIL ODOR. (OL)*	
4	-18.0	-19.5			VERY SOFT GRAY ORGANIC CLAY WITH	1/18"
					SLIGHT SAND AND OIL ODOR. (OL)*	
5	-23.0	-24.5			VERY SOFT GRAY ORGANIC CLAY WITH	2/18"
					SLIGHT SAND AND OIL ODOR. (OL)*	
6	-28.0	-29.5			VERY SOFT GRAY ORGANIC CLAY WITH	2/18"
				-32.5	SLIGHT SAND AND OIL ODOR. (OL)*	
7	-33.0	-34.5	-32.5		MEDIUM GRAY INORGANIC CLAY WITH	4-4-4
				-37.5	HIGH SAND AND SLIGHT SHELL CONTENT.	
					(CL)*	
8	-38.0	-39.5	-37.5		MEDIUM GRAY FINE SAND WITH SLIGHT	3-6-5
				-42.5	SHELL CONTENT. (SM)*	
9	-43.0	-44.5	-42.5		VERY STIFF GRAY INORGANIC CLAY WITH	3-8-8
				-47.5	SLIGHT SAND AND SLIGHT SHELL CONTENT.	
					(CL)*	
10	-48.0	-49.5	-47.5		STIFF GRAY ORGANIC CLAY WITH MEDIUM	3-4-5
					SAND AND SLIGHT PHOSPHATIC NODULES	
					AND DECAYED WOOD CONTENT. (OL)*	
					CONTINUED	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks: *VISUAL UNIFIED SOIL CLASSIFICATION

**LOCALLY CALLED MARL.

THE TOP 5' OF THE SOIL PROFILE CONTAINED HEAVY DEBRIS.

*** GROUND SURFACE ELEVATION ESTIMATED FROM DAVIS AND FLOYD, INC. DRAWING ENTITLED TOPOGRAPHIC SURVEY FOR AQUARIUM SITE, DATED FEBRUARY 13, 1990.

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SOUTH CAROLINA

Boring No. 8 (CONT.) S. C. I. Project No. 90108 Date 5/9 & 10/90

Ground Surface Elev. 2.0 Datum M.S.L. Gr. Water Elev. TIDAL
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
11	-53.0	-54.5			STIFF GRAY ORGANIC CLAY WITH MEDIUM	3-5-6
					SAND AND SHELL, MEDIUM PHOSPHATIC	
					NODULES AND DECAYED WOOD CONTENT.	
					(OL)*	
12	-58.0	-59.5			STIFF GRAY ORGANIC CLAY WITH SLIGHT	4-4-6
					SAND AND SHELL, SLIGHT PHOSPHATIC	
					NODULES AND DECAYED WOOD CONTENT.	
				-60.0	(OL)*	
13	-63.0	-64.5	-60.0		STIFF GRAY INORGANIC CLAY WITH SLIGHT	3-6-6
					SAND CONTENT. (CH)*	
14	-68.0	-69.5			STIFF GRAY INORGANIC CLAY WITH SLIGHT	3-8-6
					SAND CONTENT. (CH)*	
15	-73.0	-74.5			STIFF GRAY INORGANIC CLAY WITH SLIGHT	4-7-7
				-77.5	SAND CONTENT. (CH)*	
16	-78.0	-79.5	-77.5		VERY STIFF BROWNISH GREEN CALCAREOUS	3-8-11
				-82.5	CLAY WITH SLIGHT SAND CONTENT. **(MH)*	
17	-83.0	-84.5	-82.5		STIFF BROWNISH GREEN CALCAREOUS CLAY	4-6-8
					WITH SLIGHT SAND CONTENT. **(MH)*	
18	-88.0	-89.5			STIFF BROWNISH GREEN CALCAREOUS CLAY	3-7-8
					WITH SLIGHT SAND CONTENT. **(MH)*	
19	-93.0	-94.5			STIFF BROWNISH GREEN CALCAREOUS CLAY	4-6-7
					WITH SLIGHT SAND CONTENT. **(MH)*	
20	-98.0	-99.5			STIFF BROWNISH GREEN CALCAREOUS CLAY	5-6-9
					WITH SLIGHT SAND CONTENT. **(MH)*	
					CONTINUED	

Testing and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks:

SOIL CONSULTANTS, INC.

MYRTLE BEACH, S.C. CHARLESTON, S.C. SAVANNAH, GA.

LOG of BORING

Project: PROPOSED AQUARIUM, CHARLESTON, SOUTH CAROLINA

Boring No. 8 (CONT.) S. C. I. Project No. 90108 Date 5/9 & 10/90

Ground Surface Elev. 2.0 Datum M.S.L. Gr. Water Elev. TIDAL
(Minimum of 24 hrs. after completion)

Sample No.	SAMPLE Elev. - Feet & Inches From	SAMPLE Elev. - Feet & Inches To	STRATUM Elev. - Feet & Inches From	STRATUM Elev. - Feet & Inches To	VISUAL FIELD CLASSIFICATION	Blows Per 6 Inches
21	-103.0	-104.5			STIFF BROWNISH GREEN CALCAREOUS CLAY	11-4-8
					WITH SLIGHT SAND CONTENT. **(MH)*	
22	-108.0	-109.5			STIFF BROWNISH GREEN CALCAREOUS CLAY	4-7-6
				-112.5	WITH SLIGHT SAND CONTENT. **(MH)*	
23	-113.0	-114.5	-112.5		VERY STIFF BROWNISH GREEN CALCAREOUS	5-7-10
					CLAY WITH SLIGHT SAND CONTENT. **(MH)*	
24	-118.0	-119.5			VERY STIFF BROWNISH GREEN CALCAREOUS	6-8-9
					CLAY WITH SLIGHT SAND CONTENT. **(MH)*	

esting and Sampling in accordance with ASTM D. 1586-67 (1974)

Remarks:

APPENDIX VIII

MONITORING WELL CONSTRUCTION DETAILS

APPENDIX VIII

MONITORING WELL CONSTRUCTION DETAILS

The 12 monitoring wells were installed under the direct supervision of a South Carolina Certified Well Driller in accordance with South Carolina Well Standards and Regulations, 61-71. The monitoring wells were installed with a drill rig equipped with 6 7/8-inch outside diameter hollow stem augers. Equipment used in the installation process was thoroughly high-pressure steam-cleaned prior to use at the site and between the installation of each monitoring well. Decontamination water was contained and placed in a tank on the site.

Soil samples for laboratory analysis were collected during the installation of each well. Surface samples (0"-6") were collected with a stainless steel hand auger. Subsurface samples were collected with a 2-foot split-spoon sampler. Each sample was composited by gently mixing it in a stainless steel bowl or on aluminum foil. Each sample was then placed into a 500 ml wide mouthed glass jar with a teflon-lined lid using a stainless steel spoon. Samples were then placed on ice in a cooler for transportation to the laboratory. Chain of Custody documents are included in Appendix X.

The sampling equipment was decontaminated between the collection of each sample. Field decontamination procedures used for the soil sampling equipment, as well as the sampling equipment discussed in Appendix XII, were:

1) item was washed thoroughly with a dilute solution of phosphate-free laboratory detergent
2) item was rinsed at least two times with tap water
3) item was rinsed with dilute HCl solution
4) item was rinsed with deionized water
5) item was rinsed at least twice with reagent grade isopropanol
6) item was rinsed at least twice with deionized/organic free water
7) item was air dried if time permitted

Equipment not immediately re-used was wrapped in aluminum foil.

These procedures are consistent with EPA protocols except for the use of HCl. Use of HCl could mobilize metals from metal sampling equipment. If this occurred, the only potential bias would be to cause the samples to contain metals in excess of actual conditions. However, sample bias is unlikely considering the equipment was rinsed five times following use of HCl. Decontamination rinsate was contained onsite.

Soil cuttings generated by the well installation process were contained onsite in a covered roll-off container. The wells were installed in the following sequence: MW-10,

MW-8, MW-6, MW-7, MW-9, MW-2, MW-5, MW-4, MW-3, MW-12, MW-1, and MW-11.

The monitoring wells are constructed of 2-inch diameter, flush-threaded, PVC casings and No. 10 slot screens. PVC was selected as the well construction material because it was successfully used at the Calhoun Park/Ansonborough Homes site, which is more severely impact than the CHS. The integrity of well W-12, where limited free product was detected, may eventually be compromised by the product. However, the findings of this investigation indicate that the PVC wells are adequate to obtain representative groundwater samples.

A 2-foot sump was placed on the bottom of each screen to minimize clogging of the screen and permit an area for DNAPLs to accumulate if encountered. After placement of the PVC casing and screen in each borehole:

- A well graded, medium-grained silica sand was used for the sand pack. The sand pack extended at least 6 inches below the bottom of the well screen and sump, and, in accordance with R.61-71, no more than 2.5 times the borehole diameter above the top of the screen. Because of caving of native soils, a sand pack was not able to be installed over the entire screened interval of wells W-9 and W-11. Therefore, native soils abut portions of the screen of these two wells.

- A bentonite plug was emplaced in the borehole above the sand pack and hydrated with tap water. Since the wells were screened to within several feet of land surface, the bentonite was poured into the well bore.

- At least 24 hours following the hydration of the bentonite, the remainder of the annulus was filled with cement grout, and a locking, above-grade steel cover was set in the cement to protect the well casing.

Monitoring well schematics and lithologic logs illustrating the construction details of each well are included in this appendix. The latitude and longitude coordinates of each well are shown on these schematics. Pertinent information concerning each well is summarized in the Monitoring Well Construction Details table included in this appendix.

The elevation of a measuring point established on the rim of the PVC well casing of each well was surveyed by GEL. The land surface elevation adjacent to each well was also surveyed. The elevations are based on a land surface elevation of 6.0 feet above mean sea level at the location of MW-11. This elevation was estimated based on a detailed topographic survey of the proposed South Carolina Aquarium site. Depths to groundwater, measured from these points prior to collecting groundwater samples, were used to calculate the water table elevation at each well location. The elevation data is also included on the Monitoring Well Construction Details table.

MONITORING WELL CONSTRUCTION DETAILS

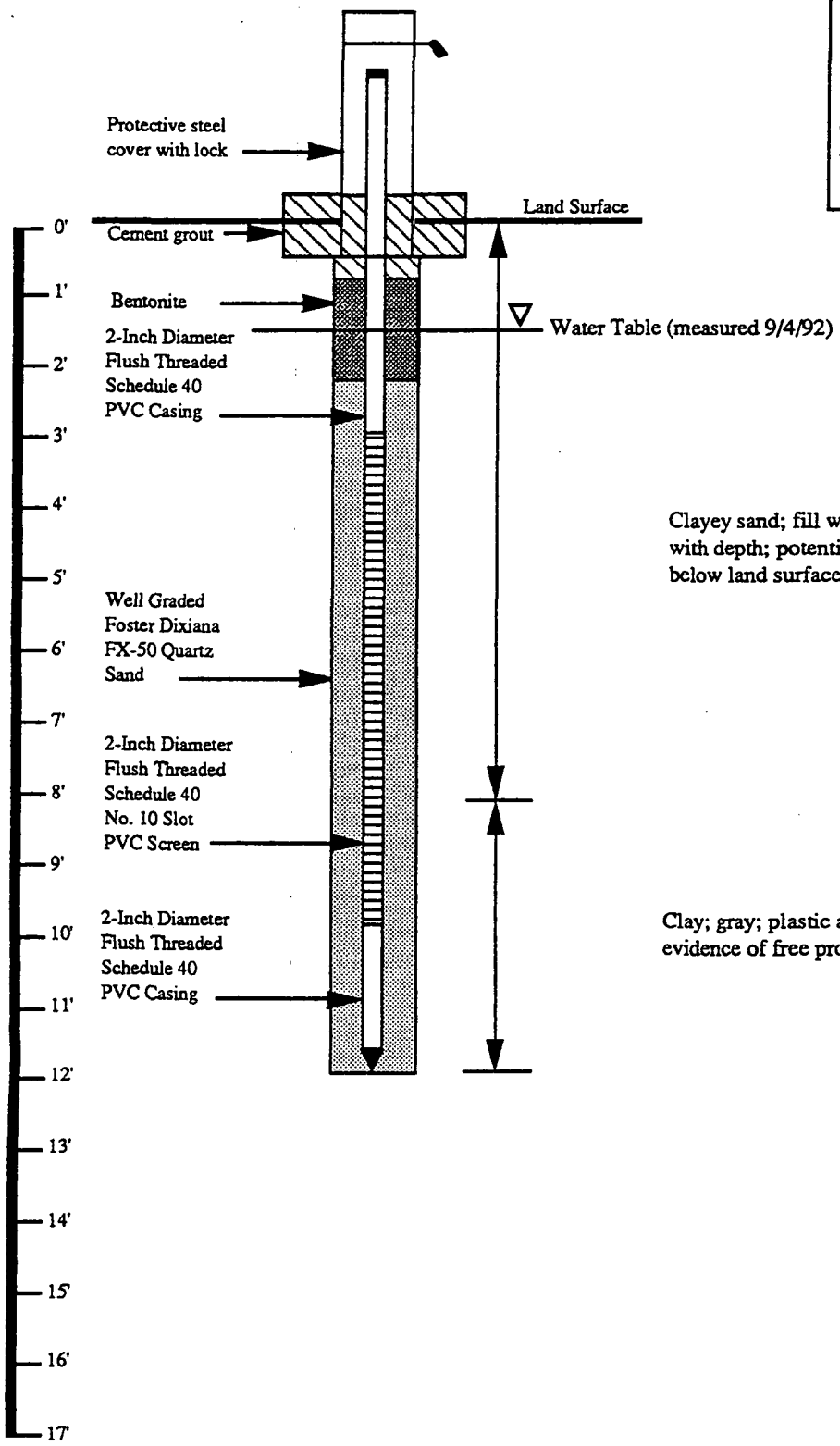
CHARLESTON HARBOR SITE
CHARLESTON, SOUTH CAROLINA

Well Number	Date Installed	Casing Material	Casing Diameter (inches)	Screen Slot Size (inches)	Land Surface Elevation* (feet msl)	Top of Well Elevation* (feet msl)	Total Well Depth** (feet)	Screened Depth* (feet)	Depth to Groundwater 9/3-4/92** (feet)	Water Table Elevation* (feet msl)
MW-1	8/25/92	PVC	2.0	0.010	5.87	8.88	14.81	3.07-(-3.93)	4.55	4.33
MW-2	8/21/92	PVC	2.0	0.010	6.20	8.96	15.00	2.96-(-4.04)	5.28	3.68
MW-3	8/24/92	PVC	2.0	0.010	6.12	8.52	18.75	2.77-(-8.23)	5.20	3.32
MW-4	8/21/92	PVC	2.0	0.010	8.06	10.90	16.66	6.24-(-3.76)	8.76	2.14
MW-5	8/21/92	PVC	2.0	0.010	7.11	9.83	18.30	3.53-(-6.47)	6.79	3.04
MW-6	8/20/92	PVC	2.0	0.010	6.05	9.00	18.12	2.88-(-7.12)	4.63	4.37
MW-7	8/20/92	PVC	2.0	0.010	6.12	9.33	18.04	3.29-(-6.71)	5.41	3.92
MW-8	8/19/92	PVC	2.0	0.010	5.84	8.32	30.99	(-7.67)-(-20.67)	5.20	3.12
MW-9	8/20/92	PVC	2.0	0.010	6.93	9.08	21.89	3.19-(-10.81)	6.29	2.79
MW-10	8/18/92	PVC	2.0	0.010	7.41	9.91	19.88	4.03-(-7.97)	5.99	3.92
MW-11	8/26/92	PVC	2.0	0.010	6.00	8.75	29.64	(-3.89)-(-18.89)	5.09	3.66
MW-12	8/25/92	PVC	2.0	0.010	5.73	8.82	19.62	3.20-(-8.80)	5.51	3.31

* Land surface elevation for well W-11 was extrapolated from the site survey of the South Carolina Aquarium site. The remaining wells were surveyed relative to well W-11.

** Referenced to measuring point on the rim of the PVC casing.

Date Installed: August 25, 1992
Latitude: N32°47'26"
Longitude: W79°55'38"
Land Surface Elevation: 5.87' msl
Top of Well Elevation: 8.88' msl
Well Drillers: S. Rucker
T. Hutto, #732



Clayey sand; fill with wood pilings; creosote odor increases with depth; potential creosote/coal tar free product at 5-6 feet below land surface

Clay; gray; plastic and cohesive; faint to moderate odor; no evidence of free product

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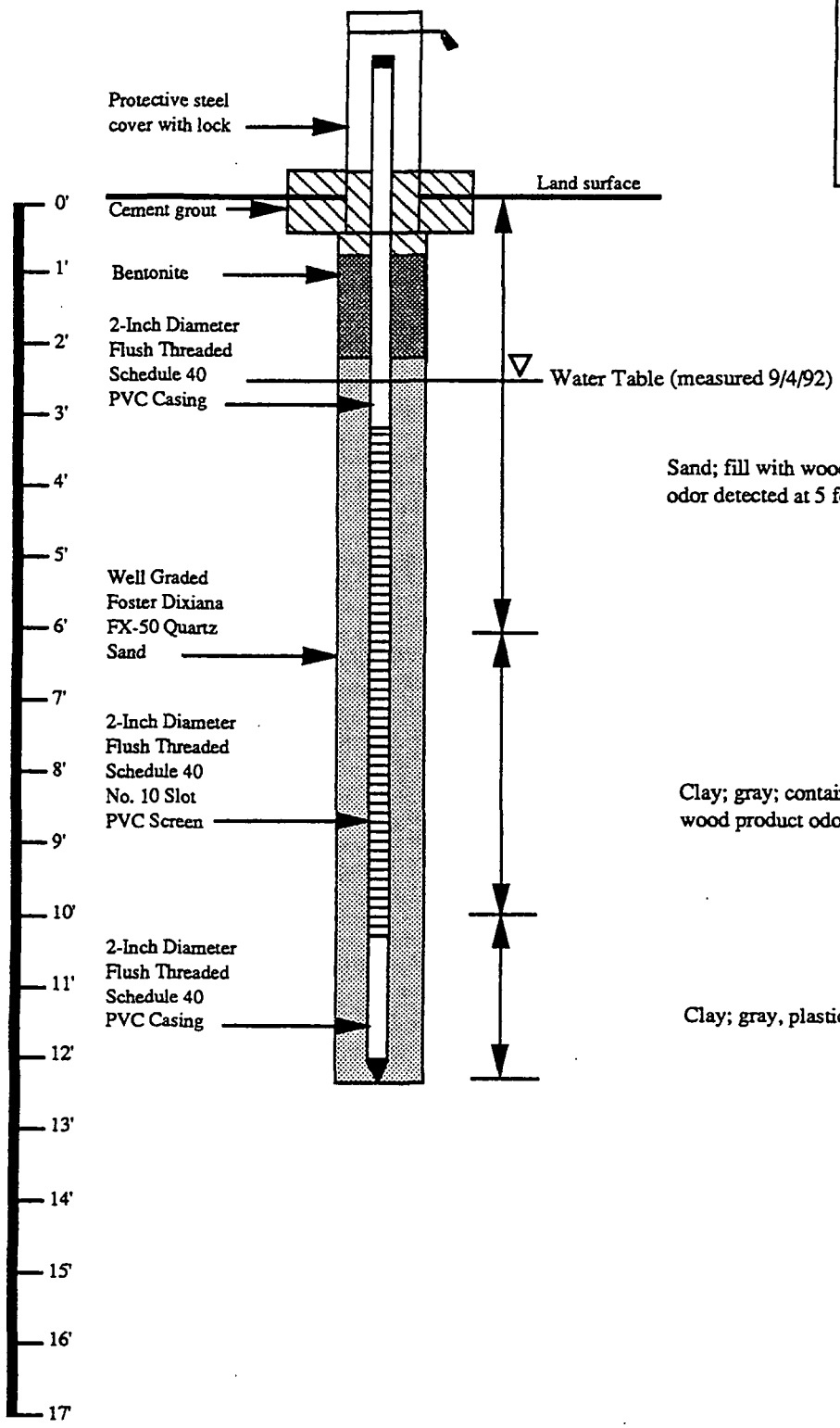
PROJECT city00391			
CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	MONITORING WELL SCHEMATIC & LITHOLOGIC LOG		WELL MW-1
DATE OCTOBER 1, 1992	DRAWN BY JAC	APPRV. BY TDH	

Date Installed: August 21, 1992
Latitude: N32°47'25"
Longitude: W79°55'38"
Land Surface Elevation: 6.20' msl
Top of Well Elevation: 8.96' msl
Well Drillers: S. Rucker
T. Hutto, #732



Sand; fill with wood, brick, gravel; petroleum and wood product odor detected at 5 feet below land surface

Clay; gray; contains wood, gravel, wood fibers; petroleum and wood product odor

Clay; gray, plastic and cohesive; no odor

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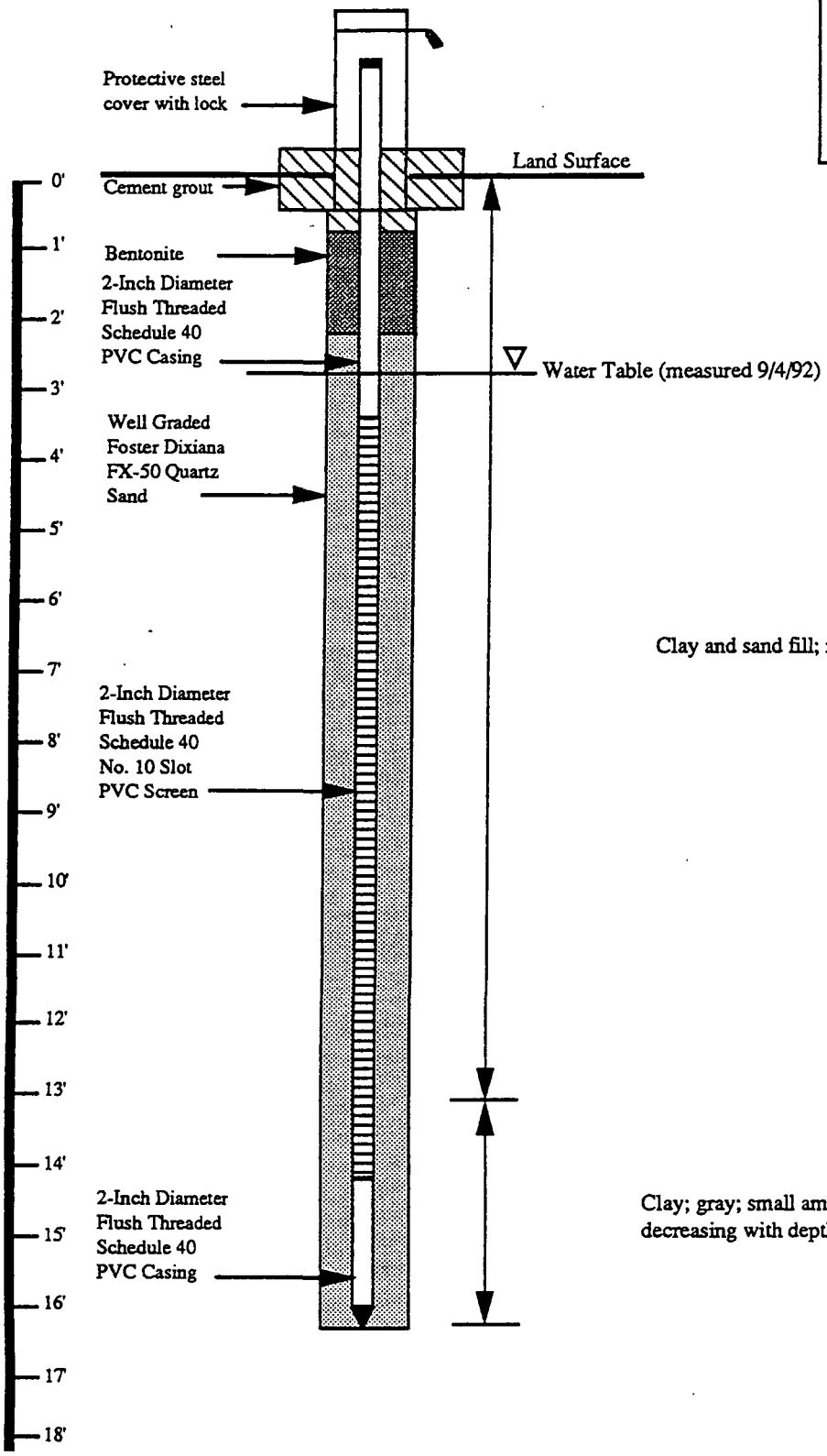
PROJECT city00391			
CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	MONITORING WELL SCHEMATIC & LITHOLOGIC LOG		WELL MW-2
DATE OCTOBER 1, 1992	DRAWN BY JAC	APPRV. BY TDH	

Date Installed: August 24, 1992
Latitude: N32°47'24"
Longitude: W79°55'38"
Land Surface Elevation: 6.12' msl
Top of Well Elevation: 8.52' msl
Well Drillers: S. Rucker
T. Hutto, #732



Clay and sand fill; moderate creosote odor

Clay; gray; small amounts of wood chips, creosote odor decreasing with depth

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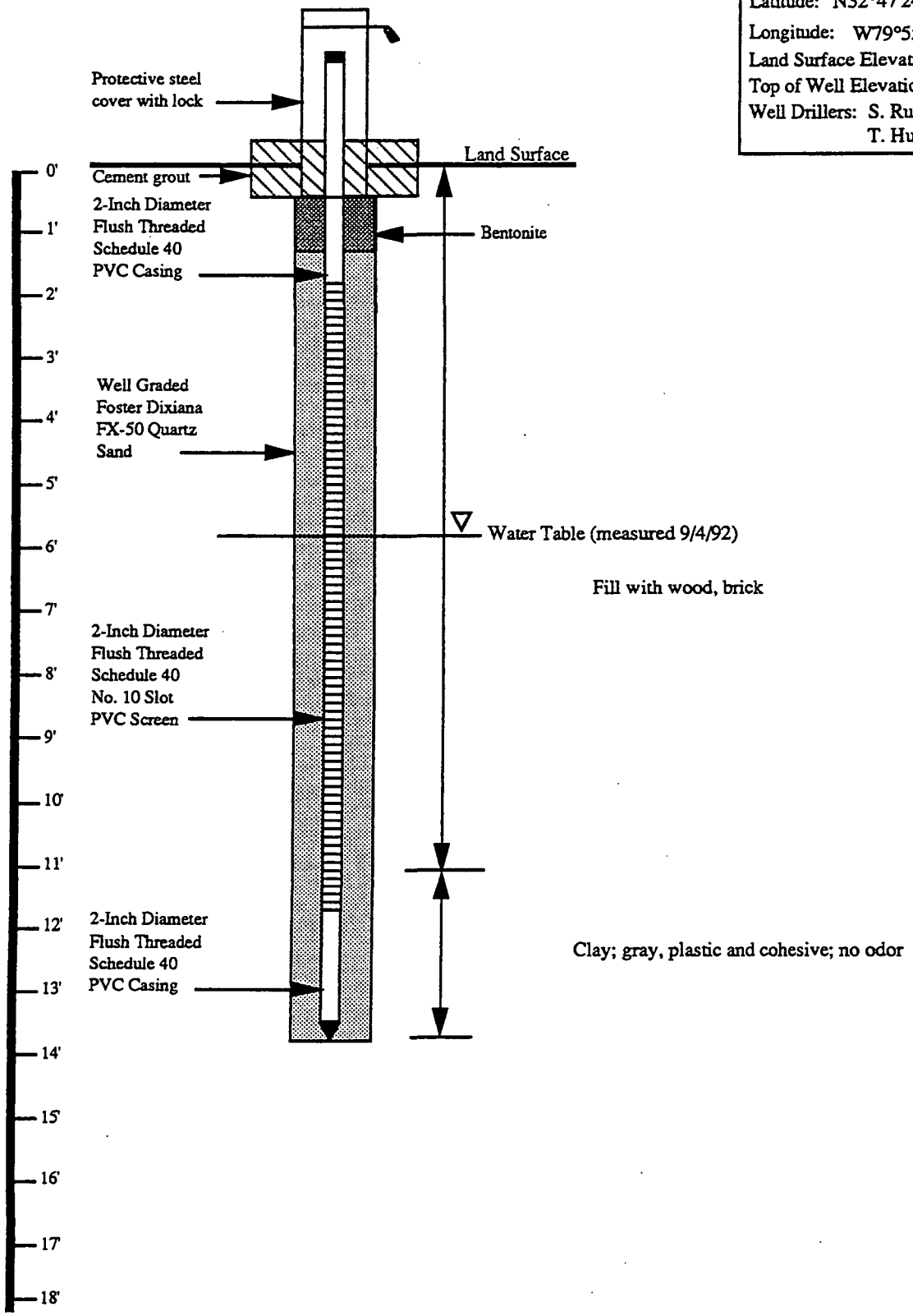
	CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	MONITORING WELL SCHEMATIC & LITHOLOGIC LOG	WELL MW-3
	DATE OCTOBER 1, 1992	DRAWN BY JAC / APPRV. BY TDH	

Date Installed: August 21, 1992
Latitude: N32°47'24"
Longitude: W79°55'37"
Land Surface Elevation: 8.06' msl
Top of Well Elevation: 10.90' msl
Well Drillers: S. Rucker
T. Hutto, #732



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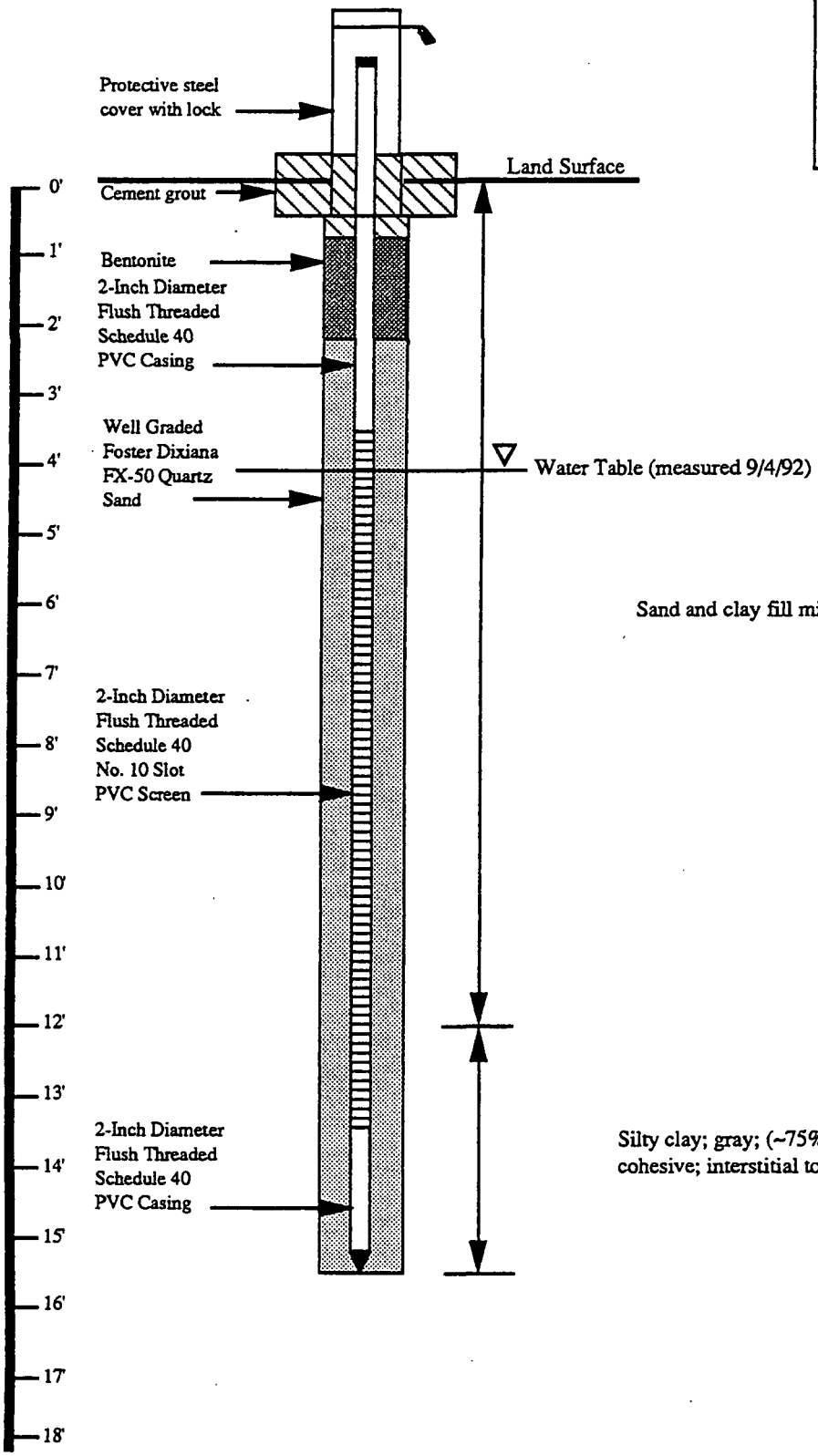
CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	MONITORING WELL SCHEMATIC & LITHOLOGIC LOG		WELL MW-4
DATE OCTOBER 1, 1992	DRAWN BY JAC	APPRV. BY TDH	

Date Installed: August 21, 1992
Latitude: N32°47'24"
Longitude: W79°55'37"
Land Surface Elevation: 7.11' msl
Top of Well Elevation: 9.83' msl
Well Drillers: S. Rucker
T. Hutto, #732



Sand and clay fill mixed with wood, sawdust, brick

Silty clay; gray; (~75%) clay; moderately dense, plastic and cohesive; interstitial to clay; (~25%) silt

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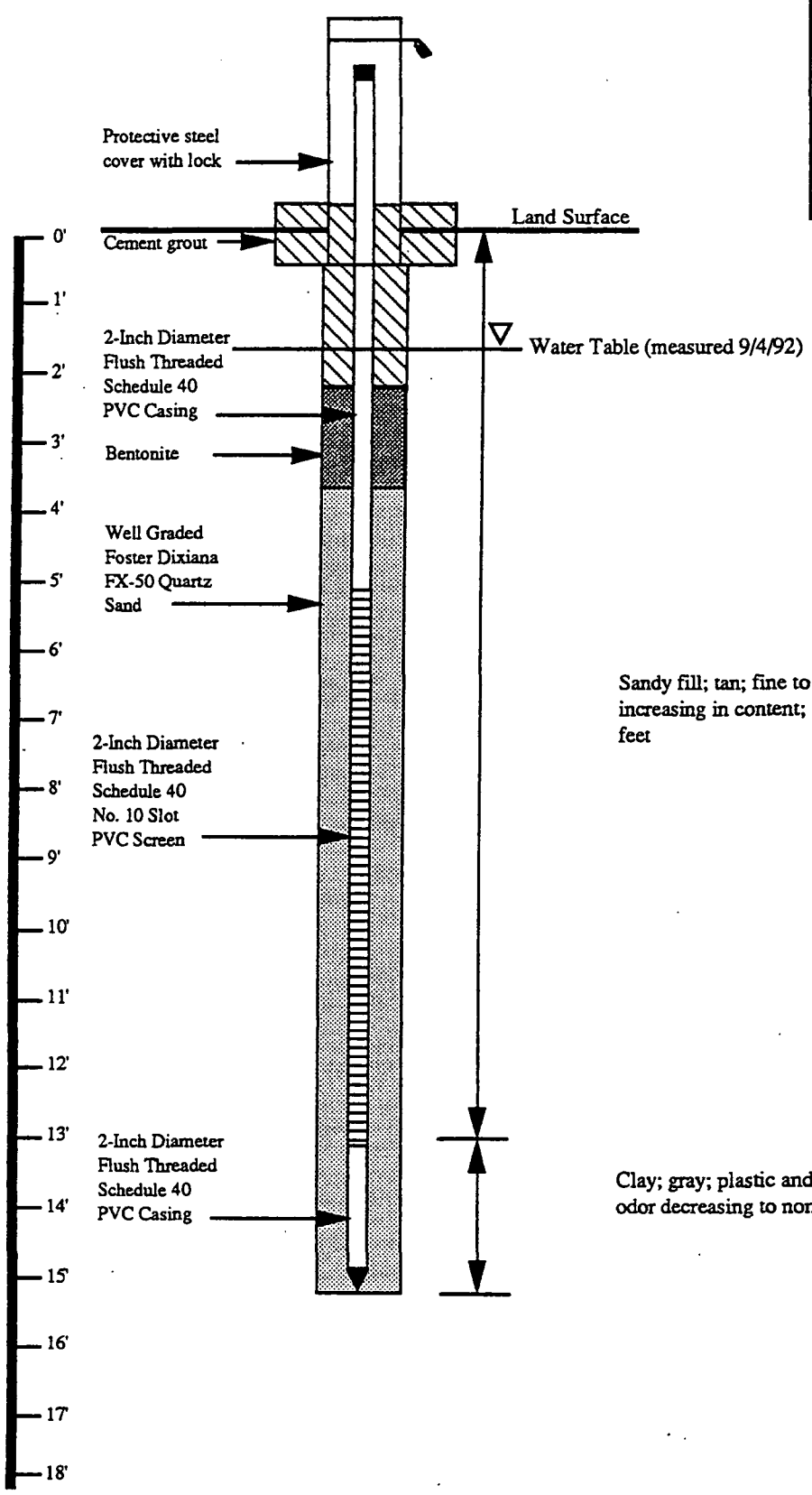
CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	MONITORING WELL SCHEMATIC & LITHOLOGIC LOG		WELL MW-5
DATE OCTOBER 1, 1992	DRAWN BY JAC	APPRV. BY TDH	

Date Installed: August 20, 1992
Latitude: N32°47'25"
Longitude: W79°55'37"
Land Surface Elevation: 6.05' msl
Top of Well Elevation: 9.00' msl
Well Drillers: S. Rucker
T. Hutto, #732



Sandy fill; tan; fine to medium grained; 10% clay at 0-2 feet, increasing in content; faint creosote odor from 2 feet to 13 feet

Clay; gray; plastic and cohesive (former marsh); faint creosote odor decreasing to none

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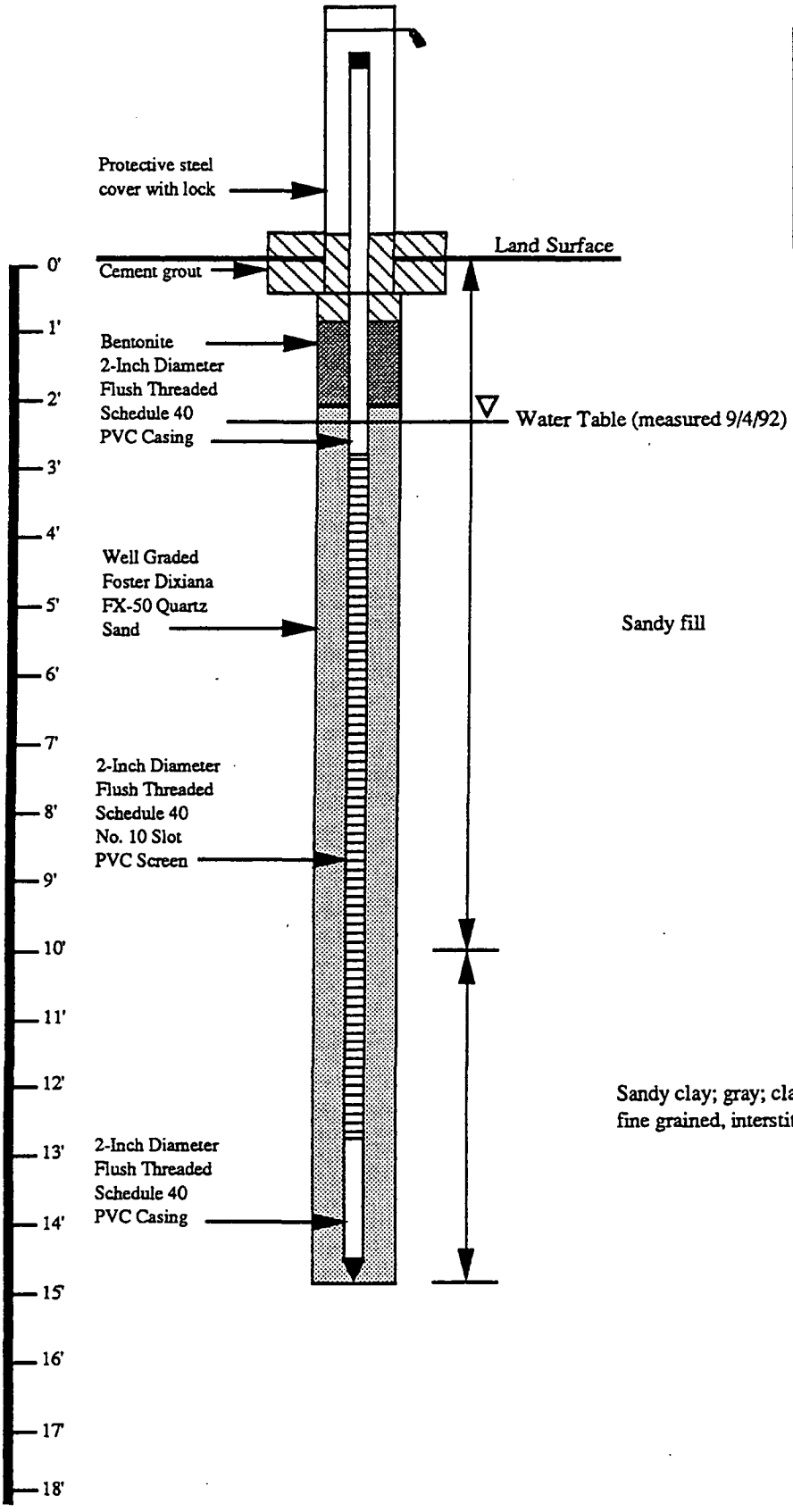
CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	MONITORING WELL SCHEMATIC & LITHOLOGIC LOG		WELL MW-6
DATE OCTOBER 1, 1992	DRAWN BY JAC	APPRV. BY TDH	



Date Installed: August 20, 1992
Latitude: N32°47'27"
Longitude: W79°55'36"
Land Surface Elevation: 6.12' msl
Top of Well Elevation: 9.33' msl
Well Drillers: S. Rucker
T. Hutto, #732

Sandy fill

Sandy clay; gray; clay (~70%); plastic, cohesive; sand (~30%), fine grained, interstitial to clay; no creosote odor

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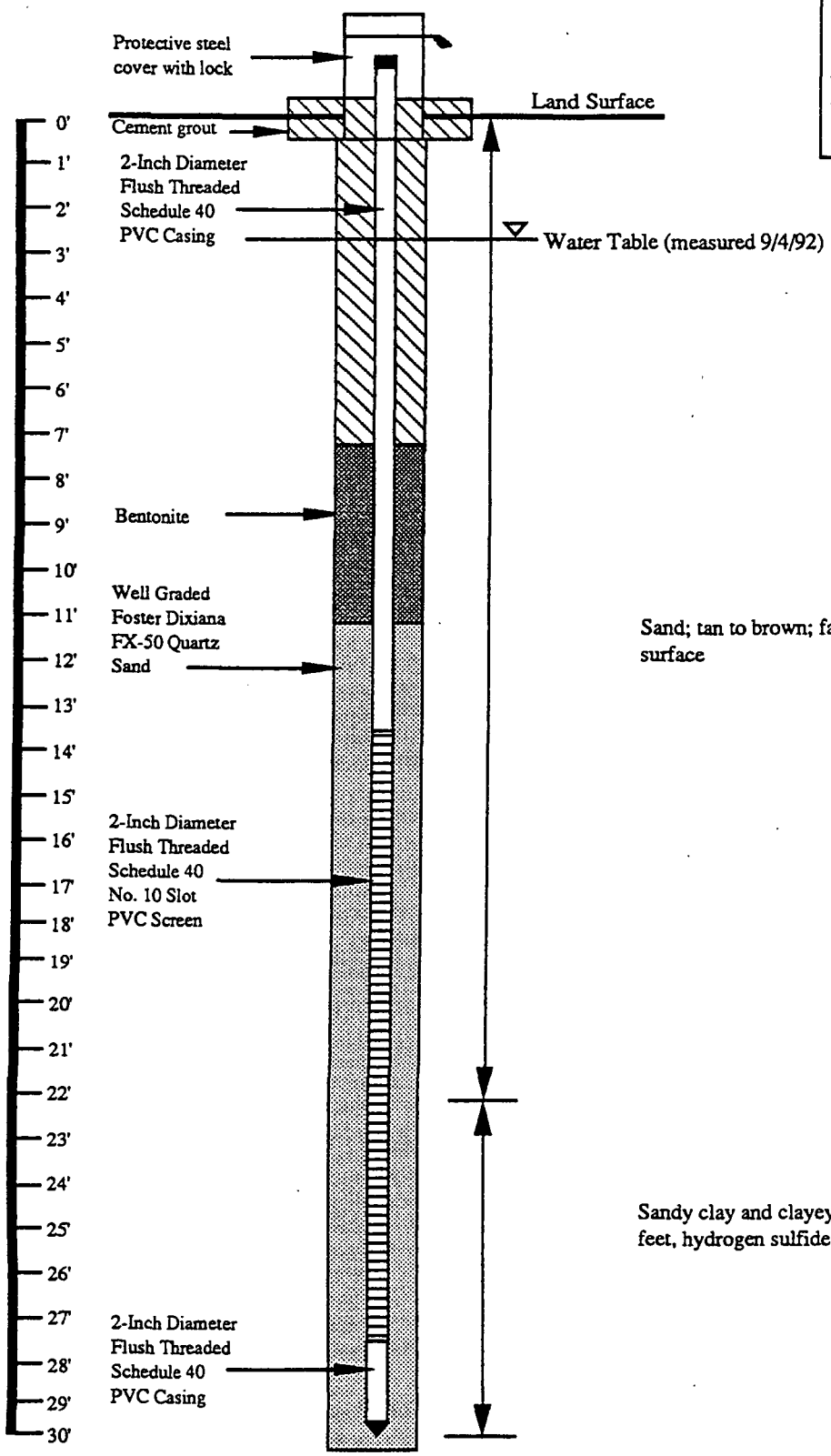
CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	MONITORING WELL SCHEMATIC & LITHOLOGIC LOG		WELL MW-7
DATE OCTOBER 1, 1992	DRAWN BY IAC	APPRV. BY TDH	

Date Installed: August 19, 1992
Latitude: N32°47'18"
Longitude: W79°55'35"
Land Surface Elevation: 5.84' msl
Top of Well Elevation: 8.32' msl
Well Drillers: S. Rucker
T. Hutto, #732



Sand; tan to brown; faint creosote odor 16 feet below land surface

Sandy clay and clayey sand; dense cohesive clay below 23 feet, hydrogen sulfide and faint creosote odors

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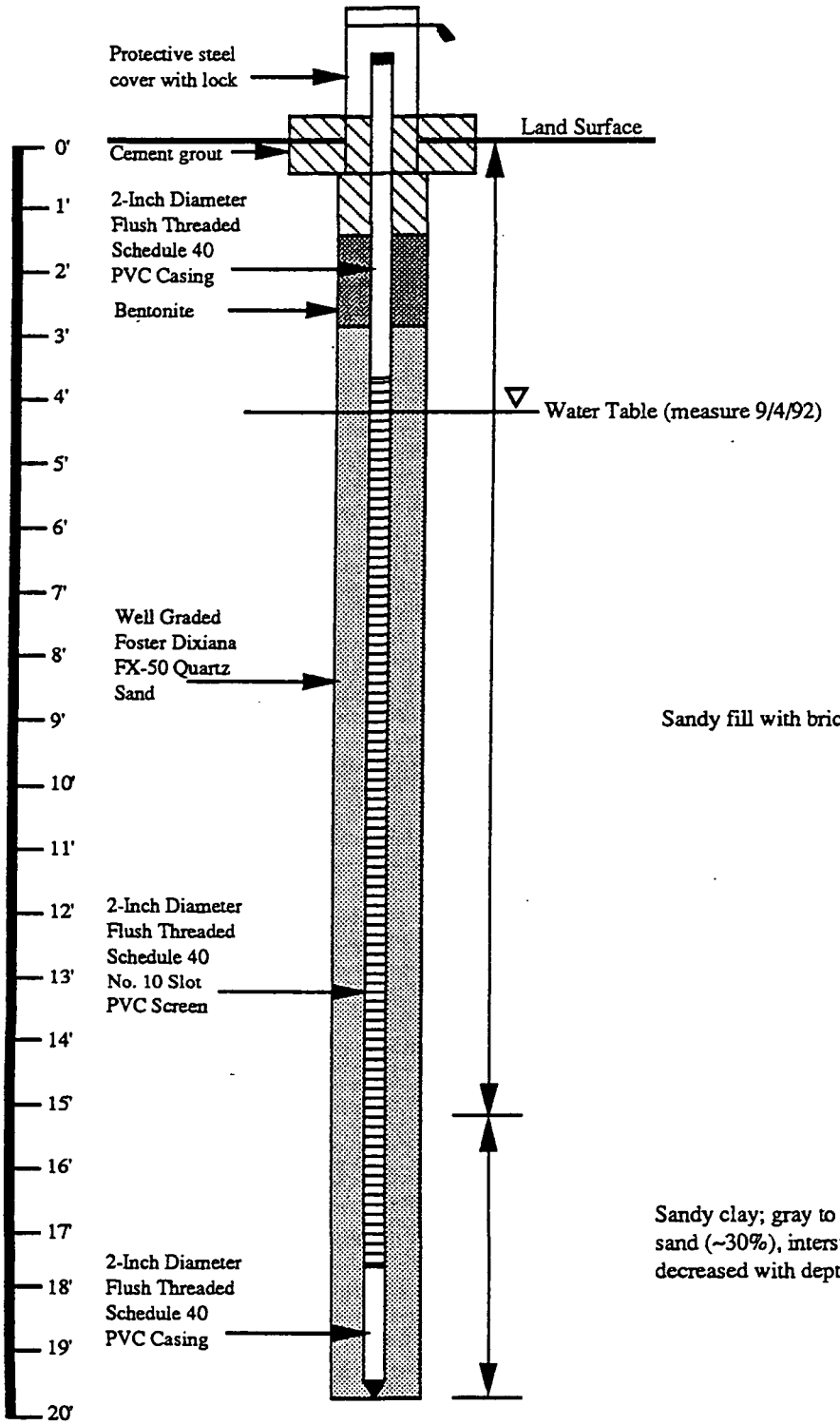
CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	MONITORING WELL SCHEMATIC & LITHOLOGIC LOG		WELL MW-8
DATE OCTOBER 1, 1992	DRAWN BY JAC	APPRV. BY TDH	

Date Installed: August 20, 1992
Latitude: N32°47'26"
Longitude: W79°55'34"
Land Surface Elevation: 6.93' msl
Top of Well Elevation: 9.08' msl
Well Drillers: S. Rucker
T. Hutto, #732



Sandy fill with brick and wood

Sandy clay; gray to black; clay (~70%); soft, plastic, cohesive; sand (~30%), interstitial to clay; moderate creosote odor, decreased with depth

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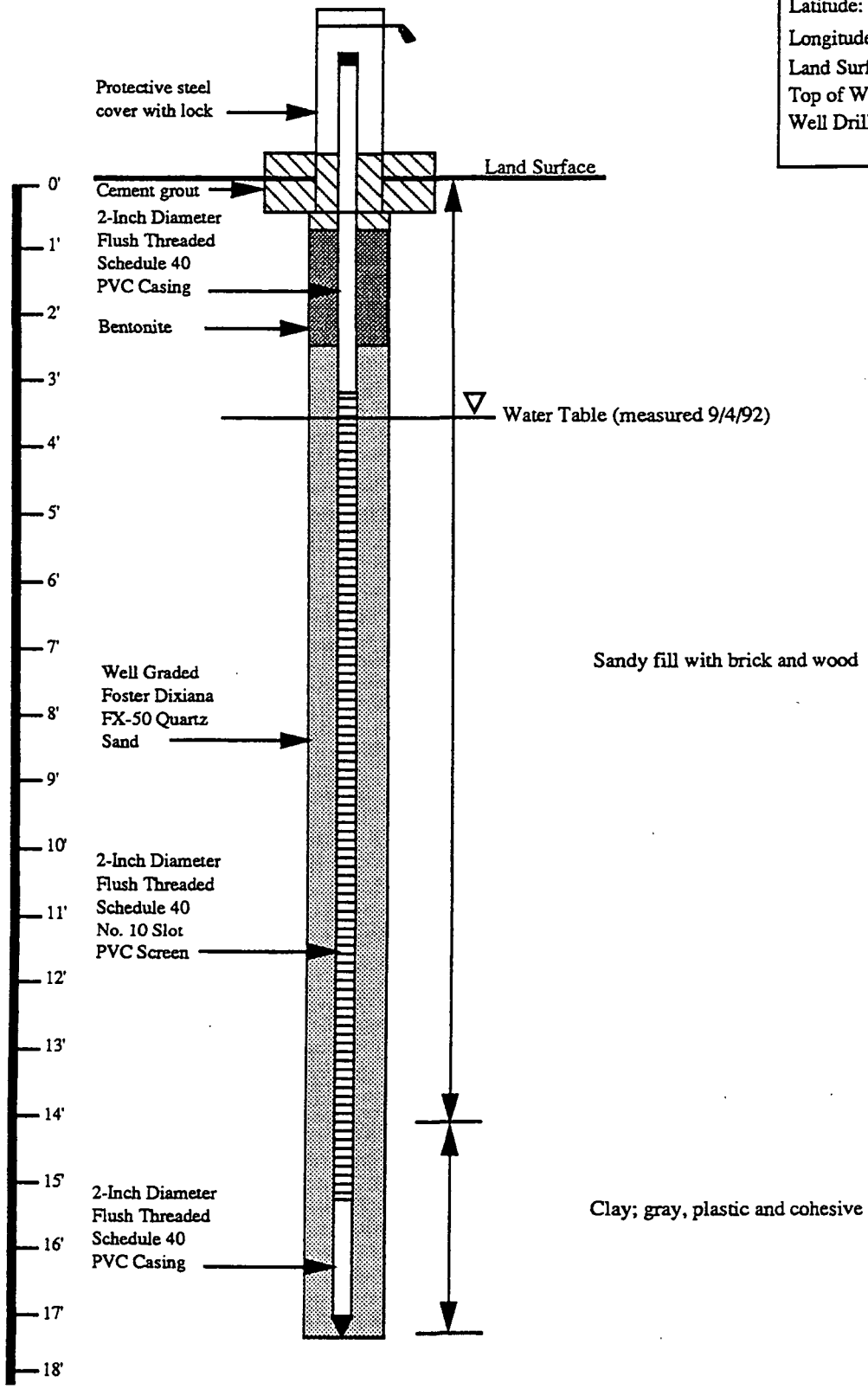
	CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	MONITORING WELL SCHEMATIC & LITHOLOGIC LOG	WELL MW-9
	DATE OCTOBER 1, 1992	DRAWN BY JAC / APPRV. BY TDH	

Date Installed: August 18, 1992
Latitude: N32°47'24"
Longitude: W79°55'35"
Land Surface Elevation: 7.41' msl
Top of Well Elevation: 9.91' msl
Well Drillers: S. Rucker
T. Hutto, #732



Sandy fill with brick and wood

Clay; gray, plastic and cohesive

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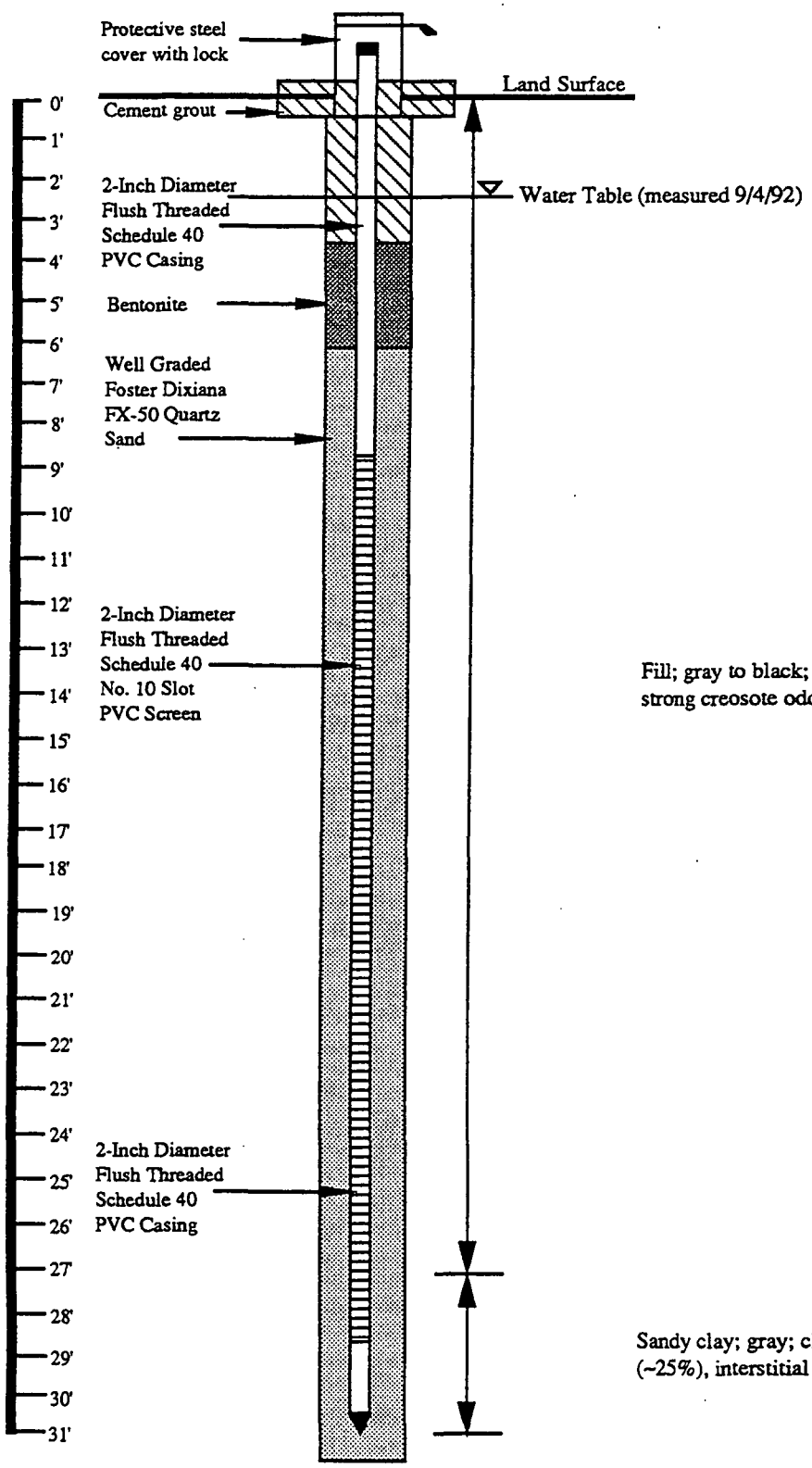
CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	MONITORING WELL SCHEMATIC & LITHOLOGIC LOG		WELL MW-10
DATE OCTOBER 1, 1992	DRAWN BY JAC	APPRV. BY TDH	

Date Installed: August 26, 1992
Latitude: N32°47'26"
Longitude: W79°55'35"
Land Surface Elevation: 6.00' msl
Top of Well Elevation: 8.75' msl
Well Drillers: S. Rucker
T. Hutto, #732



Fill; gray to black; sand with increasing clay content, wood debris, strong creosote odor

Sandy clay; gray; clay (~75%), moderately dense and plastic; sand (~25%), interstitial to clay; faint creosote odor

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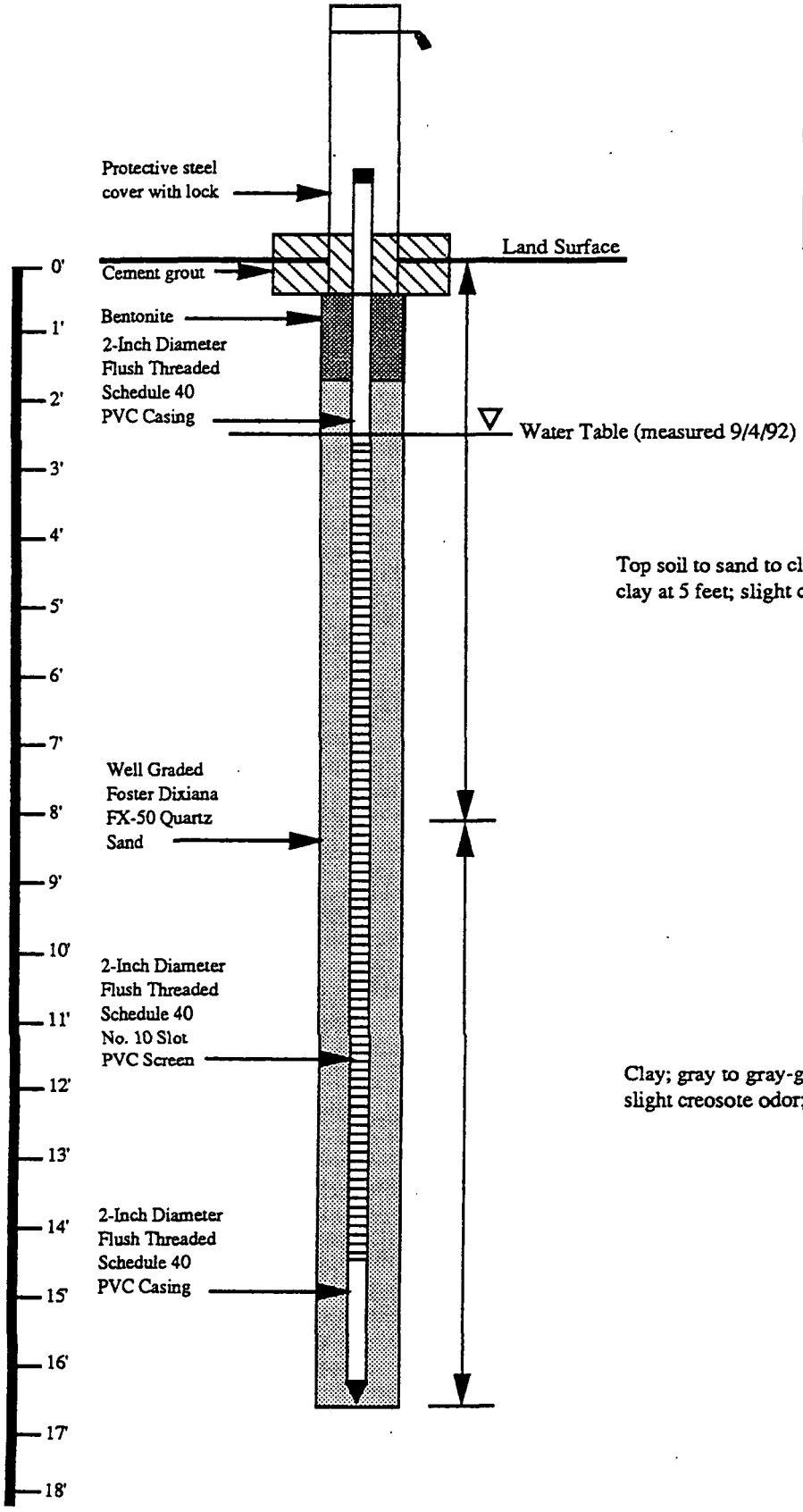
CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	MONITORING WELL SCHEMATIC & LITHOLOGIC LOG		WELL MW-11
DATE OCTOBER 1, 1992	DRAWN BY JAC	APPRV. BY TDH	



Date Installed: August 25, 1992
Latitude: N32°47'18"
Longitude: W79°55'37"
Land Surface Elevation: 5.73' msl
Top of Well Elevation: 8.82' msl
Well Drillers: S. Rucker
T. Hutto, #732

Top soil to sand to clayey sand; moderately cohesive; tight gray clay at 5 feet; slight creosote odor; possible product at 6 feet

Clay; gray to gray-green at 14 feet; plastic and cohesive; slight creosote odor; slight shell content at 14 feet

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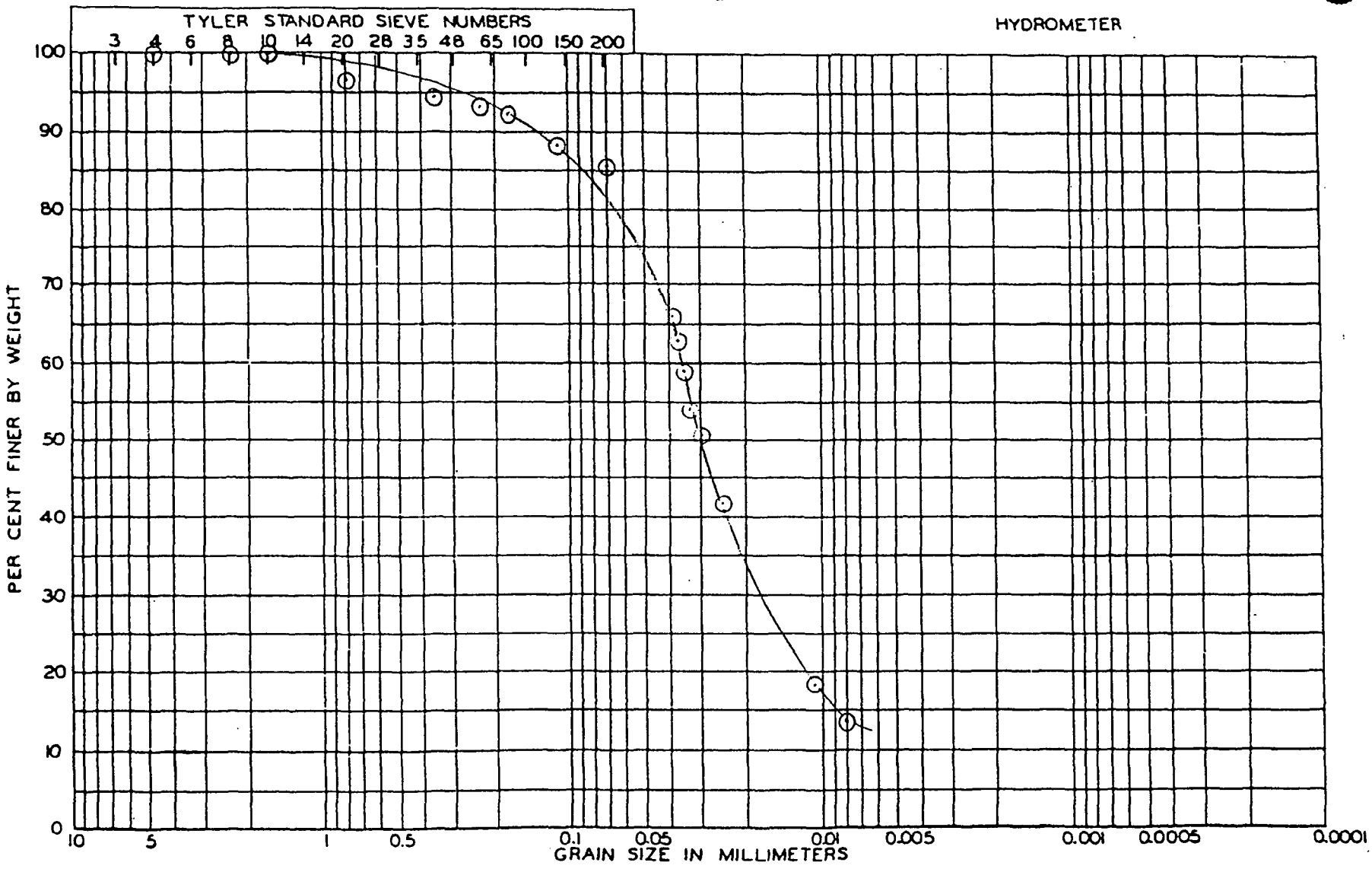
CHARLESTON HARBOR SITE CHARLESTON, SOUTH CAROLINA	MONITORING WELL SCHEMATIC & LITHOLOGIC LOG		WELL MW-12
DATE OCTOBER 1, 1992	DRAWN BY JAC	APPRV. BY TDH	

APPENDIX IX

SIEVE AND PERMEABILITY ANALYSIS



PROJECT NATIONAL PARK SERVICE, CHARLESTON HARBOR SITE BORING NO S-1 SAMPLE NO. _____

DEPTH 9'-11' ELEVATION _____ REMARKS FALLING HEAD PERMEABILITY (ASTM D2434-68): $k=1.0 \times 10^{-7}$

GRAIN SIZE DISTRIBUTION DIAGRAM

APPENDIX X

CERTIFICATES OF ANALYSIS

ANALYTICAL SUMMARY REPORT
for
National Park Service, Charleston Harbor Site
Charleston, South Carolina

October 19, 1992

Laboratory Identification:

General Engineering Laboratories

Mailing Address:

P.O. Box 30712
Charleston, South Carolina 29417

Express Mail Delivery and Shipping Address:

2040 Savage Road
Charleston, South Carolina 29414

Telephone Number:
(803) 556-8171

Summary:

Sample receipt

The samples for National Parks Service, Charleston Harbor Site arrived at General Engineering Laboratories, Charleston, South Carolina, throughout the last two weeks of August and the first week of September, 1992. All sample containers arrived without any visible signs of tampering or breakage and samples within the containers were found to be unbroken. Shipping packages contained proper chain of custody documentation and signatures.

The following samples were received by the laboratory:

SAMPLE DESCRIPTION	DATE RECEIVED	LABORATORY IDENTIFICATION
NPS-CHS, S-10, 10'-12'	08/18/92	9208313-01
NPS-CHS; S-8 0"-6"	08/19/92	9208343-01
NPS-CHS; S-8 3'-4'	08/19/92	9208343-02
NPS-CHS; S-8 19'-23'	08/19/92	9208343-03

SAMPLE DESCRIPTION	DATE RECEIVED	LABORATORY IDENTIFICATION
NPS-CHS; S-8 26'-30'	08/19/92	9208343-04
NPS-CHS; S-6 0"-6"	08/19/92	9208343-05
NPS-CHS; S-6 3'-4'	08/19/92	9208343-06
NPS-CHS; S-6, 12.5'-14'	08/20/92	9208369-01
NPS-CHS; S-6, 18'-20'	08/20/92	9208369-02
NPS-CHS; S-9, 0"-6"	08/20/92	9208369-03
NPS-CHS; S-9, 3'-4'	08/20/92	9208369-04
NPS-CHS; S-9, 13'-17'	08/20/92	9208369-05
NPS-CHS; S-9, 23'-25'	08/20/92	9208369-06
NPS-CHS; S-4, 0"-6"	08/21/92	9208391-01
NPS-CHS; S-4, 3'-4'	08/21/92	9208391-02
NPS-CHS; S-4, 15'-17'	08/21/92	9208391-03
NPS-CHS; S-4, 11'-13'	08/21/92	9208391-04
NPS-CHS; S-3, 0"-6"	08/24/92	9208408-01
NPS-CHS; S-3, 3'-4'	08/24/92	9208408-02
NPS-CHS; S-3, 17'-19'	08/24/92	9208408-03
NPS-CHS; S-3, 9'-13'	08/24/92	9208408-04
NPS-CHS; S-1, 0"-6"	08/25/92	9208437-01
NPS-CHS; S-1, 3'-4'	08/25/92	9208437-02
NPS-CHS; S-1, 13'-15'	08/25/92	9208437-03
NPS-CHS; S-12, 3'-4'	08/25/92	9208437-04
NPS-CHS; S-12, 13'-15'	08/25/92	9208437-05
NPS-CHS; S-12, 19'-21'	08/25/92	9208437-06
NPS-CHS; S-1, 7'-9'	08/25/92	9208437-07
NPS-CHS; S-11, 3'-4'	08/26/92	9208465-01
NPS-CHS; S-11, 27'-31'	08/26/92	9208465-02
NPS-CHS; S-10, 3'-4'	09/03/92	9209076-01

SAMPLE DESCRIPTION	DATE RECEIVED	LABORATORY IDENTIFICATION
MW-2	09/03/92	9209100-01
MW-4	09/03/92	9209100-02
MW-5	09/03/92	9209100-03
MW-6	09/03/92	9209100-04
MW-7	09/03/92	9209100-05
MW-8	09/03/92	9209100-06
MW-10	09/03/92	9209100-07
MW-1	09/04/92	9209119-01
MW-3	09/04/92	9209119-02
MW-4	09/04/92	9209119-03
MW-9	09/04/92	9209119-04
FIELD BLANK	09/04/92	9209119-05
MW-11	09/04/92	9209119-06
SW-1	09/04/92	9209119-07
SD-1	09/04/92	9209119-08
SW-2	09/04/92	9209119-09
SD-2	09/04/92	9209119-10
SW-3	09/04/92	9209119-11
SD-3	09/04/92	9209119-12
TRIP BLANK	09/04/92	9209119-13
SD-4	09/04/92	9209119-14
MW-12	09/04/92	9209119-15

Sample Preparation and Analysis:

EPA SW-846 methodologies were adhered to in regards to target compound lists, quantitation limits, analytical methods, quality control requirements, chain of custody, document control, and standard operating procedures.

Interpretation of Data Qualifiers

Upon review of the certificates of analysis, four qualifiers are used in the interpretation of the data package. These qualifiers are:

U = Analyte was not detected

J = Estimated values which reflect analyte concentrations below the quantitation limit but above the method detection limit

JB = Estimated value for an analyte found in the sample and in its associated analytical blank. The reported concentration of the sample is estimated high.

A = Suspected Aldol Condensation Product. This qualifier is found only on the Tentatively Identified Compound (TIC) report.

I certify that this data package, to the best of my knowledge, is in compliance with the technical and administrative requirements as stated in the methodologies.

Robert L. Pullano
Quality Assurance Group Leader

city00391

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GENERAL ENGINEERING LABORATORIES

Environmental Engineering and Analytical Services

lly F. Greene
sident

George C. Greene, P.E., Ph.D.
Vice President
SC Registration No. 9103

Laboratory	Certifications:
FL	E87156/87294
NC	233
SC	10120
VA	00151
TN	02934
WI	99988779

CERTIFICATE OF ANALYSIS

Sample: 9208437-01 Client ID: Matrix: Soil Description: NPS-CHS S-1, 0"-6"
Sampled: 08/25/92 Received: 08/25/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19483 Run Analyst: VLD DOA: 09/01/92 TOA: 1600
Evaporative Loss @ 105 C	9.00		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20552 Run Analyst: GZ DOA: 09/04/92 TOA: 1659
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19480 Run Analyst: GZ DOA: 09/04/92 TOA: 1659
				Prep Analyst: VLD DOP: 08/31/92 TOP: 1600
1,2,4-Trichlorobenzene		U	3050	ug/kg
1,2-Dichlorobenzene		U	3050	ug/kg
1,3-Dichlorobenzene		U	3050	ug/kg
1,4-Dichlorobenzene		U	3050	ug/kg
2,4-Dinitrotoluene		U	3050	ug/kg
2,6-Dinitrotoluene		U	3050	ug/kg
2-Chloronaphthalene		U	3050	ug/kg
2-Methylnaphthalene		U	3050	ug/kg
3,3'-Dichlorobenzidine		U	6100	ug/kg
4-Bromophenyl phenyl ether		U	6100	ug/kg
4-Chloroaniline		U	3050	ug/kg
4-Chlorophenyl phenyl ether		U	3050	ug/kg
Acenaphthene		U	3050	ug/kg
Acenaphthylene		U	3050	ug/kg
Anthracene		U	3050	ug/kg
Benzo(a)anthracene		U	3050	ug/kg
Benzo(a)pyrene		U	3050	ug/kg
Benzo(b)fluoranthene		U	5700	ug/kg
Benzo(ghi)perylene		U	3050	ug/kg
Benzo(k)fluoranthene		U	7630	ug/kg
Butyl benzyl phthalate		U	3050	ug/kg
Chrysene		U	6100	ug/kg
Di-n-butyl phthalate		U	6100	ug/kg
Di-n-octyl phthalate		U	6100	ug/kg
Dibenzo(a,h)anthracene		U	3050	ug/kg
Dibenzofuran		U	3050	ug/kg
Diethyl phthalate		U	3050	ug/kg
Dimethyl phthalate		U	3050	ug/kg
Fluoranthene		U	3050	ug/kg
Fluorene		U	3050	ug/kg
Hexachlorobenzene		U	3050	ug/kg
Hexachlorobutadiene		U	3050	ug/kg
Hexachlorocyclopentadiene		U	6650	ug/kg
Hexachloroethane		U	3050	ug/kg
Indeno(1,2,3-c,d)pyrene		U	6100	ug/kg
Isophorone		U	3050	ug/kg
N-Nitrosodiphenylamine		U	6100	ug/kg
N-Nitrosodipropylamine		U	3050	ug/kg
Naphthalene		U	3050	ug/kg
Nitrobenzene		U	3050	ug/kg
Phenanthrene		U	3050	ug/kg
Pyrene		U	3050	ug/kg
bis(2-Chloroethoxy)methane		U	3050	ug/kg
bis(2-Chloroethyl) ether		U	3050	ug/kg
bis(2-Chloroisopropyl)ether		U	3050	ug/kg
bis(2-Ethylhexyl)phthalate		U	6100	ug/kg
m-Nitroaniline		U	30500	ug/kg
o-Nitroaniline		U	3050	ug/kg
p-Nitroaniline		U	26300	ug/kg
PCB's Method: EPA 8080				Batch: 19523 Run Analyst: JLS DOA: 09/11/92 TOA: 0937
				Prep Analyst: VLD DOP: 09/01/92 TOP: 1500
PCB-1016		U	30500	ug/kg
PCB-1221		U	30500	ug/kg
PCB-1232		U	30500	ug/kg
PCB-1242		U	30500	ug/kg

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Environmental Engineering and Analytical Services

Molly F. Greene
President

George C. Greene, P.E., Ph.D.
Vice President
SC Registration No. 9103

Laboratory	Certifications:
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SC	10120
VA	00151
TN	02934
WI	99988779

CERTIFICATE OF ANALYSIS

Sample: 9208437-01 Client ID: Matrix: Soil Description: NPS-CHS S-1, 0"-6"
Sampled: 08/25/92 Received: 08/25/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248	88800		30500	ug/kg
PCB-1254		U	30500	ug/kg
PCB-1260		U	30500	ug/kg
PCB-1262		U	30500	ug/kg
ICP	Method: EPA 6010			Batch: 19487 Run Analyst: JSS DOA: 09/02/92 TOA: 1132 Prep Analyst: FGD DOP: 09/01/92 TOP: 1625
Silver		U	2.50	mg/kg
Arsenic	8.82		3.17	mg/kg
Barium	51.3		2.50	mg/kg
Cadmium	0.412	J	2.50	mg/kg
Chromium	27.7		2.50	mg/kg
Lead	137.		3.30	mg/kg
Selenium		U	8.67	mg/kg
Mercury	Method: EPA 7471			Batch: 19394 Run Analyst: ALK DOA: 08/31/92 TOA: 1300 Prep Analyst: ALK DOP: 08/28/92 TOP: 1200
Mercury	1020		145.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-01 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-1, 0" - 6"
Sampled: 08/25/92 Received: 08/25/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19480 Run Analyst: GZ DOA: 09/04/92 TOA: 1659	
None Found		--		ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-02 Client ID: Matrix: Soil Description: NPS-CHS S-1, 3'-4'
Sampled: 08/25/92 Received: 08/25/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19483 Run Analyst: VLD DOA: 09/01/92 TOA: 1600
Evaporative Loss @ 105 C	32.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20552 Run Analyst: GZ DOA: 09/03/92 TOA: 1949
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19480 Run Analyst: GZ DOA: 09/03/92 TOA: 1949
				Prep Analyst: VLD DOP: 08/31/92 TOP: 1600
1,2,4-Trichlorobenzene		U	4080	ug/kg
1,2-Dichlorobenzene		U	4080	ug/kg
1,3-Dichlorobenzene		U	4080	ug/kg
1,4-Dichlorobenzene		U	4080	ug/kg
2,4-Dinitrotoluene		U	4080	ug/kg
2,6-Dinitrotoluene		U	4080	ug/kg
2-Chloronaphthalene		U	4080	ug/kg
2-Methylnaphthalene	1970	J	4080	ug/kg
3,3'-Dichlorobenzidine		U	8170	ug/kg
4-Bromophenyl phenyl ether		U	8170	ug/kg
4-Chloroaniline		U	4080	ug/kg
4-Chlorophenyl phenyl ether		U	4080	ug/kg
Acenaphthene		U	4080	ug/kg
cenaphthylene		U	4080	ug/kg
nthracene	2410	J	4080	ug/kg
enzo(a)anthracene		U	4080	ug/kg
enzo(a)pyrene	3830	J	4080	ug/kg
Benzo(b)fluoranthene		U	7630	ug/kg
Benzo(ghi)perylene		U	4080	ug/kg
Benzo(k)fluoranthene		U	10200	ug/kg
Butyl benzyl phthalate		U	4080	ug/kg
Chrysene	4400	J	8170	ug/kg
Di-n-butyl phthalate		U	8170	ug/kg
Di-n-octyl phthalate		U	8170	ug/kg
Dibenzo(a,h)anthracene		U	4080	ug/kg
Dibenzofuran	529.	J	4080	ug/kg
Diethyl phthalate		U	4080	ug/kg
Dimethyl phthalate		U	4080	ug/kg
Fluoranthene		U	4080	ug/kg
Fluorene	2230	J	4080	ug/kg
Hexachlorobenzene		U	4080	ug/kg
Hexachlorobutadiene		U	4080	ug/kg
Hexachlorocyclopentadiene		U	8900	ug/kg
Hexachloroethane		U	4080	ug/kg
Indeno(1,2,3-c,d)pyrene	1600	J	8170	ug/kg
Isophorone		U	4080	ug/kg
N-Nitrosodiphenylamine		U	8170	ug/kg
N-Nitrosodipropylamine		U	4080	ug/kg
Naphthalene	1680	J	4080	ug/kg
Nitrobenzene		U	4080	ug/kg
Phenanthrene	6760		4080	ug/kg
Pyrene	7820		4080	ug/kg
bis(2-Chloroethoxy)methane		U	4080	ug/kg
bis(2-Chloroethyl) ether		U	4080	ug/kg
bis(2-Chloroisopropyl)ether		U	4080	ug/kg
bis(2-Ethylhexyl)phthalate		U	8170	ug/kg
m-Nitroaniline		U	40800	ug/kg
o-Nitroaniline		U	4080	ug/kg
p-Nitroaniline		U	35200	ug/kg
PCB's Method: EPA 8080				Batch: 19523 Run Analyst: JLS DOA: 09/11/92 TOA: 1017
				Prep Analyst: VLD DOP: 09/01/92 TOP: 1500
PCB-1016		U	81700	ug/kg
PCB-1221		U	81700	ug/kg
CB-1232		U	81700	ug/kg
CB-1242		U	81700	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-02 Client ID: Matrix: Soil Description: NPS-CHS S-1, 3'-4'
Sampled: 08/25/92 Received: 08/25/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248	225000		81700	ug/kg
PCB-1254		U	81700	ug/kg
PCB-1260		U	81700	ug/kg
PCB-1262		U	81700	ug/kg
ICP	Method: EPA 6010			Batch: 19487 Run Analyst: JSS DOA: 09/02/92 TOA: 1136 Prep Analyst: FGD DOP: 09/01/92 TOP: 1625
Silver		U	2.50	mg/kg
Arsenic	8.60		3.20	mg/kg
Barium	34.6		2.50	mg/kg
Cadmium	0.194	J	2.50	mg/kg
Chromium	21.5		2.50	mg/kg
Lead	77.5		3.33	mg/kg
Selenium		U	8.73	mg/kg
Mercury	Method: EPA 7471			Batch: 19394 Run Analyst: ALK DOA: 08/31/92 TOA: 1300 Prep Analyst: ALK DOP: 08/28/92 TOP: 1200
Mercury	213.		145.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-02 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-1, 3' - 4'
Sampled: 08/25/92 Received: 08/25/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19480 Run Analyst: GZ DOA: 09/03/92 TOA: 1949	
C9 Alkyl benzene	17,847	J	--	ug/kg
Benzene 1- propynyl	7,843	J	--	ug/kg
Benzene, (1-nitroethyl)	15,686	J	--	ug/kg
C10 Alkyl benzene	11,765	J	--	ug/kg
C10 Alkyl benzene	15,686	J	--	ug/kg
C10 Alkyl benzene	11,765	J	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-07 Client ID: Matrix: Soil Description: NPS-CBS S-1, 7'-9'
Sampled: 08/25/92 Received: 08/25/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Volatiles Method: EPA 8240 extended				Batch: 19438 Run Analyst: MKP DOA: 08/28/92 TOA: 2315
GCMS Library Search-VOA	YES			
GC/MS Volatiles Method: EPA 8240 extended				Batch: 19438 Run Analyst: MKP DOA: 08/28/92 TOA: 2315
1,1,1-Trichloroethane		U	145.	ug/kg
1,1,2,2-Tetrachloroethane		U	145.	ug/kg
1,1,2-Trichloroethane		U	145.	ug/kg
1,1-Dichloroethane		U	145.	ug/kg
1,1-Dichloroethylene		U	145.	ug/kg
1,2-Dichloroethane		U	145.	ug/kg
1,2-Dichloropropane		U	145.	ug/kg
1,2-cis-Dichloroethylene		U	145.	ug/kg
1,2-trans-Dichloroethylene		U	145.	ug/kg
2-Butanone		U	725.	ug/kg
2-Hexanone		U	145.	ug/kg
4-Methyl-2-pentanone		U	145.	ug/kg
Acetone	1040		725.	ug/kg
Benzene	4720		145.	ug/kg
Bromoform		U	145.	ug/kg
Carbon Disulfide		U	145.	ug/kg
Carbon Tetrachloride		U	145.	ug/kg
Chlorobenzene		U	145.	ug/kg
Chlorodibromomethane		U	145.	ug/kg
Chloroethane		U	145.	ug/kg
Chloroform		U	145.	ug/kg
Dichlorobromomethane		U	145.	ug/kg
Ethylbenzene	1600		145.	ug/kg
Methyl Bromide		U	145.	ug/kg
Methyl Chloride		U	145.	ug/kg
Methylene Chloride	337.		145.	ug/kg
Styrene	492.		145.	ug/kg
Tetrachloroethylene		U	145.	ug/kg
Toluene	4060		145.	ug/kg
Trichloroethylene		U	145.	ug/kg
Vinyl Acetate		U	145.	ug/kg
Vinyl chloride		U	145.	ug/kg
Xylenes (TOTAL)	9570		290.	ug/kg
cis-1,3-Dichloropropylene		U	145.	ug/kg
trans-1,3-Dichloropropylene		U	145.	ug/kg
Other Organic Tests Method: EPA 160.3				Batch: 19483 Run Analyst: VLD DOA: 09/01/92 TOA: 1600
Evaporative Loss @ 105 C	54.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 19480 Run Analyst: GZ DOA: 09/03/92 TOA: 2346
GCMS Library Search-ACID	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19480 Run Analyst: GZ DOA: 09/03/92 TOA: 2346
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19480 Run Analyst: GZ DOA: 09/03/92 TOA: 2346
				Prep Analyst: VLD DOP: 08/31/92 TOP: 1600
2,4,5-Trichlorophenol		U	60300	ug/kg
2,4,6-Trichlorophenol		U	60300	ug/kg
2,4-Dichlorophenol		U	60300	ug/kg
2,4-Dimethylphenol		U	60300	ug/kg
2,4-Dinitrophenol		U	121000	ug/kg
2-Chlorophenol		U	60300	ug/kg
2-Nitrophenol		U	60300	ug/kg
2-methyl-4,6-dinitrophenol		U	60300	ug/kg
4-Nitrophenol		U	1150000	ug/kg
4-chloro-3-methyl phenol		U	60300	ug/kg
Benzoic Acid		U	1460000	ug/kg
Benzyl Alcohol		U	60300	ug/kg
Pentachlorophenol		U	60300	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-07 Client ID: Matrix: Soil Description: NPS-CHS S-1, 7'-9'
Sampled: 08/25/92 Received: 08/25/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Phenol		U	60300	ug/kg
o-Cresol		U	60300	ug/kg
p-Cresol		U	60300	ug/kg
GC/MS Extractables Method: EPA 8270				Batch: 19480 Run Analyst: GZ DOA: 09/03/92 TOA: 2346 Prep Analyst: VLD DOP: 08/31/92 TOP: 1600
1,2,4-Trichlorobenzene		U	60300	ug/kg
1,2-Dichlorobenzene		U	60300	ug/kg
1,3-Dichlorobenzene		U	60300	ug/kg
1,4-Dichlorobenzene		U	60300	ug/kg
2,4-Dinitrotoluene		U	60300	ug/kg
2,6-Dinitrotoluene		U	60300	ug/kg
2-Chloronaphthalene		U	60300	ug/kg
2-Methylnaphthalene	565000		60300	ug/kg
3,3'-Dichlorobenzidine		U	121000	ug/kg
4-Bromophenyl phenyl ether		U	121000	ug/kg
4-Chloroaniline		U	60300	ug/kg
4-Chlorophenyl phenyl ether		U	60300	ug/kg
Acenaphthene	268000		60300	ug/kg
Acenaphthylene		U	60300	ug/kg
Anthracene	623000		60300	ug/kg
Benzo(a)anthracene	471000		60300	ug/kg
Benzo(a)pyrene	457000		60300	ug/kg
Benzo(b)fluoranthene	406000		113000	ug/kg
Benzo(ghi)perylene	123000		60300	ug/kg
Benzo(k)fluoranthene	304000		151000	ug/kg
Butyl benzyl phthalate		U	60300	ug/kg
Chrysene	406000		121000	ug/kg
Di-n-butyl phthalate		U	121000	ug/kg
Di-n-octyl phthalate		U	121000	ug/kg
Dibenzo(a,h)anthracene		U	60300	ug/kg
Dibenzofuran	428000		60300	ug/kg
Diethyl phthalate		U	60300	ug/kg
Dimethyl phthalate		U	60300	ug/kg
Fluoranthene	1010000		242000	ug/kg
Fluorene	652000		60300	ug/kg
Hexachlorobenzene		U	60300	ug/kg
Hexachlorobutadiene		U	60300	ug/kg
Hexachlorocyclopentadiene		U	132000	ug/kg
Hexachloroethane		U	60300	ug/kg
Indeno(1,2,3-c,d)pyrene	8260	J	121000	ug/kg
Isophorone		U	60300	ug/kg
N-Nitrosodiphenylamine		U	121000	ug/kg
N-Nitrosodipropylamine		U	60300	ug/kg
Naphthalene	1300000		242000	ug/kg
Nitrobenzene		U	60300	ug/kg
Phenanthrene	1680000		242000	ug/kg
Pyrene	841000		242000	ug/kg
bis(2-Chloroethoxy)methane		U	60300	ug/kg
bis(2-Chloroethyl) ether		U	60300	ug/kg
bis(2-Chloroisopropyl)ether		U	60300	ug/kg
bis(2-Ethylhexyl)phthalate		U	121000	ug/kg
m-Nitroaniline		U	603000	ug/kg
o-Nitroaniline		U	60300	ug/kg
p-Nitroaniline		U	520000	ug/kg
Pesticides Method: EPA 8080				Batch: 19375 Run Analyst: JEB DOA: 08/31/92 TOA: 1901 Prep Analyst: LMJ DOP: 08/28/92 TOP: 1500
4,4'-DDD		U	36.2	ug/kg
4,4'-DDE		U	36.2	ug/kg
4,4'-DDT		U	36.2	ug/kg
Aldrin		U	36.2	ug/kg
Dieldrin		U	36.2	ug/kg
Endosulfan I		U	36.2	ug/kg
Endosulfan II		U	36.2	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-07 Client ID: Matrix: Soil Description: NPS-CHS S-1, 7'-9'
Sampled: 08/25/92 Received: 08/25/92 Page: 3
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Endosulfan sulfate		U	36.2	ug/kg
Endrin		U	36.2	ug/kg
Endrin ketone		U	36.2	ug/kg
Heptachlor		U	36.2	ug/kg
Heptachlor epoxide		U	36.2	ug/kg
Methoxychlor		U	36.2	ug/kg
PCB-1016		U	36.2	ug/kg
PCB-1221		U	36.2	ug/kg
PCB-1232		U	36.2	ug/kg
PCB-1242		U	36.2	ug/kg
PCB-1248		U	36.2	ug/kg
PCB-1254		U	36.2	ug/kg
PCB-1260		U	36.2	ug/kg
Toxaphene		U	36.2	ug/kg
alpha-BHC		U	36.2	ug/kg
alpha-Chlordane		U	36.2	ug/kg
beta-BHC		U	36.2	ug/kg
delta-BHC		U	36.2	ug/kg
gamma-BHC		U	36.2	ug/kg
gamma-Chlordane		U	36.2	ug/kg
ICP	Method: EPA 6010			Batch: 19487 Run Analyst: JSS DOA: 09/02/92 TOA: 1156 Prep Analyst: FGD DOP: 09/01/92 TOP: 1625
Silver		U	2.50	mg/kg
Aluminum	7320		2.50	mg/kg
Arsenic	16.3		3.15	mg/kg
Barium	15.4		2.50	mg/kg
Beryllium	0.619	J	2.50	mg/kg
Calcium	2940		3.15	mg/kg
Cadmium		U	2.50	mg/kg
Cobalt	2.43	J	2.50	mg/kg
Chromium	15.5		2.50	mg/kg
Copper	10.6		2.50	mg/kg
Iron	10700		2.50	mg/kg
Potassium	1190		15.0	mg/kg
Magnesium	2100		2.50	mg/kg
Manganese	88.4		2.50	mg/kg
Sodium	2820		6.50	mg/kg
Nickel	5.11		2.50	mg/kg
Lead	30.7		3.28	mg/kg
Antimony		U	4.33	mg/kg
Selenium		U	8.60	mg/kg
Thallium		U	6.82	mg/kg
Vanadium	22.3		2.50	mg/kg
Zinc	25.6		2.50	mg/kg
Mercury	Method: EPA 7471			Batch: 19394 Run Analyst: ALK DOA: 08/31/92 TOA: 1300 Prep Analyst: ALK DOP: 08/28/92 TOP: 1200
Mercury	275.		167.	ug/kg
Cyanide by RFA	Method: EPA 335.3			Batch: 19811 Run Analyst: JEN DOA: 09/01/92 TOA: 1400
Cyanide, Total	0.600		0.167	mg/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-07 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-1, 7' - 9'
Sampled: 08/25/92 Received: 08/25/92 Page: 1

Project: CITY00391 Manager: TDH

GC/MS VOL Method: EPA 8240 Batch: 19438 Run Analyst: MKP DOA: 08/28/92 TOA: 2315

Parameter	Result	Qual	CRDL	Units
C9 alkyl benzene	1,714	J	--	ug/kg
Trimethyl benzene (isomer)	1,142	J	--	ug/kg
Trimethyl benzene (isomer)	3,296	J	--	ug/kg
Benzofuran	1,494	J	--	ug/kg
C10 alkyl benzene	2,417	J	--	ug/kg
C9 alkyl benzene	1,626	J	--	ug/kg
1H-Indene, 2,3-dihydro	3,296	J	--	ug/kg
Indene	7,912	J	--	ug/kg
Methyl benzofuran (isomer)	747	J	--	ug/kg
Methyl benzofuran (isomer)	3,076	J	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-03 Client ID: Matrix: Soil Description: NPS-CHS S-1, 13'-15
Sampled: 08/25/92 Received: 08/25/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19483 Run Analyst: VLD DOA: 09/01/92 TOA: 1600
Evaporative Loss @ 105 C	48.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20552 Run Analyst: GZ DOA: 09/03/92 TOA: 2036
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19480 Run Analyst: GZ DOA: 09/03/92 TOA: 2036
				Prep Analyst: VLD DOP: 08/31/92 TOP: 1600
1,2,4-Trichlorobenzene		U	5350	ug/kg
1,2-Dichlorobenzene		U	5350	ug/kg
1,3-Dichlorobenzene		U	5350	ug/kg
1,4-Dichlorobenzene		U	5350	ug/kg
2,4-Dinitrotoluene		U	5350	ug/kg
2,6-Dinitrotoluene		U	5350	ug/kg
2-Chloronaphthalene		U	5350	ug/kg
2-Methylnaphthalene		U	5350	ug/kg
3,3'-Dichlorobenzidine		U	10700	ug/kg
4-Bromophenyl phenyl ether		U	10700	ug/kg
4-Chloroaniline		U	5350	ug/kg
4-Chlorophenyl phenyl ether		U	5350	ug/kg
Acenaphthene		U	5350	ug/kg
Acenaphthylene		U	5350	ug/kg
Anthracene	4490	J	5350	ug/kg
Benzo(a)anthracene		U	5350	ug/kg
Benzo(a)pyrene		U	5350	ug/kg
Benzo(b)fluoranthene		U	9980	ug/kg
Benzo(ghi)perylene		U	5350	ug/kg
Benzo(k)fluoranthene		U	13400	ug/kg
Butyl benzyl phthalate		U	5350	ug/kg
Chrysene		U	10700	ug/kg
Di-n-butyl phthalate		U	10700	ug/kg
Di-n-octyl phthalate		U	10700	ug/kg
Dibenzo(a,h)anthracene		U	5350	ug/kg
Dibenzofuran	551.	J	5350	ug/kg
Diethyl phthalate		U	5350	ug/kg
Dimethyl phthalate		U	5350	ug/kg
Fluoranthene	2460	J	5350	ug/kg
Fluorene		U	5350	ug/kg
Hexachlorobenzene		U	5350	ug/kg
Hexachlorobutadiene		U	5350	ug/kg
Hexachlorocyclopentadiene		U	11700	ug/kg
Hexachloroethane		U	5350	ug/kg
Indeno(1,2,3-c,d)pyrene		U	10700	ug/kg
Isophorone		U	5350	ug/kg
N-Nitrosodiphenylamine		U	10700	ug/kg
N-Nitrosodipropylamine		U	5350	ug/kg
Naphthalene	1840	J	5350	ug/kg
Nitrobenzene		U	5350	ug/kg
Phenanthrene	3850	J	5350	ug/kg
Pyrene	2170	J	5350	ug/kg
bis(2-Chloroethoxy)methane		U	5350	ug/kg
bis(2-Chloroethyl) ether		U	5350	ug/kg
bis(2-Chloroisopropyl)ether		U	5350	ug/kg
bis(2-Ethylhexyl)phthalate		U	10700	ug/kg
m-Nitroaniline		U	53500	ug/kg
o-Nitroaniline		U	5350	ug/kg
p-Nitroaniline		U	46000	ug/kg
PCB's Method: EPA 8080				Batch: 19523 Run Analyst: JLS DOA: 09/11/92 TOA: 1056
				Prep Analyst: VLD DOP: 09/01/92 TOP: 1500
PCB-1016		U	535.	ug/kg
PCB-1221		U	535.	ug/kg
PCB-1232		U	535.	ug/kg
PCB-1242		U	535.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-03 Client ID: Matrix: Soil Description: NPS-CHS S-1, 13'-15
Sampled: 08/25/92 Received: 08/25/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248	1560		535.	ug/kg
PCB-1254		U	535.	ug/kg
PCB-1260		U	535.	ug/kg
PCB-1262		U	535.	ug/kg
ICP	Method: EPA 6010			Batch: 19487 Run Analyst: JSS DOA: 09/02/92 TOA: 1138 Prep Analyst: FGD DOP: 09/01/92 TOP: 1625
Silver		U	2.50	mg/kg
Arsenic	14.4		3.13	mg/kg
Barium	8.80		2.50	mg/kg
Cadmium		U	2.50	mg/kg
Chromium	17.1		2.50	mg/kg
Lead	4.12		3.25	mg/kg
Selenium		U	8.53	mg/kg
Mercury	Method: EPA 7471			Batch: 19394 Run Analyst: ALK DOA: 08/31/92 TOA: 1300 Prep Analyst: ALK DOP: 08/28/92 TOP: 1200
Mercury		U	159.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-03 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-1, 13' - 15'
Sampled: 08/25/92 Received: 08/25/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270 Batch: 19480 Run Analyst: GZ DOA: 09/03/92 TOA: 2036				
2 - Pentanone, 4 - hydroxy - 4 - methyl	10,256	JAB	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208408-01 Client ID: Matrix: Soil Description: NPS-CES S-3, 0"-6"
Sampled: 08/24/92 Received: 08/24/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19316 Run Analyst: VLD DOA: 08/27/92 TOA: 0900
Evaporative Loss @ 105 C	10.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20552 Run Analyst: AGW DOA: 09/01/92 TOA: 2142
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2142
				Prep Analyst: ECP DOP: 08/27/92 TOP: 1700
1,2,4-Trichlorobenzene		U	3080	ug/kg
1,2-Dichlorobenzene		U	3080	ug/kg
1,3-Dichlorobenzene		U	3080	ug/kg
1,4-Dichlorobenzene		U	3080	ug/kg
2,4-Dinitrotoluene		U	3080	ug/kg
2,6-Dinitrotoluene		U	3080	ug/kg
2-Chloronaphthalene		U	3080	ug/kg
2-Methylnaphthalene		U	3080	ug/kg
3,3'-Dichlorobenzidine		U	6170	ug/kg
4-Bromophenyl phenyl ether		U	6170	ug/kg
4-Chloroaniline		U	3080	ug/kg
4-Chlorophenyl phenyl ether		U	3080	ug/kg
Acenaphthene		U	3080	ug/kg
Acenaphthylene		U	3080	ug/kg
nthracene		U	3080	ug/kg
enzo(a)anthracene		U	3080	ug/kg
enzo(a)pyrene		U	3080	ug/kg
Benzo(b)fluoranthene		U	5770	ug/kg
Benzo(ghi)perylene		U	3080	ug/kg
Benzo(k)fluoranthene		U	7720	ug/kg
Butyl benzyl phthalate		U	3080	ug/kg
Chrysene		U	6170	ug/kg
Di-n-butyl phthalate		U	6170	ug/kg
Di-n-octyl phthalate		U	6170	ug/kg
Dibenzo(a,h)anthracene		U	3080	ug/kg
Dibenzofuran		U	3080	ug/kg
Diethyl phthalate		U	3080	ug/kg
Dimethyl phthalate		U	3080	ug/kg
Fluoranthene		U	3080	ug/kg
Fluorene		U	3080	ug/kg
Hexachlorobenzene		U	3080	ug/kg
Hexachlorobutadiene		U	3080	ug/kg
Hexachlorocyclopentadiene		U	6730	ug/kg
Hexachloroethane		U	3080	ug/kg
Indeno(1,2,3-c,d)pyrene		U	6170	ug/kg
Isophorone		U	3080	ug/kg
N-Nitrosodiphenylamine		U	6170	ug/kg
N-Nitrosodipropylamine		U	3080	ug/kg
Naphthalene		U	3080	ug/kg
Nitrobenzene		U	3080	ug/kg
Phenanthrene		U	3080	ug/kg
Pyrene		U	3080	ug/kg
bis(2-Chloroethoxy)methane		U	3080	ug/kg
bis(2-Chloroethyl) ether		U	3080	ug/kg
bis(2-Chloroisopropyl)ether		U	3080	ug/kg
bis(2-Ethylhexyl)phthalate		U	6170	ug/kg
m-Nitroaniline		U	30800	ug/kg
o-Nitroaniline		U	3080	ug/kg
p-Nitroaniline		U	26500	ug/kg
PCB's Method: EPA 8080				Batch: 19374 Run Analyst: JLS DOA: 09/01/92 TOA: 0253
				Prep Analyst: LMJ DOP: 08/28/92 TOP: 1500
PCB-1016		U	61.7	ug/kg
PCB-1221		U	61.7	ug/kg
PCB-1232		U	61.7	ug/kg
CB-1242		U	61.7	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208408-01 Client ID: Matrix: Soil Description: NPS-CHS S-3, 0"-6"
Sampled: 08/24/92 Received: 08/24/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	61.7	ug/kg
PCB-1254		U	61.7	ug/kg
PCB-1260		U	61.7	ug/kg
PCB-1262		U	61.7	ug/kg
ICP	Method: EPA 6010			Batch: 19244 Run Analyst: JSS DOA: 08/27/92 TOA: 1554 Prep Analyst: FGD DOP: 08/26/92 TOP: 1600
Silver		U	2.50	mg/kg
Arsenic	4.99		3.20	mg/kg
Barium	40.8		2.50	mg/kg
Cadmium	0.298	J	2.50	mg/kg
Chromium	201.		2.50	mg/kg
Lead	146.		3.33	mg/kg
Selenium		U	8.73	mg/kg
Mercury	Method: EPA 7471			Batch: 19394 Run Analyst: ALK DOA: 08/31/92 TOA: 1300 Prep Analyst: ALK DOP: 08/28/92 TOP: 1200
Mercury	248.		159.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208408-01 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-3, 0" - 6"
Sampled: 08/24/92 Received: 08/24/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270 Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2142				
2 - Pentanone, 4 - hydroxy - 4 - methyl	3,704	JAB	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208408-02 Client ID: Matrix: Soil Description: NPS-CHS S-3, 3'-4'
Sampled: 08/24/92 Received: 08/24/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19316 Run Analyst: VLD DOA: 08/27/92 TOA: 0900
Evaporative Loss @ 105 C	18.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20552 Run Analyst: AGW DOA: 09/01/92 TOA: 2226
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2226 Prep Analyst: ECP DOP: 08/27/92 TOP: 1700
1,2,4-Trichlorobenzene		U	3380	ug/kg
1,2-Dichlorobenzene		U	3380	ug/kg
1,3-Dichlorobenzene		U	3380	ug/kg
1,4-Dichlorobenzene		U	3380	ug/kg
2,4-Dinitrotoluene		U	3380	ug/kg
2,6-Dinitrotoluene		U	3380	ug/kg
2-Chloronaphthalene		U	3380	ug/kg
2-Methylnaphthalene		U	3380	ug/kg
3,3'-Dichlorobenzidine		U	6780	ug/kg
4-Bromophenyl phenyl ether		U	6780	ug/kg
4-Chloroaniline		U	3380	ug/kg
4-Chlorophenyl phenyl ether		U	3380	ug/kg
Acenaphthene		U	3380	ug/kg
cenaphthylene		U	3380	ug/kg
hthracene		U	3380	ug/kg
enzo(a)anthracene		U	3380	ug/kg
enzo(a)pyrene		U	3380	ug/kg
Benzo(b)fluoranthene		U	6330	ug/kg
Benzo(ghi)perylene		U	3380	ug/kg
Benzo(k)fluoranthene		U	8470	ug/kg
Butyl benzyl phthalate		U	3380	ug/kg
Chrysene		U	6780	ug/kg
Di-n-butyl phthalate		U	6780	ug/kg
Di-n-octyl phthalate		U	6780	ug/kg
Dibenzo(a,h)anthracene		U	3380	ug/kg
Dibenzofuran		U	3380	ug/kg
Diethyl phthalate		U	3380	ug/kg
Dimethyl phthalate		U	3380	ug/kg
Fluoranthene		U	3380	ug/kg
Fluorene		U	3380	ug/kg
Hexachlorobenzene		U	3380	ug/kg
Hexachlorobutadiene		U	3380	ug/kg
Hexachlorocyclopentadiene		U	7380	ug/kg
Hexachloroethane		U	3380	ug/kg
Indeno(1,2,3-c,d)pyrene		U	6780	ug/kg
Isophorone		U	3380	ug/kg
N-Nitrosodiphenylamine		U	6780	ug/kg
N-Nitrosodipropylamine		U	3380	ug/kg
Naphthalene		U	3380	ug/kg
Nitrobenzene		U	3380	ug/kg
Phenanthrene		U	3380	ug/kg
Pyrene		U	3380	ug/kg
bis(2-Chloroethoxy)methane		U	3380	ug/kg
bis(2-Chloroethyl) ether		U	3380	ug/kg
bis(2-Chloroisopropyl)ether		U	3380	ug/kg
bis(2-Ethylhexyl)phthalate		U	6780	ug/kg
m-Nitroaniline		U	33800	ug/kg
o-Nitroaniline		U	3380	ug/kg
p-Nitroaniline		U	29200	ug/kg
PCB's Method: EPA 8080				Batch: 19374 Run Analyst: JLS DOA: 09/01/92 TOA: 0332 Prep Analyst: LMJ DOP: 08/28/92 TOP: 1500
PCB-1016		U	67.8	ug/kg
PCB-1221		U	67.8	ug/kg
CB-1232		U	67.8	ug/kg
B-1242		U	67.8	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208408-02 Client ID: Matrix: Soil Description: NPS-CHS S-3, 3'-4'
Sampled: 08/24/92 Received: 08/24/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	67.8	ug/kg
PCB-1254		U	67.8	ug/kg
PCB-1260		U	67.8	ug/kg
PCB-1262		U	67.8	ug/kg
ICP	Method: EPA 6010			Batch: 19244 Run Analyst: JSS DOA: 08/27/92 TOA: 1556 Prep Analyst: FGD DOP: 08/26/92 TOP: 1600
Silver		U	2.50	mg/kg
Arsenic	2.70	J	3.17	mg/kg
Barium	18.8		2.50	mg/kg
Cadmium		U	2.50	mg/kg
Chromium	11.7		2.50	mg/kg
Lead	15.3		3.30	mg/kg
Selenium		U	8.67	mg/kg
Mercury	Method: EPA 7471			Batch: 19394 Run Analyst: ALK DOA: 08/31/92 TOA: 1300 Prep Analyst: ALK DOP: 08/28/92 TOP: 1200
Mercury	13.6	J	152.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208408-02 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-3, 3' - 4'
Sampled: 08/24/92 Received: 08/24/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270				Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2226
2 - Pentanone, 4 - hydroxy - 4 - methyl	4,472	JAB	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208408-04 Client ID: Matrix: Soil Description: NPS-CHS S-3, 9'-13
Sampled: 08/24/92 Received: 08/24/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Volatiles Method: EPA 8240 extended				Batch: 19438 Run Analyst: MKP DOA: 08/28/92 TOA: 2111
GCMS Library Search-VOA	YES			
GC/MS Volatiles Method: EPA 8240 extended				Batch: 19438 Run Analyst: MKP DOA: 08/28/92 TOA: 2111
1,1,1-Trichloroethane		U	65.3	ug/kg
1,1,2,2-Tetrachloroethane		U	65.3	ug/kg
1,1,2-Trichloroethane		U	65.3	ug/kg
1,1-Dichloroethane		U	65.3	ug/kg
1,1-Dichloroethylene		U	65.3	ug/kg
1,2-Dichloroethane		U	65.3	ug/kg
1,2-Dichloropropane		U	65.3	ug/kg
1,2-cis-Dichloroethylene		U	65.3	ug/kg
1,2-trans-Dichloroethylene		U	65.3	ug/kg
2-Butanone		U	327.	ug/kg
2-Hexanone		U	65.3	ug/kg
4-Methyl-2-pentanone		U	65.3	ug/kg
Acetone	454.		327.	ug/kg
Benzene		U	65.3	ug/kg
Bromoform		U	65.3	ug/kg
Carbon Disulfide		U	65.3	ug/kg
Carbon Tetrachloride		U	65.3	ug/kg
Chlorobenzene		U	65.3	ug/kg
Chlorodibromomethane		U	65.3	ug/kg
Chloroethane		U	65.3	ug/kg
Chloroform		U	65.3	ug/kg
Dichlorobromomethane		U	65.3	ug/kg
Ethylbenzene		U	65.3	ug/kg
Methyl Bromide		U	65.3	ug/kg
Methyl Chloride		U	65.3	ug/kg
Methylene Chloride	150.		65.3	ug/kg
Styrene		U	65.3	ug/kg
Tetrachloroethylene		U	65.3	ug/kg
Toluene		U	65.3	ug/kg
Trichloroethylene		U	65.3	ug/kg
Vinyl Acetate		U	65.3	ug/kg
Vinyl chloride		U	65.3	ug/kg
Xylenes (TOTAL)	97.5	J	131.	ug/kg
cis-1,3-Dichloropropylene		U	65.3	ug/kg
trans-1,3-Dichloropropylene		U	65.3	ug/kg
Other Organic Tests Method: EPA 160.3				Batch: 19316 Run Analyst: VLD DOA: 08/27/92 TOA: 0900
Evaporative Loss @ 105 C	49.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2354
GCMS Library Search-ACID				
GC/MS Extractables Method: EPA 8270				Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2354
GCMS Library Search-B/N				
GC/MS Extractables Method: EPA 8270				Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2354 Prep Analyst: ECP DOP: 08/27/92 TOP: 1700
2,4,5-Trichlorophenol		U	5450	ug/kg
2,4,6-Trichlorophenol		U	5450	ug/kg
2,4-Dichlorophenol		U	5450	ug/kg
2,4-Dimethylphenol		U	5450	ug/kg
2,4-Dinitrophenol		U	10900	ug/kg
2-Chlorophenol		U	5450	ug/kg
2-Nitrophenol		U	5450	ug/kg
2-methyl-4,6-dinitrophenol		U	5450	ug/kg
4-Nitrophenol		U	103000	ug/kg
4-chloro-3-methyl phenol		U	5450	ug/kg
Benzoic Acid		U	132000	ug/kg
Benzyl Alcohol		U	5450	ug/kg
Pentachlorophenol		U	5450	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208408-04 Client ID: Matrix: Soil Description: NPS-CHS S-3, 9'-13
Sampled: 08/24/92 Received: 08/24/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Phenol		U	5450	ug/kg
o-Cresol		U	5450	ug/kg
p-Cresol		U	5450	ug/kg
GC/MS Extractables Method: EPA 8270				Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2354 Prep Analyst: ECP DOP: 08/27/92 TOP: 1700
1,2,4-Trichlorobenzene		U	5450	ug/kg
1,2-Dichlorobenzene		U	5450	ug/kg
1,3-Dichlorobenzene		U	5450	ug/kg
1,4-Dichlorobenzene		U	5450	ug/kg
2,4-Dinitrotoluene		U	5450	ug/kg
2,6-Dinitrotoluene		U	5450	ug/kg
2-Chloronaphthalene		U	5450	ug/kg
2-Methylnaphthalene		U	5450	ug/kg
3,3'-Dichlorobenzidine		U	10900	ug/kg
4-Bromophenyl phenyl ether		U	10900	ug/kg
4-Chloroaniline		U	5450	ug/kg
4-Chlorophenyl phenyl ether		U	5450	ug/kg
Acenaphthene		U	5450	ug/kg
Acenaphthylene		U	5450	ug/kg
Anthracene	5230	J	5450	ug/kg
Benzo(a)anthracene		U	5450	ug/kg
Benzo(a)pyrene	6410		5450	ug/kg
Benzo(b)fluoranthene		U	10200	ug/kg
Benzo(ghi)perylene		U	5450	ug/kg
Benzo(k)fluoranthene		U	13600	ug/kg
Butyl benzyl phthalate		U	5450	ug/kg
Chrysene		U	10900	ug/kg
Di-n-butyl phthalate		U	10900	ug/kg
Di-n-octyl phthalate		U	10900	ug/kg
Dibenzo(a,h)anthracene		U	5450	ug/kg
Dibenzofuran		U	5450	ug/kg
Diethyl phthalate		U	5450	ug/kg
Dimethyl phthalate		U	5450	ug/kg
Fluoranthene	9800		5450	ug/kg
Fluorene	5840		5450	ug/kg
Hexachlorobenzene		U	5450	ug/kg
Hexachlorobutadiene		U	5450	ug/kg
Hexachlorocyclopentadiene		U	11900	ug/kg
Hexachloroethane		U	5450	ug/kg
Indeno(1,2,3-c,d)pyrene		U	10900	ug/kg
Isophorone		U	5450	ug/kg
N-Nitrosodiphenylamine		U	10900	ug/kg
N-Nitrosodipropylamine		U	5450	ug/kg
Naphthalene	11100		5450	ug/kg
Nitrobenzene		U	5450	ug/kg
Phenanthrene	17000		5450	ug/kg
Pyrene	9150		5450	ug/kg
bis(2-Chloroethoxy)methane		U	5450	ug/kg
bis(2-Chloroethyl) ether		U	5450	ug/kg
bis(2-Chloroisopropyl)ether		U	5450	ug/kg
bis(2-Ethylhexyl)phthalate		U	10900	ug/kg
m-Nitroaniline		U	54500	ug/kg
o-Nitroaniline		U	5450	ug/kg
p-Nitroaniline		U	46800	ug/kg
Pesticides Method: EPA 8080				Batch: 19375 Run Analyst: JEB DOA: 08/31/92 TOA: 1820 Prep Analyst: LMJ DOP: 08/28/92 TOP: 1500
4,4'-DDD		U	3.27	ug/kg
4,4'-DDE		U	3.27	ug/kg
4,4'-DDT		U	3.27	ug/kg
Aldrin		U	3.27	ug/kg
Dieldrin		U	3.27	ug/kg
Endosulfan I		U	3.27	ug/kg
Endosulfan II		U	3.27	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208408-04 Client ID: Matrix: Soil Description: NPS-CHS S-3, 9'-13
Sampled: 08/24/92 Received: 08/24/92 Page: 3
Project: CITY00391 Manager: TDE

Parameter	Result	Qual	QL	Units
Endosulfan sulfate		U	3.27	ug/kg
Endrin		U	3.27	ug/kg
Endrin ketone		U	3.27	ug/kg
Heptachlor		U	3.27	ug/kg
Heptachlor epoxide		U	3.27	ug/kg
Methoxychlor		U	3.27	ug/kg
PCB-1016		U	3.27	ug/kg
PCB-1221		U	3.27	ug/kg
PCB-1232		U	3.27	ug/kg
PCB-1242		U	3.27	ug/kg
PCB-1248		U	3.27	ug/kg
PCB-1254		U	3.27	ug/kg
PCB-1260		U	3.27	ug/kg
Toxaphene		U	3.27	ug/kg
alpha-BHC		U	3.27	ug/kg
alpha-Chlordane		U	3.27	ug/kg
beta-BHC		U	3.27	ug/kg
delta-BHC		U	3.27	ug/kg
gamma-BHC		U	3.27	ug/kg
gamma-Chlordane		U	3.27	ug/kg
ICP	Method: EPA 6010			Batch: 19244 Run Analyst: JSS DOA: 08/27/92 TOA: 1601 Prep Analyst: FGD DOP: 08/26/92 TOP: 1600
Silver	0.0294	J	2.50	mg/kg
Aluminum	6990		2.50	mg/kg
Arsenic	7.24		3.17	mg/kg
Barium	33.8		2.50	mg/kg
Beryllium	0.564	J	2.50	mg/kg
Calcium	10100		3.17	mg/kg
Cadmium		U	2.50	mg/kg
Cobalt	2.35	J	2.50	mg/kg
Chromium	15.1		2.50	mg/kg
Copper	23.0		2.50	mg/kg
Iron	11100		2.50	mg/kg
Potassium	1450		15.1	mg/kg
Magnesium	3030		2.50	mg/kg
Manganese	98.6		2.50	mg/kg
Sodium	6120		6.55	mg/kg
Nickel	5.75		2.50	mg/kg
Lead	144.		3.30	mg/kg
Antimony		U	4.37	mg/kg
Selenium		U	8.67	mg/kg
Thallium		U	6.88	mg/kg
Vanadium	18.8		2.50	mg/kg
Zinc	29.7		2.50	mg/kg
Mercury	Method: EPA 7471			Batch: 19534 Run Analyst: ALK DOA: 09/03/92 TOA: 0930 Prep Analyst: ALK DOP: 09/02/92 TOP: 0900
Mercury	646.		139.	ug/kg
Cyanide by RFA	Method: EPA 335.3			Batch: 19850 Run Analyst: JEN DOA: 09/09/92 TOA: 1300
Cyanide, Total	0.0420	JB	0.167	mg/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208408-04 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-3, 9' - 13'
Sampled: 08/24/92 Received: 08/24/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270 Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2354				
2- pentanone -4 hydroxy - 4 -methyl	9,803	JAB	--	ug/kg
GC/MS VOA Method: EPA 8240 Batch: 19438 Run Analyst: MKP DOA: 08/28/92 TOA: 2111				
Unknown	78	J	--	ug/kg
Unknown	98	J	--	ug/kg
Benzene, trimethyl (isomer)	78	J	--	ug/kg
1H - Indene, 2,3 - dihydro	98	J	--	ug/kg
Benzene, 1-propynyl	254	J	--	ug/kg
Unknown	137	J	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208408-03 Client ID: Matrix: Soil Description: NPS-CHS S-3, 17'-19
Sampled: 08/24/92 Received: 08/24/92 Page: 1
Project: CITY00391 Manager: TDE

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19316 Run Analyst: VLD DOA: 08/27/92 TOA: 0900
Evaporative Loss @ 105 C	19.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20552 Run Analyst: AGW DOA: 09/01/92 TOA: 2310
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2310
				Prep Analyst: ECP DOP: 08/27/92 TOP: 1700
1,2,4-Trichlorobenzene		U	3430	ug/kg
1,2-Dichlorobenzene		U	3430	ug/kg
1,3-Dichlorobenzene		U	3430	ug/kg
1,4-Dichlorobenzene		U	3430	ug/kg
2,4-Dinitrotoluene		U	3430	ug/kg
2,6-Dinitrotoluene		U	3430	ug/kg
2-Chloronaphthalene		U	3430	ug/kg
2-Methylnaphthalene		U	3430	ug/kg
3,3'-Dichlorobenzidine		U	6870	ug/kg
4-Bromophenyl phenyl ether		U	6870	ug/kg
4-Chloroaniline		U	3430	ug/kg
4-Chlorophenyl phenyl ether		U	3430	ug/kg
Acenaphthene		U	3430	ug/kg
Acenaphthylene		U	3430	ug/kg
Anthracene	4940		3430	ug/kg
Benzo(a)anthracene		U	3430	ug/kg
Benzo(a)pyrene	2660	J	3430	ug/kg
Benzo(b)fluoranthene	30000		6420	ug/kg
Benzo(ghi)perylene		U	3430	ug/kg
Benzo(k)fluoranthene		U	8570	ug/kg
Butyl benzyl phthalate		U	3430	ug/kg
Chrysene		U	6870	ug/kg
Di-n-butyl phthalate		U	6870	ug/kg
Di-n-octyl phthalate		U	6870	ug/kg
Dibenzo(a,h)anthracene		U	3430	ug/kg
Dibenzofuran	3700		3430	ug/kg
Diethyl phthalate		U	3430	ug/kg
Dimethyl phthalate		U	3430	ug/kg
Fluoranthene	9470		3430	ug/kg
Fluorene	4530		3430	ug/kg
Hexachlorobenzene		U	3430	ug/kg
Hexachlorobutadiene		U	3430	ug/kg
Hexachlorocyclopentadiene		U	7480	ug/kg
Hexachloroethane		U	3430	ug/kg
Indeno(1,2,3-c,d)pyrene		U	6870	ug/kg
Isophorone		U	3430	ug/kg
N-Nitrosodiphenylamine		U	6870	ug/kg
N-Nitrosodipropylamine		U	3430	ug/kg
Naphthalene	13200		3430	ug/kg
Nitrobenzene		U	3430	ug/kg
Phenanthrene	15200		3430	ug/kg
Pyrene	7820		3430	ug/kg
bis(2-Chloroethoxy)methane		U	3430	ug/kg
bis(2-Chloroethyl) ether		U	3430	ug/kg
bis(2-Chloroisopropyl)ether		U	3430	ug/kg
bis(2-Ethylhexyl)phthalate		U	6870	ug/kg
m-Nitroaniline		U	34300	ug/kg
o-Nitroaniline		U	3430	ug/kg
p-Nitroaniline		U	29500	ug/kg
PCB's Method: EPA 8080				Batch: 19374 Run Analyst: JLS DOA: 09/01/92 TOA: 0412
				Prep Analyst: LMJ DOP: 08/28/92 TOP: 1500
PCB-1016		U	68.7	ug/kg
PCB-1221		U	68.7	ug/kg
PCB-1232		U	68.7	ug/kg
PCB-1242		U	68.7	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208408-03 Client ID: Matrix: Soil Description: NPS-CHS S-3, 17'-19
Sampled: 08/24/92 Received: 08/24/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	68.7	ug/kg
PCB-1254		U	68.7	ug/kg
PCB-1260		U	68.7	ug/kg
PCB-1262		U	68.7	ug/kg
ICP	Method: EPA 6010			Batch: 19244 Run Analyst: JSS DOA: 08/27/92 TOA: 1559 Prep Analyst: FGD DOP: 08/26/92 TOP: 1600
Silver	0.130	J	2.50	mg/kg
Arsenic	4.80		3.15	mg/kg
Barium	32.1		2.50	mg/kg
Cadmium		U	2.50	mg/kg
Chromium	9.47		2.50	mg/kg
Lead	110.		3.28	mg/kg
Selenium		U	8.60	mg/kg
Mercury	Method: EPA 7471			Batch: 19534 Run Analyst: ALK DOA: 09/03/92 TOA: 0930 Prep Analyst: ALK DOP: 09/02/92 TOP: 0900
Mercury	814.		157.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208408-03 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-3, 17' - 19'
Sampled: 08/24/92 Received: 08/24/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2310	
Methyl naphthalene (isomer)	3,703	J	--	ug/kg
2 - Pentanone, 4 - hydroxy - 4 - methyl	5,349	JAB	--	ug/kg
Methyl naphthalene (isomer)	2,057	J	--	ug/kg
4-H-cyclopenta [def] phenanthrene	2,057	J	--	ug/kg
Unknown aromatic hydrocarbon	23,868	J	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208391-01 Client ID: Matrix: Soil Description: NPS-CHS, S-4, 0"-6"
Sampled: 08/21/92 Received: 08/21/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19214 Run Analyst: JKP DOA: 08/24/92 TOA: 1530
Evaporative Loss @ 105 C	12.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/01/92 TOA: 1846
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 1846
				Prep Analyst: ECP DOP: 08/27/92 TOP: 1700
1,2,4-Trichlorobenzene		U	330.	ug/kg
1,2-Dichlorobenzene		U	330.	ug/kg
1,3-Dichlorobenzene		U	330.	ug/kg
1,4-Dichlorobenzene		U	330.	ug/kg
2,4-Dinitrotoluene		U	330.	ug/kg
2,6-Dinitrotoluene		U	330.	ug/kg
2-Chloronaphthalene		U	330.	ug/kg
2-Methylnaphthalene		U	330.	ug/kg
3,3'-Dichlorobenzidine		U	660.	ug/kg
4-Bromophenyl phenyl ether		U	632.	ug/kg
4-Chloroaniline		U	330.	ug/kg
4-Chlorophenyl phenyl ether		U	330.	ug/kg
Acenaphthene		U	330.	ug/kg
Acenaphthylene		U	330.	ug/kg
Anthracene		U	330.	ug/kg
Benzo(a)anthracene		U	330.	ug/kg
Benzo(a)pyrene		U	330.	ug/kg
Benzo(b)fluoranthene		U	590.	ug/kg
Benzo(ghi)perylene		U	330.	ug/kg
Benzo(k)fluoranthene		U	788.	ug/kg
Butyl benzyl phthalate		U	330.	ug/kg
Chrysene		U	632.	ug/kg
Di-n-butyl phthalate		U	632.	ug/kg
Di-n-octyl phthalate		U	632.	ug/kg
Dibenzo(a,h)anthracene		U	330.	ug/kg
Dibenzofuran		U	330.	ug/kg
Diethyl phthalate		U	330.	ug/kg
Dimethyl phthalate		U	330.	ug/kg
Fluoranthene		U	330.	ug/kg
Fluorene		U	330.	ug/kg
Hexachlorobenzene		U	330.	ug/kg
Hexachlorobutadiene		U	330.	ug/kg
Hexachlorocyclopentadiene		U	688.	ug/kg
Hexachloroethane		U	330.	ug/kg
Indeno(1,2,3-c,d)pyrene		U	632.	ug/kg
Isophorone		U	330.	ug/kg
N-Nitrosodiphenylamine		U	632.	ug/kg
N-Nitrosodipropylamine		U	330.	ug/kg
Naphthalene		U	330.	ug/kg
Nitrobenzene		U	330.	ug/kg
Phenanthrene		U	330.	ug/kg
Pyrene		U	330.	ug/kg
bis(2-Chloroethoxy)methane		U	330.	ug/kg
bis(2-Chloroethyl) ether		U	330.	ug/kg
bis(2-Chloroisopropyl)ether		U	330.	ug/kg
bis(2-Ethylhexyl)phthalate		U	632.	ug/kg
m-Nitroaniline		U	3150	ug/kg
o-Nitroaniline		U	330.	ug/kg
p-Nitroaniline		U	2720	ug/kg
PCB's Method: EPA 8080				Batch: 19374 Run Analyst: JLS DOA: 09/01/92 TOA: 0055
				Prep Analyst: LMJ DOP: 08/28/92 TOP: 1500
PCB-1016		U	63.2	ug/kg
PCB-1221		U	63.2	ug/kg
PCB-1232		U	63.2	ug/kg
PCB-1242		U	63.2	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208391-01 Client ID: Matrix: Soil Description: NPS-CHS, S-4, 0"-6"
Sampled: 08/21/92 Received: 08/21/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	63.2	ug/kg
PCB-1254		U	63.2	ug/kg
PCB-1260		U	63.2	ug/kg
PCB-1262		U	63.2	ug/kg
ICP	Method: EPA 6010			Batch: 19244 Run Analyst: JSS DOA: 08/27/92 TOA: 1608 Prep Analyst: FGD DOP: 08/26/92 TOP: 1600
Silver		U	2.50	mg/kg
Arsenic	5.75		3.20	mg/kg
Barium	34.4		2.50	mg/kg
Cadmium	0.0260	J	2.50	mg/kg
Chromium	10.3		2.50	mg/kg
Lead	7.27		3.33	mg/kg
Selenium		U	8.73	mg/kg
Mercury	Method: EPA 7471			Batch: 19203 Run Analyst: ALK DOA: 08/31/92 TOA: 1200 Prep Analyst: ALK DOP: 08/28/92 TOP: 1200
Mercury	9.52	J	159.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208391-01 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-4, 0" - 6"
Sampled: 08/21/92 Received: 08/21/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270 Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 1846				
2 - Pentanone, 4 - hydroxy - 4 - methyl	4,924	JAB	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208391-02 Client ID: Matrix: Soil Description: NPS-CHS, S-4, 3'-4'
Sampled: 08/21/92 Received: 08/21/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19214 Run Analyst: JKP DOA: 08/24/92 TOA: 1530
Evaporative Loss @ 105 C	28.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/01/92 TOA: 1930
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 1930
				Prep Analyst: ECP DOP: 08/27/92 TOP: 1700
1,2,4-Trichlorobenzene		U	3850	ug/kg
1,2-Dichlorobenzene		U	3850	ug/kg
1,3-Dichlorobenzene		U	3850	ug/kg
1,4-Dichlorobenzene		U	3850	ug/kg
2,4-Dinitrotoluene		U	3850	ug/kg
2,6-Dinitrotoluene		U	3850	ug/kg
2-Chloronaphthalene		U	3850	ug/kg
2-Methylnaphthalene		U	3850	ug/kg
3,3'-Dichlorobenzidine		U	7720	ug/kg
4-Bromophenyl phenyl ether		U	7720	ug/kg
4-Chloroaniline		U	3850	ug/kg
4-Chlorophenyl phenyl ether		U	3850	ug/kg
Acenaphthene		U	3850	ug/kg
Acenaphthylene		U	3850	ug/kg
Anthracene		U	3850	ug/kg
Benzo(a)anthracene		U	3850	ug/kg
Benzo(a)pyrene		U	3850	ug/kg
Benzo(b)fluoranthene		U	7220	ug/kg
Benzo(ghi)perylene		U	3850	ug/kg
Benzo(k)fluoranthene		U	9650	ug/kg
Butyl benzyl phthalate		U	3850	ug/kg
Chrysene		U	7720	ug/kg
Di-n-butyl phthalate		U	7720	ug/kg
Di-n-octyl phthalate		U	7720	ug/kg
Dibenzo(a,h)anthracene		U	3850	ug/kg
Dibenzofuran		U	3850	ug/kg
Diethyl phthalate		U	3850	ug/kg
Dimethyl phthalate		U	3850	ug/kg
Fluoranthene		U	3850	ug/kg
Fluorene		U	3850	ug/kg
Hexachlorobenzene		U	3850	ug/kg
Hexachlorobutadiene		U	3850	ug/kg
Hexachlorocyclopentadiene		U	8420	ug/kg
Hexachloroethane		U	3850	ug/kg
Indeno(1,2,3-c,d)pyrene		U	7720	ug/kg
Isophorone		U	3850	ug/kg
N-Nitrosodiphenylamine		U	7720	ug/kg
N-Nitrosodipropylamine		U	3850	ug/kg
Naphthalene		U	3850	ug/kg
Nitrobenzene		U	3850	ug/kg
Phenanthrene		U	3850	ug/kg
Pyrene		U	3850	ug/kg
bis(2-Chloroethoxy)methane		U	3850	ug/kg
bis(2-Chloroethyl) ether		U	3850	ug/kg
bis(2-Chloroisopropyl)ether		U	3850	ug/kg
bis(2-Ethylhexyl)phthalate		U	7720	ug/kg
m-Nitroaniline		U	38500	ug/kg
o-Nitroaniline		U	3850	ug/kg
p-Nitroaniline		U	33200	ug/kg
PCB's Method: EPA 8080				Batch: 19374 Run Analyst: JLS DOA: 09/01/92 TOA: 0134
				Prep Analyst: LMJ DOP: 08/28/92 TOP: 1500
PCB-1016		U	77.2	ug/kg
PCB-1221		U	77.2	ug/kg
PCB-1232		U	77.2	ug/kg
PCB-1242		U	77.2	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208391-02 Client ID: Matrix: Soil Description: NPS-CHS, S-4, 3'-4'
Sampled: 08/21/92 Received: 08/21/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	77.2	ug/kg
PCB-1254		U	77.2	ug/kg
PCB-1260		U	77.2	ug/kg
PCB-1262		U	77.2	ug/kg
ICP	Method: EPA 6010			Batch: 19244 Run Analyst: JSS DOA: 08/27/92 TOA: 1606 Prep Analyst: FGD DOP: 08/26/92 TOP: 1600
Silver		U	2.50	mg/kg
Arsenic	4.92		3.20	mg/kg
Barium	43.5		2.50	mg/kg
Cadmium	0.188	J	2.50	mg/kg
Chromium	7.17		2.50	mg/kg
Lead	89.7		3.33	mg/kg
Selenium		U	8.73	mg/kg
Mercury	Method: EPA 7471			Batch: 19203 Run Analyst: ALK DOA: 08/24/92 TOA: 1430 Prep Analyst: ALK DOP: 08/24/92 TOP: 1100
Mercury	190.		159.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208391-02 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-4, 3' - 4'
Sampled: 08/21/92 Received: 08/21/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 1930	
Tridecane, 7 - methyl	6,010	J	--	ug/kg
Dodecane, 2,7,10 - trimethyl	6,010	J	--	ug/kg
Pentadecane, 2,6,10,14-trimethyl	5,550	J	--	ug/kg
Pentadecane, 2,6,10, 14-tetramethyl	5,550	J	--	ug/kg
2 - Pentanone, 4 - hydroxy - 4 - methyl	5,090	JAB	--	ug/kg
Unknown	2,770	J	--	ug/kg
Unknown	2,310	J	--	ug/kg
Unknown	6,480	J	--	ug/kg
Unknown	2,770	J	--	ug/kg
Unknown hydrocarbon	7,870	J	--	ug/kg
Unknown	4,630	J	--	ug/kg
Unknown	3,240	J	--	ug/kg
Unknown hydrocarbon	2,310	J	--	ug/kg
Unknown	2,310	J	--	ug/kg
Unknown	3,240	J	--	ug/kg
Unknown hydrocarbon	2,780	J	--	ug/kg
Unknown	3,700	J	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208391-04 Client ID: Matrix: Soil Description: NPS-CHS, S-4, 11'-13'
Sampled: 08/21/92 Received: 08/21/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Volatiles Method: EPA 8240 extended				Batch: 19438 Run Analyst: MKP DOA: 08/28/92 TOA: 2040
GCMS Library Search-VOA	YES			
GC/MS Volatiles Method: EPA 8240 extended				Batch: 19438 Run Analyst: MKP DOA: 08/28/92 TOA: 2040
1,1,1-Trichloroethane		U	57.5	ug/kg
1,1,2,2-Tetrachloroethane		U	57.5	ug/kg
1,1,2-Trichloroethane		U	57.5	ug/kg
1,1-Dichloroethane		U	57.5	ug/kg
1,1-Dichloroethylene		U	57.5	ug/kg
1,2-Dichloroethane		U	57.5	ug/kg
1,2-Dichloropropane		U	57.5	ug/kg
1,2-cis-Dichloroethylene		U	57.5	ug/kg
1,2-trans-Dichloroethylene		U	57.5	ug/kg
2-Butanone		U	287.	ug/kg
2-Hexanone		U	57.5	ug/kg
4-Methyl-2-pentanone		U	57.5	ug/kg
Acetone	590.		287.	ug/kg
Benzene		U	57.5	ug/kg
Bromoform		U	57.5	ug/kg
Carbon Disulfide		U	57.5	ug/kg
Carbon Tetrachloride		U	57.5	ug/kg
Chlorobenzene		U	57.5	ug/kg
Chlorodibromomethane		U	57.5	ug/kg
Chloroethane		U	57.5	ug/kg
Chloroform		U	57.5	ug/kg
Dichlorobromomethane		U	57.5	ug/kg
Ethylbenzene		U	57.5	ug/kg
Methyl Bromide		U	57.5	ug/kg
Methyl Chloride		U	57.5	ug/kg
Methylene Chloride	125.		57.5	ug/kg
Styrene		U	57.5	ug/kg
Tetrachloroethylene		U	57.5	ug/kg
Toluene		U	57.5	ug/kg
Trichloroethylene		U	57.5	ug/kg
Vinyl Acetate		U	57.5	ug/kg
Vinyl chloride		U	57.5	ug/kg
Xylenes (TOTAL)		U	115.	ug/kg
cis-1,3-Dichloropropylene		U	57.5	ug/kg
trans-1,3-Dichloropropylene		U	57.5	ug/kg
Other Organic Tests Method: EPA 160.3				Batch: 19214 Run Analyst: JKP DOA: 08/24/92 TOA: 1530
Evaporative Loss @ 105 C	42.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2058
GCMS Library Search-ACID	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2058
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2058
				Prep Analyst: ECP DOP: 08/27/92 TOP: 1700
2,4,5-Trichlorophenol		U	478.	ug/kg
2,4,6-Trichlorophenol		U	478.	ug/kg
2,4-Dichlorophenol		U	478.	ug/kg
2,4-Dimethylphenol		U	478.	ug/kg
2,4-Dinitrophenol		U	1490	ug/kg
2-Chlorophenol		U	478.	ug/kg
2-Nitrophenol		U	478.	ug/kg
2-methyl-4,6-dinitrophenol		U	1650	ug/kg
4-Nitrophenol		U	9080	ug/kg
4-chloro-3-methyl phenol		U	478.	ug/kg
Benzoic Acid		U	11600	ug/kg
Benzyl Alcohol		U	478.	ug/kg
Pentachlorophenol		U	478.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208391-04 Client ID: Matrix: Soil Description: NPS-CHS, S-4, 11'-13'
Sampled: 08/21/92 Received: 08/21/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Phenol		U	478.	ug/kg
o-Cresol		U	478.	ug/kg
p-Cresol		U	478.	ug/kg
GC/MS Extractables Method: EPA 8270				Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2058 Prep Analyst: ECP DOP: 08/27/92 TOP: 1700
1,2,4-Trichlorobenzene		U	478.	ug/kg
1,2-Dichlorobenzene		U	478.	ug/kg
1,3-Dichlorobenzene		U	478.	ug/kg
1,4-Dichlorobenzene		U	478.	ug/kg
2,4-Dinitrotoluene		U	478.	ug/kg
2,6-Dinitrotoluene		U	478.	ug/kg
2-Chloronaphthalene		U	478.	ug/kg
2-Methylnaphthalene		U	478.	ug/kg
3,3'-Dichlorobenzidine		U	958.	ug/kg
4-Bromophenyl phenyl ether		U	958.	ug/kg
4-Chloroaniline		U	478.	ug/kg
4-Chlorophenyl phenyl ether		U	478.	ug/kg
Acenaphthene		U	478.	ug/kg
Acenaphthylene		U	478.	ug/kg
Anthracene		U	478.	ug/kg
Benzo(a)anthracene		U	478.	ug/kg
Benzo(a)pyrene		U	478.	ug/kg
Benzo(b)fluoranthene		U	895.	ug/kg
Benzo(ghi)perylene		U	478.	ug/kg
Benzo(k)fluoranthene		U	1200	ug/kg
Butyl benzyl phthalate		U	478.	ug/kg
Chrysene		U	958.	ug/kg
Di-n-butyl phthalate		U	958.	ug/kg
Di-n-octyl phthalate		U	958.	ug/kg
Dibenzo(a,h)anthracene		U	478.	ug/kg
Dibenzofuran		U	478.	ug/kg
Diethyl phthalate		U	478.	ug/kg
Dimethyl phthalate		U	478.	ug/kg
Fluoranthene		U	478.	ug/kg
Fluorene		U	478.	ug/kg
Hexachlorobenzene		U	478.	ug/kg
Hexachlorobutadiene		U	478.	ug/kg
Hexachlorocyclopentadiene		U	1040	ug/kg
Hexachloroethane		U	478.	ug/kg
Indeno(1,2,3-c,d)pyrene		U	958.	ug/kg
Isophorone		U	478.	ug/kg
N-Nitrosodiphenylamine		U	958.	ug/kg
N-Nitrosodipropylamine		U	478.	ug/kg
Naphthalene		U	478.	ug/kg
Nitrobenzene		U	478.	ug/kg
Phenanthrene		U	478.	ug/kg
Pyrene		U	478.	ug/kg
bis(2-Chloroethoxy)methane		U	478.	ug/kg
bis(2-Chloroethyl) ether		U	478.	ug/kg
bis(2-Chloroisopropyl)ether		U	478.	ug/kg
bis(2-Ethylhexyl)phthalate		U	958.	ug/kg
m-Nitroaniline		U	4780	ug/kg
o-Nitroaniline		U	478.	ug/kg
p-Nitroaniline		U	4120	ug/kg
Pesticides Method: EPA 8080				Batch: 19375 Run Analyst: JEB DOA: 09/02/92 TOA: 1559 Prep Analyst: LMJ DOP: 08/28/92 TOP: 1500
4,4'-DDD		U	3.00	ug/kg
4,4'-DDE		U	3.00	ug/kg
4,4'-DDT		U	3.00	ug/kg
Aldrin		U	3.00	ug/kg
Dieldrin		U	3.00	ug/kg
Endosulfan I		U	3.00	ug/kg
Endosulfan II		U	3.00	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208391-04 Client ID: Matrix: Soil Description: NPS-CHS, S-4, 11'-13'
Sampled: 08/21/92 Received: 08/21/92 Page: 3
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Endosulfan sulfate		U	3.00	ug/kg
Endrin		U	3.00	ug/kg
Endrin ketone		U	3.00	ug/kg
Heptachlor		U	3.00	ug/kg
Heptachlor epoxide		U	3.00	ug/kg
Methoxychlor		U	3.00	ug/kg
PCB-1016		U	3.00	ug/kg
PCB-1221		U	3.00	ug/kg
PCB-1232		U	3.00	ug/kg
PCB-1242		U	3.00	ug/kg
PCB-1248		U	3.00	ug/kg
PCB-1254		U	3.00	ug/kg
PCB-1260		U	3.00	ug/kg
Toxaphene		U	3.00	ug/kg
alpha-BHC		U	3.00	ug/kg
alpha-Chlordane		U	3.00	ug/kg
beta-BHC		U	3.00	ug/kg
delta-BHC		U	3.00	ug/kg
gamma-BHC		U	3.00	ug/kg
gamma-Chlordane		U	3.00	ug/kg
ICP	Method: EPA 6010			Batch: 19244 Run Analyst: JSS DOA: 08/27/92 TOA: 1630 Prep Analyst: FGD DOP: 08/26/92 TOP: 1600
Silver		U	2.50	mg/kg
Aluminum	3280		2.50	mg/kg
Arsenic	7.55		3.17	mg/kg
Barium	7.00		2.50	mg/kg
Beryllium	0.422	J	2.50	mg/kg
Calcium	10100		3.17	mg/kg
Cadmium	0.0440	J	2.50	mg/kg
Cobalt	1.71	J	2.50	mg/kg
Chromium	10.3		2.50	mg/kg
Copper	1.83	J	2.50	mg/kg
Iron	7810		2.50	mg/kg
Potassium	1020		15.1	mg/kg
Magnesium	2000		2.50	mg/kg
Manganese	152.		2.50	mg/kg
Sodium	1730		6.55	mg/kg
Nickel	2.94		2.50	mg/kg
Lead	4.07		3.30	mg/kg
Antimony		U	4.37	mg/kg
Selenium		U	8.67	mg/kg
Thallium		U	6.88	mg/kg
Vanadium	11.4		2.50	mg/kg
Zinc	11.3		2.50	mg/kg
Mercury	Method: EPA 7471			Batch: 19203 Run Analyst: ALK DOA: 08/24/92 TOA: 1430 Prep Analyst: ALK DOP: 08/24/92 TOP: 1100
Mercury		U	159.	ug/kg
Cyanide by RFA	Method: EPA 335.3			Batch: 19287 Run Analyst: JKP DOA: 08/26/92 TOA: 1400
Cyanide, Total		U	0.0167	mg/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208391-04 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-4, 11' - 13'
Sampled: 08/21/92 Received: 08/21/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2058	
2 - Pentanone, 4 - hydroxy - 4 - methyl	8,620	JAB	--	ug/kg
C10 alkyl benzene	632	J	--	ug/kg
Unknown hydrocarbon	517	J	--	ug/kg
Unknown hydrocarbon	689	J	--	ug/kg
Dimethyl naphthalene (isomer)	517	J	--	ug/kg
Dimethyl naphthalene (isomer)	459	J	--	ug/kg
Dimethyl naphthalene (isomer)	919	J	--	ug/kg
Unknown hydrocarbon	1,436	J	--	ug/kg
Trimethyl naphthalene (isomer)	459	J	--	ug/kg
Unknown hydrocarbon	2,758	J	--	ug/kg
Unknown hydrocarbon	804	J	--	ug/kg
Dimethyl phenanthrene (isomer)	517	J	--	ug/kg
Unknown	632	J	--	ug/kg
Unknown	459	J	--	ug/kg
GC/MS VOL Method: EPA 8240			Batch: 19438 Run Analyst: MKP DOA: 08/28/92 TOA: 2040	
Hexane	189	J	--	ug/kg
Unknown	69	J	--	ug/kg
Unknown	86	J	--	ug/kg
C10 alkyl benzene	344	J	--	ug/kg
Decahydro naphthalene (isomer)	86	J	--	ug/kg
Unknown	69	J	--	ug/kg
Unknown	69	J	--	ug/kg
C10 alkyl benzene	155	J	--	ug/kg
Unknown	172	J	--	ug/kg
Unknown	189	J	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208391-03 Client ID: Matrix: Soil Description: NPS-CHS, S-4, 15'-17'
Sampled: 08/21/92 Received: 08/21/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19214 Run Analyst: JKP DOA: 08/24/92 TOA: 1530
Evaporative Loss @ 105 C	31.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: GZ DOA: 09/08/92 TOA: 2252
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19783 Run Analyst: GZ DOA: 09/08/92 TOA: 2252
				Prep Analyst: VLD DOP: 09/04/92 TOP: 1600
1,2,4-Trichlorobenzene		U	4030	ug/kg
1,2-Dichlorobenzene		U	4030	ug/kg
1,3-Dichlorobenzene		U	4030	ug/kg
1,4-Dichlorobenzene		U	4030	ug/kg
2,4-Dinitrotoluene		U	4030	ug/kg
2,6-Dinitrotoluene		U	4030	ug/kg
2-Chloronaphthalene		U	4030	ug/kg
2-Methylnaphthalene		U	4030	ug/kg
3,3'-Dichlorobenzidine		U	8050	ug/kg
4-Bromophenyl phenyl ether		U	8050	ug/kg
4-Chloroaniline		U	4030	ug/kg
4-Chlorophenyl phenyl ether		U	4030	ug/kg
Acenaphthene		U	4030	ug/kg
cenaphthylene		U	4030	ug/kg
nthracene		U	4030	ug/kg
enzo(a)anthracene		U	4030	ug/kg
Benzo(a)pyrene		U	4030	ug/kg
Benzo(b)fluoranthene		U	7530	ug/kg
Benzo(ghi)perylene		U	4030	ug/kg
Benzo(k)fluoranthene		U	10100	ug/kg
Butyl benzyl phthalate		U	4030	ug/kg
Chrysene		U	8050	ug/kg
Di-n-butyl phthalate		U	8050	ug/kg
Di-n-octyl phthalate		U	8050	ug/kg
Dibenzo(a,h)anthracene		U	4030	ug/kg
Dibenzofuran		U	4030	ug/kg
Diethyl phthalate		U	4030	ug/kg
Dimethyl phthalate		U	4030	ug/kg
Fluoranthene		U	4030	ug/kg
Fluorene		U	4030	ug/kg
Hexachlorobenzene		U	4030	ug/kg
Hexachlorobutadiene		U	4030	ug/kg
Hexachlorocyclopentadiene		U	8780	ug/kg
Hexachloroethane		U	4030	ug/kg
Indeno(1,2,3-c,d)pyrene		U	8050	ug/kg
Isophorone		U	4030	ug/kg
N-Nitrosodiphenylamine		U	8050	ug/kg
N-Nitrosodipropylamine		U	4030	ug/kg
Naphthalene		U	4030	ug/kg
Nitrobenzene		U	4030	ug/kg
Phenanthrene		U	4030	ug/kg
Pyrene		U	4030	ug/kg
bis(2-Chloroethoxy)methane		U	4030	ug/kg
bis(2-Chloroethyl) ether		U	4030	ug/kg
bis(2-Chloroisopropyl)ether		U	4030	ug/kg
bis(2-Ethylhexyl)phthalate		U	8050	ug/kg
m-Nitroaniline		U	40300	ug/kg
o-Nitroaniline		U	4030	ug/kg
p-Nitroaniline		U	34700	ug/kg
PCB's Method: EPA 8080				Batch: 19374 Run Analyst: JLS DOA: 09/01/92 TOA: 0214
				Prep Analyst: LMJ DOP: 08/28/92 TOP: 1500
PCB-1016		U	80.5	ug/kg
PCB-1221		U	80.5	ug/kg
CB-1232		U	80.5	ug/kg
CB-1242		U	80.5	ug/kg

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SC	10120
VA	00151
TN	02934
WI	99988779

CERTIFICATE OF ANALYSIS

Sample: 9208391-03 Client ID: Matrix: Soil Description: NPS-CHS, S-4, 15'-17'
Sampled: 08/21/92 Received: 08/21/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	80.5	ug/kg
PCB-1254		U	80.5	ug/kg
PCB-1260		U	80.5	ug/kg
PCB-1262		U	80.5	ug/kg
ICP	Method: EPA 6010			Batch: 19244 Run Analyst: JSS DOA: 08/27/92 TOA: 1551 Prep Analyst: FGD DOP: 08/26/92 TOP: 1600
Silver		U	2.50	mg/kg
Arsenic	3.74		3.15	mg/kg
Barium	5.10		2.50	mg/kg
Cadmium	0.0654	J	2.50	mg/kg
Chromium	8.05		2.50	mg/kg
Lead	2.43	J	3.28	mg/kg
Selenium		U	8.60	mg/kg
Mercury	Method: EPA 7471			Batch: 19203 Run Analyst: ALK DOA: 08/31/92 TOA: 1200 Prep Analyst: ALK DOP: 08/28/92 TOP: 1200
Mercury		U	139.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208391-03 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-4, 15' - 17'
Sampled: 08/21/92 Received: 08/21/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270 Batch: 19783 Run Analyst: GZ DOA: 09/08/92 TOA: 2252				
2 - Pentanone, 4 - hydroxy - 4 - methyl	6,763	JAB	--	ug/kg
Unknown	1,207	J	--	ug/kg
Unknown	1,256	J	--	ug/kg
Unknown	579	J	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-05 Client ID: Matrix: Soil Description: NPS-CHS; S-6 0"-6"
Sampled: 08/19/92 Received: 08/19/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19123 Run Analyst: SLF DOA: 08/21/92 TOA: 1500
Evaporative Loss @ 105 C	15.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 08/27/92 TOA: 1656
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1656
				Prep Analyst: LMJ DOP: 08/25/92 TOP: 0930
1,2,4-Trichlorobenzene		U	3270	ug/kg
1,2-Dichlorobenzene		U	3270	ug/kg
1,3-Dichlorobenzene		U	3270	ug/kg
1,4-Dichlorobenzene		U	3270	ug/kg
2,4-Dinitrotoluene		U	3270	ug/kg
2,6-Dinitrotoluene		U	3270	ug/kg
2-Chloronaphthalene		U	3270	ug/kg
2-Methylnaphthalene		U	3270	ug/kg
3,3'-Dichlorobenzidine		U	6530	ug/kg
4-Bromophenyl phenyl ether		U	6530	ug/kg
4-Chloroaniline		U	3270	ug/kg
4-Chlorophenyl phenyl ether		U	3270	ug/kg
Acenaphthene		U	3270	ug/kg
Acenaphthylene		U	3270	ug/kg
Anthracene		U	3270	ug/kg
Benzo(a)anthracene		U	3270	ug/kg
Benzo(a)pyrene		U	3270	ug/kg
Benzo(b)fluoranthene		U	6120	ug/kg
Benzo(ghi)perylene		U	3270	ug/kg
Benzo(k)fluoranthene		U	8170	ug/kg
Butyl benzyl phthalate		U	3270	ug/kg
Chrysene		U	6530	ug/kg
Di-n-butyl phthalate		U	6530	ug/kg
Di-n-octyl phthalate		U	6530	ug/kg
Dibenzo(a,h)anthracene		U	3270	ug/kg
Dibenzofuran		U	3270	ug/kg
Diethyl phthalate		U	3270	ug/kg
Dimethyl phthalate		U	3270	ug/kg
Fluoranthene		U	3270	ug/kg
Fluorene		U	3270	ug/kg
Hexachlorobenzene		U	3270	ug/kg
Hexachlorobutadiene		U	3270	ug/kg
Hexachlorocyclopentadiene		U	7120	ug/kg
Hexachloroethane		U	3270	ug/kg
Indeno(1,2,3-c,d)pyrene		U	6530	ug/kg
Isophorone		U	3270	ug/kg
N-Nitrosodiphenylamine		U	6530	ug/kg
N-Nitrosodipropylamine		U	3270	ug/kg
Naphthalene		U	3270	ug/kg
Nitrobenzene		U	3270	ug/kg
Phenanthrene		U	3270	ug/kg
Pyrene		U	3270	ug/kg
bis(2-Chloroethoxy)methane		U	3270	ug/kg
bis(2-Chloroethyl) ether		U	3270	ug/kg
bis(2-Chloroisopropyl)ether		U	3270	ug/kg
bis(2-Ethylhexyl)phthalate		U	6530	ug/kg
m-Nitroaniline		U	32700	ug/kg
o-Nitroaniline		U	3270	ug/kg
p-Nitroaniline		U	28200	ug/kg
PCB's Method: EPA 8080				Batch: 19369 Run Analyst: JLS DOA: 09/03/92 TOA: 1159
				Prep Analyst: VLD DOP: 08/27/92 TOP: 0900
PCB-1016		U	131.	ug/kg
PCB-1221		U	131.	ug/kg
PCB-1232		U	131.	ug/kg
PCB-1242		U	131.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-05 Client ID: Matrix: Soil Description: NPS-CHS; S-6 0"-6"
Sampled: 08/19/92 Received: 08/19/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	131.	ug/kg
PCB-1254	494.		131.	ug/kg
PCB-1260	479.		131.	ug/kg
PCB-1262		U	131.	ug/kg
ICP	Method: EPA 6010			Batch: 19132 Run Analyst: JSS DOA: 08/24/92 TOA: 1231 Prep Analyst: FGD DOP: 08/21/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	4.72		3.28	mg/kg
Barium	17.6		2.50	mg/kg
Cadmium	0.234	J	2.50	mg/kg
Chromium	14.7		2.50	mg/kg
Lead	109.		3.42	mg/kg
Selenium	3.06	J	8.95	mg/kg
Mercury	Method: EPA 7471			Batch: 19102 Run Analyst: PJM DOA: 08/21/92 TOA: 1000 Prep Analyst: PJM DOP: 08/20/92 TOP: 2200
Mercury		U	167.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-05 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-6, 0" - 6"
Sampled: 08/19/92 Received: 08/19/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1656	
2- pentanone -4 hydroxy -4 -methy	47,000	JAB	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-06 Client ID: Matrix: Soil Description: NPS-CHS; S-6 3'-4'
Sampled: 08/19/92 Received: 08/19/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19123 Run Analyst: SLF DOA: 08/21/92 TOA: 1500
Evaporative Loss @ 105 C	17.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 08/27/92 TOA: 1741
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1741
				Prep Analyst: LMJ DOP: 08/25/92 TOP: 0930
1,2,4-Trichlorobenzene		U	3350	ug/kg
1,2-Dichlorobenzene		U	3350	ug/kg
1,3-Dichlorobenzene		U	3350	ug/kg
1,4-Dichlorobenzene		U	3350	ug/kg
2,4-Dinitrotoluene		U	3350	ug/kg
2,6-Dinitrotoluene		U	3350	ug/kg
2-Chloronaphthalene		U	3350	ug/kg
2-Methylnaphthalene		U	3350	ug/kg
3,3'-Dichlorobenzidine		U	6700	ug/kg
4-Bromophenyl phenyl ether		U	6700	ug/kg
4-Chloroaniline		U	3350	ug/kg
4-Chlorophenyl phenyl ether		U	3350	ug/kg
Acenaphthene		U	3350	ug/kg
Acenaphthylene		U	3350	ug/kg
Anthracene		U	3350	ug/kg
Benzo(a)anthracene		U	3350	ug/kg
Benzo(a)pyrene		U	3350	ug/kg
Benzo(b)fluoranthene		U	6270	ug/kg
Benzo(ghi)perylene		U	3350	ug/kg
Benzo(k)fluoranthene		U	8370	ug/kg
Butyl benzyl phthalate		U	3350	ug/kg
Chrysene		U	6700	ug/kg
Di-n-butyl phthalate		U	6700	ug/kg
Di-n-octyl phthalate		U	6700	ug/kg
Dibenzo(a,h)anthracene		U	3350	ug/kg
Dibenzofuran		U	3350	ug/kg
Diethyl phthalate		U	3350	ug/kg
Dimethyl phthalate		U	3350	ug/kg
Fluoranthene		U	3350	ug/kg
Fluorene		U	3350	ug/kg
Hexachlorobenzene		U	3350	ug/kg
Hexachlorobutadiene		U	3350	ug/kg
Hexachlorocyclopentadiene		U	7300	ug/kg
Hexachloroethane		U	3350	ug/kg
Indeno(1,2,3-c,d)pyrene		U	6700	ug/kg
Isophorone		U	3350	ug/kg
N-Nitrosodiphenylamine		U	6700	ug/kg
N-Nitrosodipropylamine		U	3350	ug/kg
Naphthalene		U	3350	ug/kg
Nitrobenzene		U	3350	ug/kg
Phenanthrene		U	3350	ug/kg
Pyrene		U	3350	ug/kg
bis(2-Chloroethoxy)methane		U	3350	ug/kg
bis(2-Chloroethyl) ether		U	3350	ug/kg
bis(2-Chloroisopropyl)ether		U	3350	ug/kg
bis(2-Ethylhexyl)phthalate		U	6700	ug/kg
m-Nitroaniline		U	33500	ug/kg
o-Nitroaniline		U	3350	ug/kg
p-Nitroaniline		U	28800	ug/kg
PCB's Method: EPA 8080				Batch: 19369 Run Analyst: JLS DOA: 09/01/92 TOA: 1125
				Prep Analyst: VLD DOP: 08/27/92 TOP: 0900
PCB-1016		U	67.0	ug/kg
PCB-1221		U	67.0	ug/kg
PCB-1232		U	67.0	ug/kg
PCB-1242		U	67.0	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-06 Client ID: Matrix: Soil Description: NPS-CHS; S-6 3'-4'
Sampled: 08/19/92 Received: 08/19/92 Page: 2

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	67.0	ug/kg
PCB-1254		U	67.0	ug/kg
PCB-1260		U	67.0	ug/kg
PCB-1262		U	67.0	ug/kg
ICP	Method: EPA 6010			Batch: 19132 Run Analyst: JSS DOA: 08/24/92 TOA: 1234 Prep Analyst: FGD DOP: 08/21/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	6.97		3.13	mg/kg
Barium	34.1		2.50	mg/kg
Cadmium	0.0828	J	2.50	mg/kg
Chromium	10.1		2.50	mg/kg
Lead	34.6		3.25	mg/kg
Selenium	5.11	J	8.53	mg/kg
Mercury	Method: EPA 7471			Batch: 19102 Run Analyst: PJM DOA: 08/21/92 TOA: 1000 Prep Analyst: PJM DOP: 08/20/92 TOP: 2200
Mercury	52.4	J	159.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-06 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-6, 3' - 4'
Sampled: 08/19/92 Received: 08/19/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1741	
2- pentanone -4 hydroxy -4 -methy	34,136	JAB	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-01 Client ID: Matrix: Soil Description: NPS-CHS;S-6,12.5'-14'
Sampled: 08/20/92 Received: 08/20/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19123 Run Analyst: SLF DOA: 08/21/92 TOA: 1500
Evaporative Loss @ 105 C	38.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 08/27/92 TOA: 1827
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1827
				Prep Analyst: LMJ DOP: 08/25/92 TOP: 0930
1,2,4-Trichlorobenzene		U	4480	ug/kg
1,2-Dichlorobenzene		U	4480	ug/kg
1,3-Dichlorobenzene		U	4480	ug/kg
1,4-Dichlorobenzene		U	4480	ug/kg
2,4-Dinitrotoluene		U	4480	ug/kg
2,6-Dinitrotoluene		U	4480	ug/kg
2-Chloronaphthalene		U	4480	ug/kg
2-Methylnaphthalene		U	4480	ug/kg
3,3'-Dichlorobenzidine		U	8970	ug/kg
4-Bromophenyl phenyl ether		U	8970	ug/kg
4-Chloroaniline		U	4480	ug/kg
4-Chlorophenyl phenyl ether		U	4480	ug/kg
Acenaphthene		U	4480	ug/kg
Acenaphthylene		U	4480	ug/kg
Anthracene		U	4480	ug/kg
Benzo(a)anthracene		U	4480	ug/kg
Benzo(a)pyrene		U	4480	ug/kg
Benzo(b)fluoranthene		U	8380	ug/kg
Benzo(ghi)perylene		U	4480	ug/kg
Benzo(k)fluoranthene		U	11200	ug/kg
Butyl benzyl phthalate		U	4480	ug/kg
Chrysene		U	8970	ug/kg
Di-n-butyl phthalate		U	8970	ug/kg
Di-n-octyl phthalate		U	8970	ug/kg
Dibenzo(a,h)anthracene		U	4480	ug/kg
Dibenzofuran		U	4480	ug/kg
Diethyl phthalate		U	4480	ug/kg
Dimethyl phthalate		U	4480	ug/kg
Fluoranthene	10500		4480	ug/kg
Fluorene	4300	J	4480	ug/kg
Hexachlorobenzene		U	4480	ug/kg
Hexachlorobutadiene		U	4480	ug/kg
Hexachlorocyclopentadiene		U	9770	ug/kg
Hexachloroethane		U	4480	ug/kg
Indeno(1,2,3-c,d)pyrene		U	8970	ug/kg
Isophorone		U	4480	ug/kg
N-Nitrosodiphenylamine		U	8970	ug/kg
N-Nitrosodipropylamine		U	4480	ug/kg
Naphthalene	11800		4480	ug/kg
Nitrobenzene		U	4480	ug/kg
Phenanthrene		U	4480	ug/kg
Pyrene	13400		4480	ug/kg
bis(2-Chloroethoxy)methane		U	4480	ug/kg
bis(2-Chloroethyl) ether		U	4480	ug/kg
bis(2-Chloroisopropyl)ether		U	4480	ug/kg
bis(2-Ethylhexyl)phthalate		U	8970	ug/kg
m-Nitroaniline		U	44800	ug/kg
o-Nitroaniline		U	4480	ug/kg
p-Nitroaniline		U	38500	ug/kg
PCB's Method: EPA 8080				Batch: 19369 Run Analyst: JLS DOA: 09/01/92 TOA: 1204
				Prep Analyst: VLD DOP: 08/27/92 TOP: 0900
PCB-1016		U	89.7	ug/kg
PCB-1221		U	89.7	ug/kg
PCB-1232		U	89.7	ug/kg
PCB-1242		U	89.7	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-01 Client ID: Matrix: Soil Description: NPS-CHS;S-6,12.5'-14'
Sampled: 08/20/92 Received: 08/20/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	89.7	ug/kg
PCB-1254		U	89.7	ug/kg
PCB-1260		U	89.7	ug/kg
PCB-1262		U	89.7	ug/kg
ICP	Method: EPA 6010			Batch: 19132 Run Analyst: JSS DOA: 08/24/92 TOA: 1236 Prep Analyst: FGD DOP: 08/21/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	7.07		3.23	mg/kg
Barium	12.1		2.50	mg/kg
Cadmium	0.0431	J	2.50	mg/kg
Chromium	9.73		2.50	mg/kg
Lead	9.83		3.37	mg/kg
Selenium	1.68	J	8.80	mg/kg
Mercury	Method: EPA 7471			Batch: 19203 Run Analyst: ALK DOA: 08/27/92 TOA: 1430 Prep Analyst: ALK DOP: 08/27/92 TOP: 1100
Mercury	40.0	J	167.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-01 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-6, 12.5' - 14'
Sampled: 08/20/92 Received: 08/20/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270 Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1827				
2 - Pentanone, 4 - hydroxy - 4-methyl	45,161	JAB	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-02 Client ID: Matrix: Soil Sampled: 08/20/92 Description: NPS-CHS;S-6,18'-20' Received: 08/20/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19123 Run Analyst: SLF DOA: 08/21/92 TOA: 1500
Evaporative Loss @ 105 C	44.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 08/27/92 TOA: 1913
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1913 Prep Analyst: LMJ DOP: 08/25/92 TOP: 0930
1,2,4-Trichlorobenzene		U	4970	ug/kg
1,2-Dichlorobenzene		U	4970	ug/kg
1,3-Dichlorobenzene		U	4970	ug/kg
1,4-Dichlorobenzene		U	4970	ug/kg
2,4-Dinitrotoluene		U	4970	ug/kg
2,6-Dinitrotoluene		U	4970	ug/kg
2-Chloronaphthalene		U	4970	ug/kg
2-Methylnaphthalene		U	4970	ug/kg
3,3'-Dichlorobenzidine		U	9920	ug/kg
4-Bromophenyl phenyl ether		U	9920	ug/kg
4-Chloroaniline		U	4970	ug/kg
4-Chlorophenyl phenyl ether		U	4970	ug/kg
Acenaphthene		U	4970	ug/kg
Acenaphthylene		U	4970	ug/kg
nthracene		U	4970	ug/kg
enzo(a)anthracene		U	4970	ug/kg
enzo(a)pyrene		U	4970	ug/kg
Benzo(b)fluoranthene		U	9280	ug/kg
Benzo(ghi)perylene		U	4970	ug/kg
Benzo(k)fluoranthene		U	12400	ug/kg
Butyl benzyl phthalate		U	4970	ug/kg
Chrysene		U	9920	ug/kg
Di-n-butyl phthalate		U	9920	ug/kg
Di-n-octyl phthalate		U	9920	ug/kg
Dibenzo(a,h)anthracene		U	4970	ug/kg
Dibenzofuran		U	4970	ug/kg
Diethyl phthalate		U	4970	ug/kg
Dimethyl phthalate		U	4970	ug/kg
Fluoranthene		U	4970	ug/kg
Fluorene		U	4970	ug/kg
Hexachlorobenzene		U	4970	ug/kg
Hexachlorobutadiene		U	4970	ug/kg
Hexachlorocyclopentadiene		U	10800	ug/kg
Hexachloroethane		U	4970	ug/kg
Indeno(1,2,3-c,d)pyrene		U	9920	ug/kg
Isophorone		U	4970	ug/kg
N-Nitrosodiphenylamine		U	9920	ug/kg
N-Nitrosodipropylamine		U	4970	ug/kg
Naphthalene		U	4970	ug/kg
Nitrobenzene		U	4970	ug/kg
Phenanthrene		U	4970	ug/kg
Pyrene		U	4970	ug/kg
bis(2-Chloroethoxy)methane		U	4970	ug/kg
bis(2-Chloroethyl) ether		U	4970	ug/kg
bis(2-Chloroisopropyl)ether		U	4970	ug/kg
bis(2-Ethylhexyl)phthalate		U	9920	ug/kg
m-Nitroaniline		U	49700	ug/kg
o-Nitroaniline		U	4970	ug/kg
p-Nitroaniline		U	42700	ug/kg
PCB's Method: EPA 8080				Batch: 19369 Run Analyst: JLS DOA: 09/01/92 TOA: 1402 Prep Analyst: VLD DOP: 08/27/92 TOP: 0900
PCB-1016		U	99.2	ug/kg
PCB-1221		U	99.2	ug/kg
CB-1232		U	99.2	ug/kg
B-1242		U	99.2	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-02 Client ID: Matrix: Soil Description: NPS-CHS;S-6,18'-20'
Sampled: 08/20/92 Received: 08/20/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	99.2	ug/kg
PCB-1254		U	99.2	ug/kg
PCB-1260		U	99.2	ug/kg
PCB-1262		U	99.2	ug/kg
ICP	Method: EPA 6010			Batch: 19244 Run Analyst: JSS DOA: 08/27/92 TOA: 1611 Prep Analyst: FGD DOP: 08/26/92 TOP: 1600
Silver		U	2.50	mg/kg
Arsenic	6.20		3.20	mg/kg
Barium	8.05		2.50	mg/kg
Cadmium	0.117	J	2.50	mg/kg
Chromium	13.0		2.50	mg/kg
Lead	4.16		3.33	mg/kg
Selenium		U	8.73	mg/kg
Mercury	Method: EPA 7471			Batch: 19203 Run Analyst: ALK DOA: 08/27/92 TOA: 1430 Prep Analyst: ALK DOP: 08/27/92 TOP: 1100
Mercury	14.3	J	159.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-02 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-6, 18' - 20'
Sampled: 08/20/92 Received: 08/20/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19248 Run Analyst: AGW DOA: 09/27/92 TOA: 1913	
2 - Pentanone, 4 - hydroxy - 4-methyl	5,833	JAB	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-01 Client ID: Matrix: Soil Description: NPS-CHS; S-8 0"-6"
Sampled: 08/19/92 Received: 08/19/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19123 Run Analyst: SLF DOA: 08/21/92 TOA: 1500
Evaporative Loss @ 105 C	14.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20552 Run Analyst: AGW DOA: 08/27/92 TOA: 1351
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1351
				Prep Analyst: LMJ DOP: 08/25/92 TOP: 0930
1,2,4-Trichlorobenzene		U	3230	ug/kg
1,2-Dichlorobenzene		U	3230	ug/kg
1,3-Dichlorobenzene		U	3230	ug/kg
1,4-Dichlorobenzene		U	3230	ug/kg
2,4-Dinitrotoluene		U	3230	ug/kg
2,6-Dinitrotoluene		U	3230	ug/kg
2-Chloronaphthalene		U	3230	ug/kg
2-Methylnaphthalene		U	3230	ug/kg
3,3'-Dichlorobenzidine		U	6470	ug/kg
4-Bromophenyl phenyl ether		U	6470	ug/kg
4-Chloroaniline		U	3230	ug/kg
4-Chlorophenyl phenyl ether		U	3230	ug/kg
Acenaphthene		U	3230	ug/kg
Acenaphthylene		U	3230	ug/kg
Anthracene		U	3230	ug/kg
Benzo(a)anthracene		U	3230	ug/kg
Benzo(a)pyrene		U	3230	ug/kg
Benzo(b)fluoranthene		U	6030	ug/kg
Benzo(ghi)perylene		U	3230	ug/kg
Benzo(k)fluoranthene		U	8070	ug/kg
Butyl benzyl phthalate		U	3230	ug/kg
Chrysene		U	6470	ug/kg
Di-n-butyl phthalate		U	6470	ug/kg
Di-n-octyl phthalate		U	6470	ug/kg
Dibenzo(a,h)anthracene		U	3230	ug/kg
Dibenzofuran		U	3230	ug/kg
Diethyl phthalate		U	3230	ug/kg
Dimethyl phthalate		U	3230	ug/kg
Fluoranthene		U	3230	ug/kg
Fluorene		U	3230	ug/kg
Hexachlorobenzene		U	3230	ug/kg
Hexachlorobutadiene		U	3230	ug/kg
Hexachlorocyclopentadiene		U	7030	ug/kg
Hexachloroethane		U	3230	ug/kg
Indeno(1,2,3-c,d)pyrene		U	6470	ug/kg
Isophorone		U	3230	ug/kg
N-Nitrosodiphenylamine		U	6470	ug/kg
N-Nitrosodipropylamine		U	3230	ug/kg
Naphthalene		U	3230	ug/kg
Nitrobenzene		U	3230	ug/kg
Phenanthrene		U	3230	ug/kg
Pyrene		U	3230	ug/kg
bis(2-Chloroethoxy)methane		U	3230	ug/kg
bis(2-Chloroethyl) ether		U	3230	ug/kg
bis(2-Chloroisopropyl)ether		U	3230	ug/kg
bis(2-Ethylhexyl)phthalate		U	6470	ug/kg
m-Nitroaniline		U	32300	ug/kg
o-Nitroaniline		U	3230	ug/kg
p-Nitroaniline		U	27800	ug/kg
PCB's Method: EPA 8080				Batch: 19369 Run Analyst: JLS DOA: 09/03/92 TOA: 1839
				Prep Analyst: VLD DOP: 08/27/92 TOP: 0900
PCB-1016		U	323.	ug/kg
PCB-1221		U	323.	ug/kg
PCB-1232		U	323.	ug/kg
PCB-1242		U	323.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-01 Client ID: Matrix: Soil Description: NPS-CES; S-8 0"-6"
Sampled: 08/19/92 Received: 08/19/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248	1050		323.	ug/kg
PCB-1254		U	323.	ug/kg
PCB-1260		U	323.	ug/kg
PCB-1262		U	323.	ug/kg
ICP	Method: EPA 6010			Batch: 19132 Run Analyst: JSS DOA: 08/24/92 TOA: 1148 Prep Analyst: FGD DOP: 08/21/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	7.84		3.23	mg/kg
Barium	33.2		2.50	mg/kg
Cadmium	0.363	J	2.50	mg/kg
Chromium	21.8		2.50	mg/kg
Lead	121.		3.37	mg/kg
Selenium	2.15	J	8.80	mg/kg
Mercury	Method: EPA 7471			Batch: 19102 Run Analyst: PJM DOA: 08/21/92 TOA: 1000 Prep Analyst: PJM DOP: 08/20/92 TOP: 2200
Mercury	585.		167.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-01 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-8, 0" - 6"
Sampled: 08/19/92 Received: 08/19/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1351	
2- pentanone -4 hydroxy -4 -methy	69,800	JAB	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-02 Client ID: Matrix: Soil Description: NPS-CHS; S-8 3'-4'
Sampled: 08/19/92 Received: 08/19/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19123 Run Analyst: SLF DOA: 08/21/92 TOA: 1500
Evaporative Loss @ 105 C	18.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 08/27/92 TOA: 1437
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1437
				Prep Analyst: LMJ DOP: 08/25/92 TOP: 0930
1,2,4-Trichlorobenzene		U	3380	ug/kg
1,2-Dichlorobenzene		U	3380	ug/kg
1,3-Dichlorobenzene		U	3380	ug/kg
1,4-Dichlorobenzene		U	3380	ug/kg
2,4-Dinitrotoluene		U	3380	ug/kg
2,6-Dinitrotoluene		U	3380	ug/kg
2-Chloronaphthalene		U	3380	ug/kg
2-Methylnaphthalene		U	3380	ug/kg
3,3'-Dichlorobenzidine		U	6780	ug/kg
4-Bromophenyl phenyl ether		U	6780	ug/kg
4-Chloroaniline		U	3380	ug/kg
4-Chlorophenyl phenyl ether		U	3380	ug/kg
Acenaphthene		U	3380	ug/kg
Acenaphthylene		U	3380	ug/kg
Anthracene		U	3380	ug/kg
Benzo(a)anthracene		U	3380	ug/kg
Benzo(a)pyrene		U	3380	ug/kg
Benzo(b)fluoranthene		U	6330	ug/kg
Benzo(ghi)perylene		U	3380	ug/kg
Benzo(k)fluoranthene		U	8470	ug/kg
Butyl benzyl phthalate		U	3380	ug/kg
Chrysene		U	6780	ug/kg
Di-n-butyl phthalate		U	6780	ug/kg
Di-n-octyl phthalate		U	6780	ug/kg
Dibenzo(a,h)anthracene		U	3380	ug/kg
Dibenzofuran		U	3380	ug/kg
Diethyl phthalate		U	3380	ug/kg
Dimethyl phthalate		U	3380	ug/kg
Fluoranthene		U	3380	ug/kg
Fluorene		U	3380	ug/kg
Hexachlorobenzene		U	3380	ug/kg
Hexachlorobutadiene		U	3380	ug/kg
Hexachlorocyclopentadiene		U	7380	ug/kg
Hexachloroethane		U	3380	ug/kg
Indeno(1,2,3-c,d)pyrene		U	6780	ug/kg
Isophorone		U	3380	ug/kg
N-Nitrosodiphenylamine		U	6780	ug/kg
N-Nitrosodipropylamine		U	3380	ug/kg
Naphthalene		U	3380	ug/kg
Nitrobenzene		U	3380	ug/kg
Phenanthrene		U	3380	ug/kg
Pyrene		U	3380	ug/kg
bis(2-Chloroethoxy)methane		U	3380	ug/kg
bis(2-Chloroethyl) ether		U	3380	ug/kg
bis(2-Chloroisopropyl)ether		U	3380	ug/kg
bis(2-Ethylhexyl)phthalate		U	6780	ug/kg
m-Nitroaniline		U	33800	ug/kg
o-Nitroaniline		U	3380	ug/kg
p-Nitroaniline		U	29200	ug/kg
PCB's Method: EPA 8080				Batch: 19369 Run Analyst: JLS DOA: 09/01/92 TOA: 0847
				Prep Analyst: VLD DOP: 08/27/92 TOP: 0900
PCB-1016		U	67.8	ug/kg
PCB-1221		U	67.8	ug/kg
PCB-1232		U	67.8	ug/kg
PCB-1242		U	67.8	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-02 Client ID: Matrix: Soil Description: NPS-CHS; S-8 3'-4'
Sampled: 08/19/92 Received: 08/19/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	67.8	ug/kg
PCB-1254		U	67.8	ug/kg
PCB-1260		U	67.8	ug/kg
PCB-1262		U	67.8	ug/kg
ICP	Method: EPA 6010			Batch: 19132 Run Analyst: JSS DOA: 08/24/92 TOA: 1150 Prep Analyst: FGD DOP: 08/21/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	6.18		3.30	mg/kg
Barium	14.6		2.50	mg/kg
Cadmium		U	2.50	mg/kg
Chromium	8.97		2.50	mg/kg
Lead	4.57		3.45	mg/kg
Selenium	3.15	J	9.02	mg/kg
Mercury	Method: EPA 7471			Batch: 19102 Run Analyst: PJM DOA: 08/21/92 TOA: 1000 Prep Analyst: PJM DOP: 08/20/92 TOP: 2200
Mercury	42.9	J	159.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-02 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-8, 3' - 4'
Sampled: 08/19/92 Received: 08/19/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1437	
2- pentanone -4 hydroxy -4 -methy	60,975	JAB	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-03 Client ID: Matrix: Soil Description: NPS-CHS; S-8 19'-23'
Sampled: 08/19/92 Received: 08/19/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19123 Run Analyst: SLF DOA: 08/21/92 TOA: 1500
Evaporative Loss @ 105 C	20.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 08/27/92 TOA: 1600
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1600
				Prep Analyst: LMJ DOP: 08/25/92 TOP: 0930
1,2,4-Trichlorobenzene		U	3470	ug/kg
1,2-Dichlorobenzene		U	3470	ug/kg
1,3-Dichlorobenzene		U	3470	ug/kg
1,4-Dichlorobenzene		U	3470	ug/kg
2,4-Dinitrotoluene		U	3470	ug/kg
2,6-Dinitrotoluene		U	3470	ug/kg
2-Chloronaphthalene		U	3470	ug/kg
2-Methylnaphthalene		U	3470	ug/kg
3,3'-Dichlorobenzidine		U	6950	ug/kg
4-Bromophenyl phenyl ether		U	6950	ug/kg
4-Chloroaniline		U	3470	ug/kg
4-Chlorophenyl phenyl ether		U	3470	ug/kg
Acenaphthene		U	3470	ug/kg
Acenaphthylene		U	3470	ug/kg
nthracene		U	3470	ug/kg
enzo(a)anthracene		U	3470	ug/kg
Benzo(a)pyrene		U	3470	ug/kg
Benzo(b)fluoranthene		U	6500	ug/kg
Benzo(ghi)perylene		U	3470	ug/kg
Benzo(k)fluoranthene		U	8680	ug/kg
Butyl benzyl phthalate		U	3470	ug/kg
Chrysene		U	6950	ug/kg
Di-n-butyl phthalate		U	6950	ug/kg
Di-n-octyl phthalate		U	6950	ug/kg
Dibenzo(a,h)anthracene		U	3470	ug/kg
Dibenzofuran		U	3470	ug/kg
Diethyl phthalate		U	3470	ug/kg
Dimethyl phthalate		U	3470	ug/kg
Fluoranthene		U	3470	ug/kg
Fluorene		U	3470	ug/kg
Hexachlorobenzene		U	3470	ug/kg
Hexachlorobutadiene		U	3470	ug/kg
Hexachlorocyclopentadiene		U	7570	ug/kg
Hexachloroethane		U	3470	ug/kg
Indeno(1,2,3-c,d)pyrene		U	6950	ug/kg
Isophorone		U	3470	ug/kg
N-Nitrosodiphenylamine		U	6950	ug/kg
N-Nitrosodipropylamine		U	3470	ug/kg
Naphthalene		U	3470	ug/kg
Nitrobenzene		U	3470	ug/kg
Phenanthrene		U	3470	ug/kg
Pyrene		U	3470	ug/kg
bis(2-Chloroethoxy)methane		U	3470	ug/kg
bis(2-Chloroethyl) ether		U	3470	ug/kg
bis(2-Chloroisopropyl)ether		U	3470	ug/kg
bis(2-Ethylhexyl)phthalate		U	6950	ug/kg
m-Nitroaniline		U	34700	ug/kg
o-Nitroaniline		U	3470	ug/kg
p-Nitroaniline		U	29800	ug/kg
PCB's Method: EPA 8080				Batch: 19369 Run Analyst: JLS DOA: 09/01/92 TOA: 0927
				Prep Analyst: VLD DOP: 08/27/92 TOP: 0900
PCB-1016		U	69.5	ug/kg
PCB-1221		U	69.5	ug/kg
PCB-1232		U	69.5	ug/kg
PCB-1242		U	69.5	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-03 Client ID: Matrix: Soil Description: NPS-CHS; S-8 19'-23'
Sampled: 08/19/92 Received: 08/19/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	69.5	ug/kg
PCB-1254		U	69.5	ug/kg
PCB-1260		U	69.5	ug/kg
PCB-1262		U	69.5	ug/kg
ICP	Method: EPA 6010			Batch: 19132 Run Analyst: JSS DOA: 08/24/92 TOA: 1153 Prep Analyst: FGD DOP: 08/21/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	4.98		3.30	mg/kg
Barium	15.9		2.50	mg/kg
Cadmium		U	2.50	mg/kg
Chromium	8.74		2.50	mg/kg
Lead	15.9		3.45	mg/kg
Selenium	1.07	J	9.02	mg/kg
Mercury	Method: EPA 7471			Batch: 19102 Run Analyst: PJM DOA: 08/21/92 TOA: 1000 Prep Analyst: PJM DOP: 08/20/92 TOP: 2200
Mercury	20.0	J	167.	ug/kg

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SC	10120
VA	00151
TN	02934
WI	99988779

CERTIFICATE OF ANALYSIS

Sample: 9208343-03 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-8, 19' - 23'
Sampled: 08/19/92 Received: 08/19/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1600	
2- pentanone -4 hydroxy -4 -methy	77,777	JAB	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-04 Client ID: Matrix: Soil Description: NPS-CHS; S-8 26'-30'
Sampled: 08/19/92 Received: 08/19/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19123 Run Analyst: SLF DOA: 08/21/92 TOA: 1500
Evaporative Loss @ 105 C	35.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 08/27/92 TOA: 1610
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1610 Prep Analyst: LMJ DOP: 08/25/92 TOP: 0930
1,2,4-Trichlorobenzene		U	4270	ug/kg
1,2-Dichlorobenzene		U	4270	ug/kg
1,3-Dichlorobenzene		U	4270	ug/kg
1,4-Dichlorobenzene		U	4270	ug/kg
2,4-Dinitrotoluene		U	4270	ug/kg
2,6-Dinitrotoluene		U	4270	ug/kg
2-Chloronaphthalene		U	4270	ug/kg
2-Methylnaphthalene		U	4270	ug/kg
3,3'-Dichlorobenzidine		U	8550	ug/kg
4-Bromophenyl phenyl ether		U	8550	ug/kg
4-Chloroaniline		U	4270	ug/kg
4-Chlorophenyl phenyl ether		U	4270	ug/kg
Acenaphthene		U	4270	ug/kg
Acenaphthylene		U	4270	ug/kg
Anthracene		U	4270	ug/kg
Benzo(a)anthracene		U	4270	ug/kg
Benzo(a)pyrene		U	4270	ug/kg
Benzo(b)fluoranthene		U	7980	ug/kg
Benzo(ghi)perylene		U	4270	ug/kg
Benzo(k)fluoranthene		U	10700	ug/kg
Butyl benzyl phthalate		U	4270	ug/kg
Chrysene		U	8550	ug/kg
Di-n-butyl phthalate		U	8550	ug/kg
Di-n-octyl phthalate		U	8550	ug/kg
Dibenzo(a,h)anthracene		U	4270	ug/kg
Dibenzofuran		U	4270	ug/kg
Diethyl phthalate		U	4270	ug/kg
Dimethyl phthalate		U	4270	ug/kg
Fluoranthene		U	4270	ug/kg
Fluorene		U	4270	ug/kg
Hexachlorobenzene		U	4270	ug/kg
Hexachlorobutadiene		U	4270	ug/kg
Hexachlorocyclopentadiene		U	9320	ug/kg
Hexachloroethane		U	4270	ug/kg
Indeno(1,2,3-c,d)pyrene		U	8550	ug/kg
Isophorone		U	4270	ug/kg
N-Nitrosodiphenylamine		U	8550	ug/kg
N-Nitrosodipropylamine		U	4270	ug/kg
Naphthalene		U	4270	ug/kg
Nitrobenzene		U	4270	ug/kg
Phenanthrene		U	4270	ug/kg
Pyrene		U	4270	ug/kg
bis(2-Chloroethoxy)methane		U	4270	ug/kg
bis(2-Chloroethyl) ether		U	4270	ug/kg
bis(2-Chloroisopropyl)ether		U	4270	ug/kg
bis(2-Ethylhexyl)phthalate		U	8550	ug/kg
m-Nitroaniline		U	42700	ug/kg
o-Nitroaniline		U	4270	ug/kg
p-Nitroaniline		U	36800	ug/kg
PCB's Method: EPA 8080				Batch: 19369 Run Analyst: JLS DOA: 09/01/92 TOA: 1046 Prep Analyst: VLD DOP: 08/27/92 TOP: 0900
PCB-1016		U	85.5	ug/kg
PCB-1221		U	85.5	ug/kg
PCB-1232		U	85.5	ug/kg
PCB-1242		U	85.5	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-04 Client ID: Matrix: Soil Description: NPS-CHS; S-8 26'-30'
Sampled: 08/19/92 Received: 08/19/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248	0.185	J	85.5	ug/kg
PCB-1254		U	85.5	ug/kg
PCB-1260		U	85.5	ug/kg
PCB-1262		U	85.5	ug/kg
ICP	Method: EPA 6010			Batch: 19132 Run Analyst: JSS DOA: 08/24/92 TOA: 1155 Prep Analyst: FGD DOP: 08/21/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	8.81		3.13	mg/kg
Barium	7.01		2.50	mg/kg
Cadmium		U	2.50	mg/kg
Chromium	12.3		2.50	mg/kg
Lead	3.48		3.25	mg/kg
Selenium	0.185	J	8.53	mg/kg
Mercury	Method: EPA 7471			Batch: 19102 Run Analyst: PJM DOA: 08/21/92 TOA: 1000 Prep Analyst: PJM DOP: 08/20/92 TOP: 2200
Mercury	5.00	J	167.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208343-04 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-8, 26' - 30'
Sampled: 08/19/92 Received: 08/19/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1610	
2- pentanone -4 hydroxy -4 -methy	82,000	JAB	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-03 Client ID: Matrix: Soil Description: NPS-CHS;S-9,0"-6"
Sampled: 08/20/92 Received: 08/20/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19123 Run Analyst: SLF DOA: 08/21/92 TOA: 1500
Evaporative Loss @ 105 C	14.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 08/27/92 TOA: 1959
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1959
				Prep Analyst: LMJ DOP: 08/25/92 TOP: 0930
1,2,4-Trichlorobenzene		U	3230	ug/kg
1,2-Dichlorobenzene		U	3230	ug/kg
1,3-Dichlorobenzene		U	3230	ug/kg
1,4-Dichlorobenzene		U	3230	ug/kg
2,4-Dinitrotoluene		U	3230	ug/kg
2,6-Dinitrotoluene		U	3230	ug/kg
2-Chloronaphthalene		U	3230	ug/kg
2-Methylnaphthalene		U	3230	ug/kg
3,3'-Dichlorobenzidine		U	6470	ug/kg
4-Bromophenyl phenyl ether		U	6470	ug/kg
4-Chloroaniline		U	3230	ug/kg
4-Chlorophenyl phenyl ether		U	3230	ug/kg
Acenaphthene		U	3230	ug/kg
Acenaphthylene		U	3230	ug/kg
Anthracene		U	3230	ug/kg
Benzo(a)anthracene		U	3230	ug/kg
Benzo(a)pyrene		U	3230	ug/kg
Benzo(b)fluoranthene		U	6030	ug/kg
Benzo(ghi)perylene		U	3230	ug/kg
Benzo(k)fluoranthene		U	8070	ug/kg
Butyl benzyl phthalate		U	3230	ug/kg
Chrysene		U	6470	ug/kg
Di-n-butyl phthalate		U	6470	ug/kg
Di-n-octyl phthalate		U	6470	ug/kg
Dibenzo(a,h)anthracene		U	3230	ug/kg
Dibenzofuran		U	3230	ug/kg
Diethyl phthalate		U	3230	ug/kg
Dimethyl phthalate		U	3230	ug/kg
Fluoranthene		U	3230	ug/kg
Fluorene		U	3230	ug/kg
Hexachlorobenzene		U	3230	ug/kg
Hexachlorobutadiene		U	3230	ug/kg
Hexachlorocyclopentadiene		U	7030	ug/kg
Hexachloroethane		U	3230	ug/kg
Indeno(1,2,3-c,d)pyrene		U	6470	ug/kg
Isophorone		U	3230	ug/kg
N-Nitrosodiphenylamine		U	6470	ug/kg
N-Nitrosodipropylamine		U	3230	ug/kg
Naphthalene		U	3230	ug/kg
Nitrobenzene		U	3230	ug/kg
Phenanthrene		U	3230	ug/kg
Pyrene		U	3230	ug/kg
bis(2-Chloroethoxy)methane		U	3230	ug/kg
bis(2-Chloroethyl) ether		U	3230	ug/kg
bis(2-Chloroisopropyl)ether		U	3230	ug/kg
bis(2-Ethylhexyl)phthalate		U	6470	ug/kg
m-Nitroaniline		U	32300	ug/kg
o-Nitroaniline		U	3230	ug/kg
p-Nitroaniline		U	27800	ug/kg
PCB's Method: EPA 8080				Batch: 19369 Run Analyst: JLS DOA: 09/03/92 TOA: 2315
				Prep Analyst: VLD DOP: 08/27/92 TOP: 0900
PCB-1016		U	64.7	ug/kg
PCB-1221		U	64.7	ug/kg
PCB-1232		U	64.7	ug/kg
PCB-1242		U	64.7	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-03 Client ID: Matrix: Soil Description: NPS-CHS;S-9,0"-6"
Sampled: 08/20/92 Received: 08/20/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	64.7	ug/kg
PCB-1254	181.		64.7	ug/kg
PCB-1260	216.		64.7	ug/kg
PCB-1262		U	64.7	ug/kg
ICP	Method: EPA 6010			Batch: 19132 Run Analyst: JSS DOA: 08/24/92 TOA: 1238 Prep Analyst: FGD DOP: 08/21/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	8.12		3.25	mg/kg
Barium	35.6		2.50	mg/kg
Cadmium	0.789	J	2.50	mg/kg
Chromium	28.1		2.50	mg/kg
Lead	151.		3.38	mg/kg
Selenium	2.62	J	8.88	mg/kg
Mercury	Method: EPA 7471			Batch: 19203 Run Analyst: ALK DOA: 08/31/92 TOA: 1200 Prep Analyst: ALK DOP: 08/28/92 TOP: 1200
Mercury	835.		167.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-03 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-9, 0" - 6"
Sampled: 08/20/92 Received: 08/20/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270 Batch: 19248 Run Analyst: AGW DOA: 08/27/92 TOA: 1959				
2 - Pentanone, 4 - hydroxy - 4-methyl	42,635	JAB	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-04 Client ID: Matrix: Soil Description: NPS-CHS;S-9,3'-4'
Sampled: 08/20/92 Received: 08/20/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19123 Run Analyst: SLF DOA: 08/21/92 TOA: 1500
Evaporative Loss @ 105 C	16.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/01/92 TOA: 1634
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19248 Run Analyst: AGW DOA: 09/01/92 TOA: 1634
				Prep Analyst: LMJ DOP: 08/25/92 TOP: 0930
1,2,4-Trichlorobenzene		U	13200	ug/kg
1,2-Dichlorobenzene		U	13200	ug/kg
1,3-Dichlorobenzene		U	13200	ug/kg
1,4-Dichlorobenzene		U	13200	ug/kg
2,4-Dinitrotoluene		U	13200	ug/kg
2,6-Dinitrotoluene		U	13200	ug/kg
2-Chloronaphthalene		U	13200	ug/kg
2-Methylnaphthalene		U	13200	ug/kg
3,3'-Dichlorobenzidine		U	26500	ug/kg
4-Bromophenyl phenyl ether		U	26500	ug/kg
4-Chloroaniline		U	13200	ug/kg
4-Chlorophenyl phenyl ether		U	13200	ug/kg
Acenaphthene	30200		13200	ug/kg
Acenaphthylene		U	13200	ug/kg
nthracene	27000		13200	ug/kg
enzo(a)anthracene		U	13200	ug/kg
enzo(a)pyrene		U	13200	ug/kg
Benzo(b)fluoranthene		U	24700	ug/kg
Benzo(ghi)perylene		U	13200	ug/kg
Benzo(k)fluoranthene		U	33000	ug/kg
Butyl benzyl phthalate		U	13200	ug/kg
Chrysene		U	26500	ug/kg
Di-n-butyl phthalate		U	26500	ug/kg
Di-n-octyl phthalate		U	26500	ug/kg
Dibenzo(a,h)anthracene		U	13200	ug/kg
Dibenzofuran	17500		13200	ug/kg
Diethyl phthalate		U	13200	ug/kg
Dimethyl phthalate		U	13200	ug/kg
Fluoranthene	52400		13200	ug/kg
Fluorene	27000		13200	ug/kg
Hexachlorobenzene		U	13200	ug/kg
Hexachlorobutadiene		U	13200	ug/kg
Hexachlorocyclopentadiene		U	28800	ug/kg
Hexachloroethane		U	13200	ug/kg
Indeno(1,2,3-c,d)pyrene		U	26500	ug/kg
Isophorone		U	13200	ug/kg
N-Nitrosodiphenylamine		U	26500	ug/kg
N-Nitrosodipropylamine		U	13200	ug/kg
Naphthalene	17500		13200	ug/kg
Nitrobenzene		U	13200	ug/kg
Phenanthrene	90500		13200	ug/kg
Pyrene	42900		13200	ug/kg
bis(2-Chloroethoxy)methane		U	13200	ug/kg
bis(2-Chloroethyl) ether		U	13200	ug/kg
bis(2-Chloroisopropyl)ether		U	13200	ug/kg
bis(2-Ethylhexyl)phthalate		U	26500	ug/kg
m-Nitroaniline		U	132000	ug/kg
o-Nitroaniline		U	13200	ug/kg
p-Nitroaniline		U	114000	ug/kg
PCB's Method: EPA 8080				Batch: 19369 Run Analyst: JLS DOA: 09/04/92 TOA: 0152
				Prep Analyst: VLD DOP: 08/27/92 TOP: 0900
PCB-1016		U	662.	ug/kg
PCB-1221		U	662.	ug/kg
PCB-1232		U	662.	ug/kg
CB-1242		U	662.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-04 Client ID: Matrix: Soil Description: NPS-CHS;S-9,3'-4'
Sampled: 08/20/92 Received: 08/20/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	662.	ug/kg
PCB-1254		U	662.	ug/kg
PCB-1260		U	662.	ug/kg
PCB-1262		U	662.	ug/kg
ICP	Method: EPA 6010			Batch: 19132 Run Analyst: JSS DOA: 08/24/92 TOA: 1240 Prep Analyst: FGD DOP: 08/21/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	9.73		3.28	mg/kg
Barium	43.8		2.50	mg/kg
Cadmium	3.01		2.50	mg/kg
Chromium	37.7		2.50	mg/kg
Lead	340.		3.42	mg/kg
Selenium	2.70	J	8.95	mg/kg
Mercury	Method: EPA 7471			Batch: 19203 Run Analyst: ALK DOA: 08/24/92 TOA: 1430 Prep Analyst: ALK DOP: 08/24/92 TOP: 1100
Mercury	486.		152.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-04 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-9, 3' - 4'
Sampled: 08/20/92 Received: 08/20/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19248 Run Analyst: AGW DOA: 09/01/92 TOA: 1634	
2 - Pentanone, 4 - hydroxy - 4-methyl	39,682	JAB	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-05 Client ID: Matrix: Soil Description: NPS-CHS;S-9,13'-17'
Sampled: 08/20/92 Received: 08/20/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19123 Run Analyst: SLF DOA: 08/21/92 TOA: 1500
Evaporative Loss @ 105 C	32.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/01/92 TOA: 1718
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19248 Run Analyst: AGW DOA: 09/01/92 TOA: 1718
				Prep Analyst: LMJ DOP: 08/25/92 TOP: 0930
1,2,4-Trichlorobenzene		U	16300	ug/kg
1,2-Dichlorobenzene		U	16300	ug/kg
1,3-Dichlorobenzene		U	16300	ug/kg
1,4-Dichlorobenzene		U	16300	ug/kg
2,4-Dinitrotoluene		U	16300	ug/kg
2,6-Dinitrotoluene		U	16300	ug/kg
2-Chloronaphthalene		U	16300	ug/kg
2-Methylnaphthalene	31400		16300	ug/kg
3,3'-Dichlorobenzidine		U	32700	ug/kg
4-Bromophenyl phenyl ether		U	32700	ug/kg
4-Chloroaniline		U	16300	ug/kg
4-Chlorophenyl phenyl ether		U	16300	ug/kg
Acenaphthene	27500		16300	ug/kg
Acenaphthylene		U	16300	ug/kg
Anthracene	24000		4080	ug/kg
Benzo(a)anthracene		U	16300	ug/kg
Benzo(a)pyrene		U	16300	ug/kg
Benzo(b)fluoranthene		U	30500	ug/kg
Benzo(ghi)perylene		U	16300	ug/kg
Benzo(k)fluoranthene		U	40800	ug/kg
Butyl benzyl phthalate		U	16300	ug/kg
Chrysene		U	32700	ug/kg
Di-n-butyl phthalate		U	32700	ug/kg
Di-n-octyl phthalate		U	32700	ug/kg
Dibenzo(a,h)anthracene		U	16300	ug/kg
Dibenzofuran	19600		16300	ug/kg
Diethyl phthalate		U	16300	ug/kg
Dimethyl phthalate		U	16300	ug/kg
Fluoranthene	35300		16300	ug/kg
Fluorene	27500		16300	ug/kg
Hexachlorobenzene		U	16300	ug/kg
Hexachlorobutadiene		U	16300	ug/kg
Hexachlorocyclopentadiene		U	35700	ug/kg
Hexachloroethane		U	16300	ug/kg
Indeno(1,2,3-c,d)pyrene		U	32700	ug/kg
Isophorone		U	16300	ug/kg
N-Nitrosodiphenylamine		U	32700	ug/kg
N-Nitrosodipropylamine		U	16300	ug/kg
Naphthalene	47100		16300	ug/kg
Nitrobenzene		U	16300	ug/kg
Phenanthrene	72500		16300	ug/kg
Pyrene	31400		16300	ug/kg
bis(2-Chloroethoxy)methane		U	16300	ug/kg
bis(2-Chloroethyl) ether		U	16300	ug/kg
bis(2-Chloroisopropyl)ether		U	16300	ug/kg
bis(2-Ethylhexyl)phthalate		U	32700	ug/kg
m-Nitroaniline		U	163000	ug/kg
o-Nitroaniline		U	16300	ug/kg
p-Nitroaniline		U	141000	ug/kg
PCB's Method: EPA 8080				Batch: 19369 Run Analyst: JLS DOA: 09/02/92 TOA: 0837
				Prep Analyst: VLD DOP: 08/27/92 TOP: 0900
PCB-1016		U	81.7	ug/kg
PCB-1221		U	81.7	ug/kg
PCB-1232		U	81.7	ug/kg
PCB-1242		U	81.7	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-05 Client ID: Matrix: Soil Description: NPS-CHS;S-9,13'-17'
Sampled: 08/20/92 Received: 08/20/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	81.7	ug/kg
PCB-1254		U	81.7	ug/kg
PCB-1260		U	81.7	ug/kg
PCB-1262		U	81.7	ug/kg
ICP	Method: EPA 6010			Batch: 19132 Run Analyst: JSS DOA: 08/24/92 TOA: 1242 Prep Analyst: FGD DOP: 08/21/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	6.29		3.25	mg/kg
Barium	36.3		2.50	mg/kg
Cadmium	0.277	J	2.50	mg/kg
Chromium	8.73		2.50	mg/kg
Lead	118.		3.38	mg/kg
Selenium	1.09	J	8.88	mg/kg
Mercury	Method: EPA 7471			Batch: 19203 Run Analyst: ALK DOA: 08/31/92 TOA: 1430 Prep Analyst: ALK DOP: 08/28/92 TOP: 1100
Mercury	583.		139.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-05 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-9, 13' - 17'
Sampled: 08/20/92 Received: 08/20/92 Page: 1

Project: CITY00391 Manager: TDH

GC/MS Extractables Method: EPA 8270 Batch: 19248 Run Analyst: AGW DOA: 09/01/92 TOA: 1718

Parameter	Result	Qual	CRDL	Units
2 - Pentanone, 4 - hydroxy - 4 - methyl	38,725	JAB	--	ug/kg
α - pinene	23,040	J	--	ug/kg
C10 alkyl benzene	3,921	J	--	ug/kg
Methyl naphthalene (isomer)	5,392	J	--	ug/kg
1,1' Biphenyl	2,450	J	--	ug/kg
Ethyl naphthalene (isomer)	2,450	J	--	ug/kg
Dimethyl naphthalene (isomer)	6,372	J	--	ug/kg
Dimethyl naphthalene (isomer)	11,274	J	--	ug/kg
Dimethyl naphthalene (isomer)	2,941	J	--	ug/kg
11H - Benzo [b] flourene	3,921	J	--	ug/kg
Unknown aromatic hydrocarbon	3,431	J	--	ug/kg
Unknown	3,921	J	--	ug/kg
Unknown	18,137	J	--	ug/kg
Unknown	13,725	J	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-06 Client ID: Matrix: Soil Description: NPS-CHS;S-9,23'-25'
Sampled: 08/20/92 Received: 08/20/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19123 Run Analyst: SLF DOA: 08/21/92 TOA: 1500
Evaporative Loss @ 105 C	37.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/01/92 TOA: 0044
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19248 Run Analyst: AGW DOA: 09/01/92 TOA: 0044
				Prep Analyst: LMJ DOP: 08/25/92 TOP: 0930
1,2,4-Trichlorobenzene		U	4420	ug/kg
1,2-Dichlorobenzene		U	4420	ug/kg
1,3-Dichlorobenzene		U	4420	ug/kg
1,4-Dichlorobenzene		U	4420	ug/kg
2,4-Dinitrotoluene		U	4420	ug/kg
2,6-Dinitrotoluene		U	4420	ug/kg
2-Chloronaphthalene		U	4420	ug/kg
2-Methylnaphthalene	20600		4420	ug/kg
3,3'-Dichlorobenzidine		U	8820	ug/kg
4-Bromophenyl phenyl ether		U	8820	ug/kg
4-Chloroaniline		U	4420	ug/kg
4-Chlorophenyl phenyl ether		U	4420	ug/kg
Acenaphthene	16400		4420	ug/kg
Acenaphthylene		U	4420	ug/kg
Anthracene	16400		4420	ug/kg
Benzo(a)anthracene	13200		4420	ug/kg
Benzo(a)pyrene	7940		4420	ug/kg
Benzo(b)fluoranthene	7410	J	8250	ug/kg
Benzo(ghi)perylene		U	4420	ug/kg
Benzo(k)fluoranthene	7410	J	11000	ug/kg
Butyl benzyl phthalate		U	4420	ug/kg
Chrysene	11600		8820	ug/kg
Di-n-butyl phthalate		U	8820	ug/kg
Di-n-octyl phthalate		U	8820	ug/kg
Dibenzo(a,h)anthracene		U	4420	ug/kg
Dibenzofuran	11100		4420	ug/kg
Diethyl phthalate		U	4420	ug/kg
Dimethyl phthalate		U	4420	ug/kg
Fluoranthene	31200		4420	ug/kg
Fluorene	16400		4420	ug/kg
Hexachlorobenzene		U	4420	ug/kg
Hexachlorobutadiene		U	4420	ug/kg
Hexachlorocyclopentadiene		U	9620	ug/kg
Hexachloroethane		U	4420	ug/kg
Indeno(1,2,3-c,d)pyrene		U	8820	ug/kg
Isophorone		U	4420	ug/kg
N-Nitrosodiphenylamine		U	8820	ug/kg
N-Nitrosodipropylamine		U	4420	ug/kg
Naphthalene	9520		4420	ug/kg
Nitrobenzene		U	4420	ug/kg
Phenanthrene	55000		4420	ug/kg
Pyrene	23300		4420	ug/kg
bis(2-Chloroethoxy)methane		U	4420	ug/kg
bis(2-Chloroethyl) ether		U	4420	ug/kg
bis(2-Chloroisopropyl)ether		U	4420	ug/kg
bis(2-Ethylhexyl)phthalate		U	8820	ug/kg
m-Nitroaniline		U	44200	ug/kg
o-Nitroaniline		U	4420	ug/kg
p-Nitroaniline		U	38000	ug/kg
PCB's Method: EPA 8080				Batch: 19369 Run Analyst: JLS DOA: 09/02/92 TOA: 0916
				Prep Analyst: VLD DOP: 08/27/92 TOP: 0900
PCB-1016		U	88.2	ug/kg
PCB-1221		U	88.2	ug/kg
PCB-1232		U	88.2	ug/kg
PCB-1242		U	88.2	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-06 Client ID: Matrix: Soil Description: NPS-CHS;S-9,23'-25'
Sampled: 08/20/92 Received: 08/20/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	88.2	ug/kg
PCB-1254		U	88.2	ug/kg
PCB-1260		U	88.2	ug/kg
PCB-1262		U	88.2	ug/kg
ICP	Method: EPA 6010			Batch: 19132 Run Analyst: JSS DOA: 08/24/92 TOA: 1253 Prep Analyst: FGD DOP: 08/21/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	8.59		3.25	mg/kg
Barium	22.1		2.50	mg/kg
Cadmium		U	2.50	mg/kg
Chromium	9.39		2.50	mg/kg
Lead	61.0		3.38	mg/kg
Selenium	0.593	J	8.88	mg/kg
Mercury	Method: EPA 7471			Batch: 19203 Run Analyst: ALK DOA: 08/31/92 TOA: 1200 Prep Analyst: ALK DOP: 08/28/92 TOP: 1200
Mercury	262.		159.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208369-06 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-9, 23' - 25'
Sampled: 08/20/92 Received: 08/20/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19248 Run Analyst: AGW DOA: 09/01/92 TOA: 0044	
Methyl naphthalene (isomer)	12,169	J	--	ug/kg
C13 Alkyl Naphthalene	6,349	J	--	ug/kg
C14 Alkyl Naphthalene	5,290	J	--	ug/kg
Methyl Anthracene (isomer)	8,990	J	--	ug/kg
1H - Indene, 2 - phenyl	10,050	J	--	ug/kg
Dimethyl Phenanthrene (isomer)	6,349	J	--	ug/kg
2 - Pentanone, 4 - hydroxy - 4-methyl	31,217	JAB	--	ug/kg
Dimethyl naphthalene (isomer)	3,704	J	--	ug/kg
Dimethyl naphthalene (isomer)	4,232	J	--	ug/kg
Dimethyl naphthalene (isomer)	4,232	J	--	ug/kg
C14 Alkyl Naphthalene	3,175	J	--	ug/kg
C15 Alkyl Benzene	4,232	J	--	ug/kg
Methyl phenanthrene or Methyl anthracene	4,762	J	--	ug/kg
Unknown aromatic hydrocarbon	8,465	J	--	ug/kg
Unknown aromatic hydrocarbon	3,704	J	--	ug/kg
Unknown	41,790	J	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9209076-01 Client ID: Matrix: Soil Sampled: 09/02/92 Description: NPS-CHS,S-10,3'-4' Received: 09/03/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19785 Run Analyst: VLD DOA: 09/04/92 TOA: 1300
Evaporative Loss @ 105 C	18.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20552 Run Analyst: GZ DOA: 09/09/92 TOA: 1608
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19783 Run Analyst: GZ DOA: 09/09/92 TOA: 1608 Prep Analyst: VLD DOP: 09/04/92 TOP: 1600
1,2,4-Trichlorobenzene		U	3380	ug/kg
1,2-Dichlorobenzene		U	3380	ug/kg
1,3-Dichlorobenzene		U	3380	ug/kg
1,4-Dichlorobenzene		U	3380	ug/kg
2,4-Dinitrotoluene		U	3380	ug/kg
2,6-Dinitrotoluene		U	3380	ug/kg
2-Chloronaphthalene		U	3380	ug/kg
2-Methylnaphthalene		U	3380	ug/kg
3,3'-Dichlorobenzidine		U	6780	ug/kg
4-Bromophenyl phenyl ether		U	6780	ug/kg
4-Chloroaniline		U	3380	ug/kg
4-Chlorophenyl phenyl ether		U	3380	ug/kg
Acenaphthene		U	3380	ug/kg
Acenaphthylene		U	3380	ug/kg
Anthracene		U	3380	ug/kg
Benzo(a)anthracene		U	3380	ug/kg
Benzo(a)pyrene		U	3380	ug/kg
Benzo(b)fluoranthene		U	6330	ug/kg
Benzo(ghi)perylene		U	3380	ug/kg
Benzo(k)fluoranthene		U	8470	ug/kg
Butyl benzyl phthalate		U	3380	ug/kg
Chrysene		U	6780	ug/kg
Di-n-butyl phthalate		U	6780	ug/kg
Di-n-octyl phthalate		U	6780	ug/kg
Dibenzo(a,h)anthracene		U	3380	ug/kg
Dibenzofuran		U	3380	ug/kg
Diethyl phthalate		U	3380	ug/kg
Dimethyl phthalate		U	3380	ug/kg
Fluoranthene	3250	J	3380	ug/kg
Fluorene		U	3380	ug/kg
Hexachlorobenzene		U	3380	ug/kg
Hexachlorobutadiene		U	3380	ug/kg
Hexachlorocyclopentadiene		U	7380	ug/kg
Hexachloroethane		U	3380	ug/kg
Indeno(1,2,3-c,d)pyrene		U	6780	ug/kg
Isophorone		U	3380	ug/kg
N-Nitrosodiphenylamine		U	6780	ug/kg
N-Nitrosodipropylamine		U	3380	ug/kg
Naphthalene		U	3380	ug/kg
Nitrobenzene		U	3380	ug/kg
Phenanthrene		U	3380	ug/kg
Pyrene	2850	J	3380	ug/kg
bis(2-Chloroethoxy)methane		U	3380	ug/kg
bis(2-Chloroethyl) ether		U	3380	ug/kg
bis(2-Chloroisopropyl)ether		U	3380	ug/kg
bis(2-Ethylhexyl)phthalate		U	6780	ug/kg
m-Nitroaniline		U	33800	ug/kg
o-Nitroaniline		U	3380	ug/kg
p-Nitroaniline		U	29200	ug/kg
PCB's Method: EPA 8080				Batch: 19936 Run Analyst: JLS DOA: 09/11/92 TOA: 0501 Prep Analyst: LMJ DOP: 09/09/92 TOP: 1500
PCB-1016		U	678.	ug/kg
PCB-1221		U	678.	ug/kg
PCB-1232		U	678.	ug/kg
PCB-1242		U	678.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9209076-01 Client ID: Matrix: Soil Description: NPS-CHS,S-10,3'-4'
Sampled: 09/02/92 Received: 09/03/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	678.	ug/kg
PCB-1254		U	678.	ug/kg
PCB-1260		U	678.	ug/kg
PCB-1262		U	678.	ug/kg
ICP	Method: EPA 6010			Batch: 19980 Run Analyst: JSS DOA: 09/11/92 TOA: 1543 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	37.8		6.25	mg/kg
Barium	329.		2.50	mg/kg
Cadmium	1.90	J	2.50	mg/kg
Chromium	21.1		2.50	mg/kg
Lead	539.		6.52	mg/kg
Selenium		U	8.53	mg/kg
Mercury	Method: EPA 7471			Batch: 19893 Run Analyst: ALK DOA: 09/09/92 TOA: 1400 Prep Analyst: ALK DOP: 09/09/92 TOP: 0900
Mercury	159.		152.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9209076-01 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-10, 3' - 4'
Sampled: 09/03/92 Received: 09/03/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19783 Run Analyst: GZ DOA: 09/09/92 TOA: 1608	
None Found		--	ug/kg	

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CERTIFICATE OF ANALYSIS

Sample: 9208313-01 Client ID: Matrix: Soil Description: NPS-CHS, S-10, 10'-12'
Sampled: 08/18/92 Received: 08/18/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 18843 Run Analyst: SLF DOA: 08/20/92 TOA: 1400
Evaporative Loss @ 105 C	22.0	JB	0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/01/92 TOA: 0127
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19248 Run Analyst: AGW DOA: 09/01/92 TOA: 0127
				Prep Analyst: LMJ DOP: 08/25/92 TOP: 0930
1,2,4-Trichlorobenzene		U	3570	ug/kg
1,2-Dichlorobenzene		U	3570	ug/kg
1,3-Dichlorobenzene		U	3570	ug/kg
1,4-Dichlorobenzene		U	3570	ug/kg
2,4-Dinitrotoluene		U	3570	ug/kg
2,6-Dinitrotoluene		U	3570	ug/kg
2-Chloronaphthalene		U	3570	ug/kg
2-Methylnaphthalene		U	3570	ug/kg
3,3'-Dichlorobenzidine		U	7120	ug/kg
4-Bromophenyl phenyl ether		U	7120	ug/kg
4-Chloroaniline		U	3570	ug/kg
4-Chlorophenyl phenyl ether		U	3570	ug/kg
Acenaphthene		U	3570	ug/kg
Acenaphthylene		U	3570	ug/kg
Anthracene		U	3570	ug/kg
Benzo(a)anthracene		U	3570	ug/kg
Benzo(a)pyrene		U	3570	ug/kg
Benzo(b)fluoranthene		U	6670	ug/kg
Benzo(ghi)perylene		U	3570	ug/kg
Benzo(k)fluoranthene		U	8900	ug/kg
Butyl benzyl phthalate		U	3570	ug/kg
Chrysene		U	7120	ug/kg
Di-n-butyl phthalate		U	7120	ug/kg
Di-n-octyl phthalate		U	7120	ug/kg
Dibenzo(a,h)anthracene		U	3570	ug/kg
Dibenzofuran		U	3570	ug/kg
Diethyl phthalate		U	3570	ug/kg
Dimethyl phthalate		U	3570	ug/kg
Fluoranthene		U	3570	ug/kg
Fluorene		U	3570	ug/kg
Hexachlorobenzene		U	3570	ug/kg
Hexachlorobutadiene		U	3570	ug/kg
Hexachlorocyclopentadiene		U	7770	ug/kg
Hexachloroethane		U	3570	ug/kg
Indeno(1,2,3-c,d)pyrene		U	7120	ug/kg
Isophorone		U	3570	ug/kg
N-Nitrosodiphenylamine		U	7120	ug/kg
N-Nitrosodipropylamine		U	3570	ug/kg
Naphthalene		U	3570	ug/kg
Nitrobenzene		U	3570	ug/kg
Phenanthrene		U	3570	ug/kg
Pyrene		U	3570	ug/kg
bis(2-Chloroethoxy)methane		U	3570	ug/kg
bis(2-Chloroethyl) ether		U	3570	ug/kg
bis(2-Chloroisopropyl)ether		U	3570	ug/kg
bis(2-Ethylhexyl)phthalate		U	7120	ug/kg
m-Nitroaniline		U	35700	ug/kg
o-Nitroaniline		U	3570	ug/kg
p-Nitroaniline		U	30700	ug/kg
PCB's Method: EPA 8080				Batch: 19547 Run Analyst: JLS DOA: 09/03/92 TOA: 1759
				Prep Analyst: ECP DOP: 08/20/92 TOP: 2200
PCB-1016		U	42.7	ug/kg
PCB-1221		U	42.7	ug/kg
PCB-1232		U	42.7	ug/kg
PCB-1242		U	42.7	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208313-01 Client ID: Matrix: Soil Description: NPS-CHS, S-10, 10'-12'
Sampled: 08/18/92 Received: 08/18/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248	141.		42.7	ug/kg
PCB-1254		U	42.7	ug/kg
PCB-1260		U	42.7	ug/kg
PCB-1262		U	42.7	ug/kg
ICP	Method: EPA 6010			Batch: 19132 Run Analyst: JSS DOA: 08/24/92 TOA: 1217 Prep Analyst: FGD DOP: 08/21/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	6.16		3.30	mg/kg
Barium	17.1		2.50	mg/kg
Cadmium	0.0504	J	2.50	mg/kg
Chromium	7.36		2.50	mg/kg
Lead	61.3		3.45	mg/kg
Selenium	0.473	J	9.02	mg/kg
Mercury	Method: EPA 7471			Batch: 18983 Run Analyst: ALK DOA: 08/24/92 TOA: 1400 Prep Analyst: ALK DOP: 08/24/92 TOP: 1000
Mercury	57.1	J	159.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208313-01 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-10, 10' - 12'
Sampled: 08/18/92 Received: 08/18/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 20354 Run Analyst: AGW DOA: 09/01/92 TOA: 0127	
2- pentanone -4 hydroxy 4 -methyl	27,350	JAB	--	ug/kg
Unknown	1,709	J	--	ug/kg
Unknown aromatic hydrocarbon	13,248	J	--	ug/kg
Unknown	5982	J	--	ug/kg
Unknown	2136	J	--	ug/kg

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WL	99988779

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Sample: 9208465-01 Client ID: Matrix: Soil Description: NPS-CHS; S-11, 3'-4'
Sampled: 08/26/92 Received: 08/26/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19544 Run Analyst: JKP DOA: 09/01/92 TOA: 1530
Evaporative Loss @ 105 C	17.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20552 Run Analyst: GZ DOA: 09/04/92 TOA: 0034
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19480 Run Analyst: GZ DOA: 09/04/92 TOA: 0034
				Prep Analyst: VLD DOP: 08/31/92 TOP: 1600
1,2,4-Trichlorobenzene		U	13400	ug/kg
1,2-Dichlorobenzene		U	13400	ug/kg
1,3-Dichlorobenzene		U	13400	ug/kg
1,4-Dichlorobenzene		U	13400	ug/kg
2,4-Dinitrotoluene		U	13400	ug/kg
2,6-Dinitrotoluene		U	13400	ug/kg
2-Chloronaphthalene		U	13400	ug/kg
2-Methylnaphthalene		U	13400	ug/kg
3,3'-Dichlorobenzidine		U	26800	ug/kg
4-Bromophenyl phenyl ether		U	26800	ug/kg
4-Chloroaniline		U	13400	ug/kg
4-Chlorophenyl phenyl ether		U	13400	ug/kg
Acenaphthene	4900	J	13400	ug/kg
cenaphthylene		U	13400	ug/kg
nthracene	11200	J	13400	ug/kg
enzo(a)anthracene		U	13400	ug/kg
enzo(a)pyrene		U	13400	ug/kg
Benzo(b)fluoranthene		U	25000	ug/kg
Benzo(ghi)perylene		U	13400	ug/kg
Benzo(k)fluoranthene		U	33500	ug/kg
Butyl benzyl phthalate		U	13400	ug/kg
Chrysene		U	26800	ug/kg
Di-n-butyl phthalate		U	26800	ug/kg
Di-n-octyl phthalate		U	26800	ug/kg
Dibenzo(a,h)anthracene		U	13400	ug/kg
Dibenzofuran	1730	J	13400	ug/kg
Diethyl phthalate		U	13400	ug/kg
Dimethyl phthalate		U	13400	ug/kg
Fluoranthene	11200	J	13400	ug/kg
Fluorene		U	13400	ug/kg
Hexachlorobenzene		U	13400	ug/kg
Hexachlorobutadiene		U	13400	ug/kg
Hexachlorocyclopentadiene		U	29200	ug/kg
Hexachloroethane		U	13400	ug/kg
Indeno(1,2,3-c,d)pyrene		U	26800	ug/kg
Isophorone		U	13400	ug/kg
N-Nitrosodiphenylamine		U	26800	ug/kg
N-Nitrosodipropylamine		U	13400	ug/kg
Naphthalene		U	13400	ug/kg
Nitrobenzene		U	13400	ug/kg
Phenanthrene	11200	J	13400	ug/kg
Pyrene	9640	J	13400	ug/kg
bis(2-Chloroethoxy)methane		U	13400	ug/kg
bis(2-Chloroethyl) ether		U	13400	ug/kg
bis(2-Chloroisopropyl)ether		U	13400	ug/kg
bis(2-Ethylhexyl)phthalate		U	26800	ug/kg
m-Nitroaniline		U	134000	ug/kg
o-Nitroaniline		U	13400	ug/kg
p-Nitroaniline		U	115000	ug/kg
PCB's Method: EPA 8080				Batch: 19523 Run Analyst: JLS DOA: 09/11/92 TOA: 0355
				Prep Analyst: VLD DOP: 09/01/92 TOP: 1500
PCB-1016		U	67.0	ug/kg
PCB-1221		U	67.0	ug/kg
CB-1232		U	67.0	ug/kg
B-1242		U	67.0	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208465-01 Client ID: Matrix: Soil Description: NPS-CHS; S-11, 3'-4'
Sampled: 08/26/92 Received: 08/26/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	67.0	ug/kg
PCB-1254		U	67.0	ug/kg
PCB-1260		U	67.0	ug/kg
PCB-1262		U	67.0	ug/kg
ICP	Method: EPA 6010			Batch: 19487 Run Analyst: JSS DOA: 09/02/92 TOA: 1212 Prep Analyst: FGD DOP: 09/01/92 TOP: 1625
Silver		U	2.50	mg/kg
Arsenic	10.3		3.15	mg/kg
Barium	16.7		2.50	mg/kg
Cadmium		U	2.50	mg/kg
Chromium	28.6		2.50	mg/kg
Lead	19.6		3.28	mg/kg
Selenium		U	8.60	mg/kg
Mercury	Method: EPA 7471			Batch: 19534 Run Analyst: ALK DOA: 09/03/92 TOA: 0930 Prep Analyst: ALK DOP: 09/02/92 TOP: 0900
Mercury	1370		152.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208465-01 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-11, 3' - 4''
Sampled: 08/26/92 Received: 08/26/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19480 Run Analyst: GZ DOA: 09/04/92 TOA: 0034	
2 - Pentanone, 4 - hydroxy - 4 - methyl	14,458	JAB	--	ug/kg
7 - methyl tridecene	8,032	J	--	ug/kg
Unknown hydrocarbon	6,426	J	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208465-02 Client ID: Matrix: Soil Description: NPS-CHS; S-11, 27'-31'
Sampled: 08/26/92 Received: 08/26/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19544 Run Analyst: JKP DOA: 09/01/92 TOA: 1520
Evaporative Loss @ 105 C	46.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20552 Run Analyst: GZ DOA: 09/04/92 TOA: 2058
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19480 Run Analyst: GZ DOA: 09/04/92 TOA: 2058
				Prep Analyst: VLD DOP: 08/31/92 TOP: 1600
1,2,4-Trichlorobenzene		U	5150	ug/kg
1,2-Dichlorobenzene		U	5150	ug/kg
1,3-Dichlorobenzene		U	5150	ug/kg
1,4-Dichlorobenzene		U	5150	ug/kg
2,4-Dinitrotoluene		U	5150	ug/kg
2,6-Dinitrotoluene		U	5150	ug/kg
2-Chloronaphthalene		U	5150	ug/kg
2-Methylnaphthalene		U	5150	ug/kg
3,3'-Dichlorobenzidine		U	10300	ug/kg
4-Bromophenyl phenyl ether		U	10300	ug/kg
4-Chloroaniline		U	5150	ug/kg
4-Chlorophenyl phenyl ether		U	5150	ug/kg
Acenaphthene		U	5150	ug/kg
Acenaphthylene		U	5150	ug/kg
Anthracene	4320	J	5150	ug/kg
Benzo(a)anthracene		U	5150	ug/kg
Benzo(a)pyrene		U	5150	ug/kg
Benzo(b)fluoranthene		U	9620	ug/kg
Benzo(ghi)perylene		U	5150	ug/kg
Benzo(k)fluoranthene		U	12900	ug/kg
Butyl benzyl phthalate		U	5150	ug/kg
Chrysene		U	10300	ug/kg
Di-n-butyl phthalate		U	10300	ug/kg
Di-n-octyl phthalate		U	10300	ug/kg
Dibenzo(a,h)anthracene		U	5150	ug/kg
Dibenzofuran	514.	J	5150	ug/kg
Diethyl phthalate		U	5150	ug/kg
Dimethyl phthalate		U	5150	ug/kg
Fluoranthene	2080	J	5150	ug/kg
Fluorene		U	5150	ug/kg
Hexachlorobenzene		U	5150	ug/kg
Hexachlorobutadiene		U	5150	ug/kg
Hexachlorocyclopentadiene		U	11200	ug/kg
Hexachloroethane		U	5150	ug/kg
Indeno(1,2,3-c,d)pyrene		U	10300	ug/kg
Isophorone		U	5150	ug/kg
N-Nitrosodiphenylamine		U	10300	ug/kg
N-Nitrosodipropylamine		U	5150	ug/kg
Naphthalene		U	5150	ug/kg
Nitrobenzene		U	5150	ug/kg
Phenanthrene	3700	J	5150	ug/kg
Pyrene	1990	J	5150	ug/kg
bis(2-Chloroethoxy)methane		U	5150	ug/kg
bis(2-Chloroethyl) ether		U	5150	ug/kg
bis(2-Chloroisopropyl)ether		U	5150	ug/kg
bis(2-Ethylhexyl)phthalate		U	10300	ug/kg
m-Nitroaniline		U	51500	ug/kg
o-Nitroaniline		U	5150	ug/kg
p-Nitroaniline		U	44200	ug/kg
PCB's Method: EPA 8080				Batch: 19523 Run Analyst: JLS DOA: 09/10/92 TOA: 0702
				Prep Analyst: VLD DOP: 09/01/92 TOP: 1500
PCB-1016		U	103.	ug/kg
PCB-1221		U	103.	ug/kg
PCB-1232		U	103.	ug/kg
PCB-1242		U	103.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208465-02 Client ID: Matrix: Soil Description: NPS-CHS; S-11, 27'-31'
Sampled: 08/26/92 Received: 08/26/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	103.	ug/kg
PCB-1254		U	103.	ug/kg
PCB-1260		U	103.	ug/kg
PCB-1262		U	103.	ug/kg
ICP	Method: EPA 6010			Batch: 19487 Run Analyst: JSS DOA: 09/02/92 TOA: 1214 Prep Analyst: FGD DOP: 09/01/92 TOP: 1625
Silver		U	2.50	mg/kg
Arsenic	14.8		3.13	mg/kg
Barium	10.1		2.50	mg/kg
Cadmium		U	2.50	mg/kg
Chromium	17.6		2.50	mg/kg
Lead	8.16		3.25	mg/kg
Selenium		U	8.53	mg/kg
Mercury	Method: EPA 7471			Batch: 19534 Run Analyst: ALK DOA: 09/03/92 TOA: 0930 Prep Analyst: ALK DOP: 09/02/92 TOP: 0900
Mercury	0.261	J	145.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208465-02 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-11, 27' - 31'
Sampled: 08/26/92 Received: 08/26/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270 Batch: 19480 Run Analyst: GZ DOA: 09/04/92 TOA: 2058				
Unknown	3,086	J	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-04 Client ID: Matrix: Soil Description: NPS-CHS S-12, 3'-4'
Sampled: 08/25/92 Received: 08/25/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19483 Run Analyst: VLD DOA: 09/01/92 TOA: 1600
Evaporative Loss @ 105 C	17.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20552 Run Analyst: GZ DOA: 09/04/92 TOA: 1747
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19480 Run Analyst: GZ DOA: 09/04/92 TOA: 1747
				Prep Analyst: VLD DOP: 08/31/92 TOP: 1600
1,2,4-Trichlorobenzene		U	335.	ug/kg
1,2-Dichlorobenzene		U	335.	ug/kg
1,3-Dichlorobenzene		U	335.	ug/kg
1,4-Dichlorobenzene		U	335.	ug/kg
2,4-Dinitrotoluene		U	335.	ug/kg
2,6-Dinitrotoluene		U	335.	ug/kg
2-Chloronaphthalene		U	335.	ug/kg
2-Methylnaphthalene		U	335.	ug/kg
3,3'-Dichlorobenzidine		U	670.	ug/kg
4-Bromophenyl phenyl ether		U	670.	ug/kg
4-Chloroaniline		U	335.	ug/kg
4-Chlorophenyl phenyl ether		U	335.	ug/kg
Acenaphthene		U	335.	ug/kg
cenaphthylene		U	335.	ug/kg
thracene		U	335.	ug/kg
nzo(a)anthracene		U	335.	ug/kg
nzo(a)pyrene		U	335.	ug/kg
Benzo(b)fluoranthene		U	627.	ug/kg
Benzo(ghi)perylene		U	335.	ug/kg
Benzo(k)fluoranthene		U	837.	ug/kg
Butyl benzyl phthalate		U	335.	ug/kg
Chrysene		U	670.	ug/kg
Di-n-butyl phthalate		U	670.	ug/kg
Di-n-octyl phthalate		U	670.	ug/kg
Dibenzo(a,h)anthracene		U	335.	ug/kg
Dibenzofuran		U	335.	ug/kg
Diethyl phthalate		U	335.	ug/kg
Dimethyl phthalate		U	335.	ug/kg
Fluoranthene		U	335.	ug/kg
Fluorene		U	335.	ug/kg
Hexachlorobenzene		U	335.	ug/kg
Hexachlorobutadiene		U	335.	ug/kg
Hexachlorocyclopentadiene		U	730.	ug/kg
Hexachloroethane		U	335.	ug/kg
Indeno(1,2,3-c,d)pyrene		U	670.	ug/kg
Isophorone		U	335.	ug/kg
N-Nitrosodiphenylamine		U	670.	ug/kg
N-Nitrosodipropylamine		U	335.	ug/kg
Naphthalene		U	335.	ug/kg
Nitrobenzene		U	335.	ug/kg
Phenanthrene		U	335.	ug/kg
Pyrene		U	335.	ug/kg
bis(2-Chloroethoxy)methane		U	335.	ug/kg
bis(2-Chloroethyl) ether		U	335.	ug/kg
bis(2-Chloroisopropyl)ether		U	335.	ug/kg
bis(2-Ethylhexyl)phthalate		U	670.	ug/kg
m-Nitroaniline		U	3350	ug/kg
o-Nitroaniline		U	335.	ug/kg
p-Nitroaniline		U	2880	ug/kg
PCB's Method: EPA 8080				Batch: 19523 Run Analyst: JLS DOA: 09/11/92 TOA: 0104
				Prep Analyst: VLD DOP: 09/01/92 TOP: 1500
PCB-1016		U	67.0	ug/kg
PCB-1221		U	67.0	ug/kg
CB-1232		U	67.0	ug/kg
B-1242		U	67.0	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-04 Client ID: Matrix: Soil Description: NPS-CHS S-12, 3'-4'
Sampled: 08/25/92 Received: 08/25/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	67.0	ug/kg
PCB-1254		U	67.0	ug/kg
PCB-1260		U	67.0	ug/kg
PCB-1262		U	67.0	ug/kg
ICP	Method: EPA 6010			Batch: 19487 Run Analyst: JSS DOA: 09/02/92 TOA: 1140 Prep Analyst: FGD DOP: 09/01/92 TOP: 1625
Silver		U	2.50	mg/kg
Arsenic	10.4		3.17	mg/kg
Barium	19.1		2.50	mg/kg
Cadmium		U	2.50	mg/kg
Chromium	7.14		2.50	mg/kg
Lead	5.69		3.30	mg/kg
Selenium		U	8.67	mg/kg
Mercury	Method: EPA 7471			Batch: 19394 Run Analyst: ALK DOA: 08/31/92 TOA: 1300 Prep Analyst: ALK DOP: 08/28/92 TOP: 1200
Mercury	10.0	J	167.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-04 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-12, 3' - 4'
Sampled: 08/25/92 Received: 08/25/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19480 Run Analyst: GZ DOA: 09/04/92 TOA: 1747	
2 - Pentanone, 4 - hydroxy - 4 - methyl	7,229	JAB	--	ug/kg
Unknown phthalate	161	J	--	ug/kg

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TN	02934
WI	99988779

CERTIFICATE OF ANALYSIS

Sample: 9208437-05 Client ID: Matrix: Soil Description: NPS-CHS S-12, 13'-15'
Sampled: 08/25/92 Received: 08/25/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19483 Run Analyst: VLD DOA: 09/01/92 TOA: 1600
Evaporative Loss @ 105 C	51.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20552 Run Analyst: GZ DOA: 09/03/92 TOA: 2211
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19480 Run Analyst: GZ DOA: 09/03/92 TOA: 2211
				Prep Analyst: VLD DOP: 08/31/92 TOP: 1600
1,2,4-Trichlorobenzene		U	5670	ug/kg
1,2-Dichlorobenzene		U	5670	ug/kg
1,3-Dichlorobenzene		U	5670	ug/kg
1,4-Dichlorobenzene		U	5670	ug/kg
2,4-Dinitrotoluene		U	5670	ug/kg
2,6-Dinitrotoluene		U	5670	ug/kg
2-Chloronaphthalene		U	5670	ug/kg
2-Methylnaphthalene	13600		5670	ug/kg
3,3'-Dichlorobenzidine		U	11300	ug/kg
4-Bromophenyl phenyl ether		U	11300	ug/kg
4-Chloroaniline		U	5670	ug/kg
4-Chlorophenyl phenyl ether		U	5670	ug/kg
Acenaphthene	5440	J	5670	ug/kg
Acenaphthylene		U	5670	ug/kg
nthracene	8840		5670	ug/kg
enzo(a)anthracene	6800		5670	ug/kg
enzo(a)pyrene	4080	J	5670	ug/kg
Benzo(b)fluoranthene	4080	J	10600	ug/kg
Benzo(ghi)perylene		U	5670	ug/kg
Benzo(k)fluoranthene	4080	J	14200	ug/kg
Butyl benzyl phthalate		U	5670	ug/kg
Chrysene	4760	J	11300	ug/kg
Di-n-butyl phthalate		U	11300	ug/kg
Di-n-octyl phthalate		U	11300	ug/kg
Dibenzo(a,h)anthracene		U	5670	ug/kg
Dibenzofuran	4760	J	5670	ug/kg
Diethyl phthalate		U	5670	ug/kg
Dimethyl phthalate		U	5670	ug/kg
Fluoranthene	19000		5670	ug/kg
Fluorene	8840		5670	ug/kg
Hexachlorobenzene		U	5670	ug/kg
Hexachlorobutadiene		U	5670	ug/kg
Hexachlorocyclopentadiene		U	12400	ug/kg
Hexachloroethane		U	5670	ug/kg
Indeno(1,2,3-c,d)pyrene		U	11300	ug/kg
Isophorone		U	5670	ug/kg
N-Nitrosodiphenylamine		U	11300	ug/kg
N-Nitrosodipropylamine		U	5670	ug/kg
Naphthalene	46900		5670	ug/kg
Nitrobenzene		U	5670	ug/kg
Phenanthrene		U	5670	ug/kg
Pyrene	16300		5670	ug/kg
bis(2-Chloroethoxy)methane		U	5670	ug/kg
bis(2-Chloroethyl) ether		U	5670	ug/kg
bis(2-Chloroisopropyl)ether		U	5670	ug/kg
bis(2-Ethylhexyl)phthalate		U	11300	ug/kg
m-Nitroaniline		U	56700	ug/kg
o-Nitroaniline		U	5670	ug/kg
p-Nitroaniline		U	48800	ug/kg
PCB's Method: EPA 8080				Batch: 19523 Run Analyst: JLS DOA: 09/11/92 TOA: 1422
				Prep Analyst: VLD DOP: 09/01/92 TOP: 1500
PCB-1016		U	11300	ug/kg
PCB-1221		U	11300	ug/kg
PCB-1232		U	11300	ug/kg
CB-1242		U	11300	ug/kg

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SC	10120
VA	00151
TN	02934
WL	99988779

CERTIFICATE OF ANALYSIS

Sample: 9208437-05 Client ID: Matrix: Soil Description: NPS-CHS S-12, 13'-15'
Sampled: 08/25/92 Received: 08/25/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248	54500		11300	ug/kg
PCB-1254		U	11300	ug/kg
PCB-1260		U	11300	ug/kg
PCB-1262		U	11300	ug/kg
ICP	Method: EPA 6010			Batch: 19487 Run Analyst: JSS DOA: 09/02/92 TOA: 1142 Prep Analyst: FGD DOP: 09/01/92 TOP: 1625
Silver		U	2.50	mg/kg
Arsenic	19.0		3.13	mg/kg
Barium	11.1		2.50	mg/kg
Cadmium		U	2.50	mg/kg
Chromium	19.0		2.50	mg/kg
Lead	6.99		3.25	mg/kg
Selenium		U	8.53	mg/kg
Mercury	Method: EPA 7471			Batch: 19394 Run Analyst: ALK DOA: 08/31/92 TOA: 1300 Prep Analyst: ALK DOP: 08/28/92 TOP: 1200
Mercury	45.0	J	167.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-05 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-12, 13' - 15'
Sampled: 08/25/92 Received: 08/25/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19480 Run Analyst: GZ DOA: 09/03/92 TOA: 2211	
Methyl naphthalene (isomer)	6,803	J	--	ug/kg
2 - Pentanone, 4 - hydroxy - 4 - methyl	9,524	JAB	--	ug/kg
Dimethyl naphthalene (isomer)	2,721	J	--	ug/kg
Dimethyl naphthalene (isomer)	3,401	J	--	ug/kg
4-H-cyclopenta [def] phenanthrene	5,442	J	--	ug/kg
11 H Benzo [b] fluorene	2,721	J	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-06 Client ID: Matrix: Soil Description: NPS-CHS S-12, 19'-21'
Sampled: 08/25/92 Received: 08/25/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19483 Run Analyst: VLD DOA: 09/01/92 TOA: 1600
Evaporative Loss @ 105 C	52.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20552 Run Analyst: GZ DOA: 09/03/92 TOA: 2259
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19480 Run Analyst: GZ DOA: 09/03/92 TOA: 2259
				Prep Analyst: VLD DOP: 08/31/92 TOP: 1600
1,2,4-Trichlorobenzene		U	5780	ug/kg
1,2-Dichlorobenzene		U	5780	ug/kg
1,3-Dichlorobenzene		U	5780	ug/kg
1,4-Dichlorobenzene		U	5780	ug/kg
2,4-Dinitrotoluene		U	5780	ug/kg
2,6-Dinitrotoluene		U	5780	ug/kg
2-Chloronaphthalene		U	5780	ug/kg
2-Methylnaphthalene	14600		5780	ug/kg
3,3'-Dichlorobenzidine		U	11600	ug/kg
4-Bromophenyl phenyl ether		U	11600	ug/kg
4-Chloroaniline		U	5780	ug/kg
4-Chlorophenyl phenyl ether		U	5780	ug/kg
Acenaphthene	2860	J	5780	ug/kg
Acenaphthylene		U	5780	ug/kg
Anthracene	11100		5780	ug/kg
Benzo(a)anthracene	9720		5780	ug/kg
Benzo(a)pyrene	6250		5780	ug/kg
Benzo(b)fluoranthene	6940	J	10800	ug/kg
Benzo(ghi)perylene		U	5780	ug/kg
Benzo(k)fluoranthene	4860	J	14500	ug/kg
Butyl benzyl phthalate		U	5780	ug/kg
Chrysene	6940	J	11600	ug/kg
Di-n-butyl phthalate		U	11600	ug/kg
Di-n-octyl phthalate		U	11600	ug/kg
Dibenzo(a,h)anthracene		U	5780	ug/kg
Dibenzofuran	7640		5780	ug/kg
Diethyl phthalate		U	5780	ug/kg
Dimethyl phthalate		U	5780	ug/kg
Fluoranthene	25700		5780	ug/kg
Fluorene	11100		5780	ug/kg
Hexachlorobenzene		U	5780	ug/kg
Hexachlorobutadiene		U	5780	ug/kg
Hexachlorocyclopentadiene		U	12600	ug/kg
Hexachloroethane		U	5780	ug/kg
Indeno(1,2,3-c,d)pyrene		U	11600	ug/kg
Isophorone		U	5780	ug/kg
N-Nitrosodiphenylamine		U	11600	ug/kg
N-Nitrosodipropylamine		U	5780	ug/kg
Naphthalene	70100		5780	ug/kg
Nitrobenzene		U	5780	ug/kg
Phenanthrene	35400		5780	ug/kg
Pyrene	21500		5780	ug/kg
bis(2-Chloroethoxy)methane		U	5780	ug/kg
bis(2-Chloroethyl) ether		U	5780	ug/kg
bis(2-Chloroisopropyl)ether		U	5780	ug/kg
bis(2-Ethylhexyl)phthalate		U	11600	ug/kg
m-Nitroaniline		U	57800	ug/kg
o-Nitroaniline		U	5780	ug/kg
p-Nitroaniline		U	49800	ug/kg
PCB's Method: EPA 8080				Batch: 19523 Run Analyst: JLS DOA: 09/11/92 TOA: 0223
				Prep Analyst: VLD DOP: 09/01/92 TOP: 1500
PCB-1016		U	116.	ug/kg
PCB-1221		U	116.	ug/kg
PCB-1232		U	116.	ug/kg
PCB-1242		U	116.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-06 Client ID: Matrix: Soil Description: NPS-CHS S-12, 19'-21'
Sampled: 08/25/92 Received: 08/25/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	116.	ug/kg
PCB-1254		U	116.	ug/kg
PCB-1260		U	116.	ug/kg
PCB-1262		U	116.	ug/kg
ICP	Method: EPA 6010			Batch: 19487 Run Analyst: JSS DOA: 09/02/92 TOA: 1210 Prep Analyst: FGD DOP: 09/01/92 TOP: 1625
Silver		U	2.50	mg/kg
Arsenic	14.2		3.20	mg/kg
Barium	8.67		2.50	mg/kg
Cadmium		U	2.50	mg/kg
Chromium	15.6		2.50	mg/kg
Lead	4.81		3.33	mg/kg
Selenium		U	8.73	mg/kg
Mercury	Method: EPA 7471			Batch: 19394 Run Analyst: ALK DOA: 08/31/92 TOA: 1300 Prep Analyst: ALK DOP: 08/28/92 TOP: 1200
Mercury	12.5	J	139.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9208437-06 Client ID: NPS-CHS Matrix: Soil Description: NPS-CHS, S-12, 19' - 21'
Sampled: 08/25/92 Received: 08/25/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19480 Run Analyst: AGW DOA: 09/03/92 TOA: 2259	
2 - Pentanone, 4 - hydroxy - 4 - methyl	10,417	JAB	--	ug/kg
C9 Alkyl benzene	3,472	J	--	ug/kg
Methyl naphthalene (isomer)	4,861	J	--	ug/kg
Dibenzothiophene	2,778	J	--	ug/kg
4-H-cyclopenta [def] phenanthrene	5,556	J	--	ug/kg
11 H Benzo [b] fluorene	2,778	J	--	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9209119-01 Client ID: Matrix: GroundH2O Description: MW-1
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Volatiles Method: EPA 8240 extended				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1434
GCMS Library Search-VOA	YES			
GC/MS Volatiles Method: EPA 8240 extended				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1434
1,1,1-Trichloroethane		U	16.7	ug/l
1,1,2,2-Tetrachloroethane		U	16.7	ug/l
1,1,2-Trichloroethane		U	16.7	ug/l
1,1-Dichloroethane		U	16.7	ug/l
1,1-Dichloroethylene		U	16.7	ug/l
1,2-Dichloroethane		U	16.7	ug/l
1,2-Dichloropropane		U	16.7	ug/l
1,2-cis-Dichloroethylene		U	16.7	ug/l
1,2-trans-Dichloroethylene		U	16.7	ug/l
2-Butanone		U	83.3	ug/l
2-Hexanone		U	16.7	ug/l
4-Methyl-2-pentanone		U	16.7	ug/l
Acetone	111.		83.3	ug/l
Benzene	36.2		16.7	ug/l
Bromoform		U	16.7	ug/l
Carbon Disulfide		U	16.7	ug/l
Carbon Tetrachloride		U	16.7	ug/l
Chlorobenzene		U	16.7	ug/l
Chlorodibromomethane		U	16.7	ug/l
Chloroethane		U	16.7	ug/l
Chloroform		U	16.7	ug/l
Dichlorobromomethane		U	16.7	ug/l
Ethylbenzene	23.7		16.7	ug/l
Methyl Bromide		U	16.7	ug/l
Methyl Chloride		U	16.7	ug/l
Methylene Chloride	14.5	JB	16.7	ug/l
Styrene		U	16.7	ug/l
Tetrachloroethylene		U	16.7	ug/l
Toluene	24.7		16.7	ug/l
Trichloroethylene		U	16.7	ug/l
Vinyl Acetate		U	16.7	ug/l
Vinyl chloride		U	16.7	ug/l
Xylenes (TOTAL)	71.3		33.3	ug/l
cis-1,3-Dichloropropylene		U	16.7	ug/l
trans-1,3-Dichloropropylene		U	16.7	ug/l
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 1859
GCMS Library Search-ACID				
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 1859
GCMS Library Search-B/N				
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 1859
				Prep Analyst: JKP DOP: 09/10/92 TOP: 1500
2,4,5-Trichlorophenol		U	333.	ug/l
2,4,6-Trichlorophenol		U	333.	ug/l
2,4-Dichlorophenol		U	333.	ug/l
2,4-Dimethylphenol		U	333.	ug/l
2,4-Dinitrophenol		U	3000	ug/l
2-Chlorophenol		U	333.	ug/l
2-Nitrophenol		U	333.	ug/l
2-methyl-4,6-dinitrophenol		U	333.	ug/l
4-Nitrophenol		U	3800	ug/l
4-chloro-3-methyl phenol		U	333.	ug/l
Benzoic Acid		U	4820	ug/l
Benzyl Alcohol		U	333.	ug/l
Pentachlorophenol		U	333.	ug/l
Phenol		U	333.	ug/l
-Cresol		U	333.	ug/l
-Cresol		U	333.	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-01 Client ID: Matrix: GroundH2O Description: MW-1
Sampled: 09/04/92 Received: 09/04/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 1859 Prep Analyst: JKP DOP: 09/10/92 TOP: 1500
1,2,4-Trichlorobenzene		U	333.	ug/l
1,2-Dichlorobenzene		U	333.	ug/l
1,3-Dichlorobenzene		U	333.	ug/l
1,4-Dichlorobenzene		U	333.	ug/l
2,4-Dinitrotoluene		U	333.	ug/l
2,6-Dinitrotoluene		U	333.	ug/l
2-Chloronaphthalene		U	333.	ug/l
2-Methylnaphthalene	480.		333.	ug/l
3,3'-Dichlorobenzidine		U	1330	ug/l
4-Bromophenyl phenyl ether		U	667.	ug/l
4-Chloroaniline		U	333.	ug/l
4-Chlorophenyl phenyl ether		U	333.	ug/l
Acenaphthene	240.	J	333.	ug/l
Acenaphthylene		U	333.	ug/l
Anthracene		U	333.	ug/l
Benzo(a)anthracene		U	333.	ug/l
Benzo(a)pyrene		U	333.	ug/l
Benzo(b)fluoranthene		U	373.	ug/l
Benzo(ghi)perylene		U	333.	ug/l
Benzo(k)fluoranthene		U	500.	ug/l
Butyl benzyl phthalate		U	333.	ug/l
Chrysene		U	667.	ug/l
Di-n-butyl phthalate		U	667.	ug/l
Di-n-octyl phthalate		U	667.	ug/l
Dibenzo(a,h)anthracene		U	333.	ug/l
Dibenzofuran	195.	J	333.	ug/l
Diethyl phthalate		U	333.	ug/l
Dimethyl phthalate		U	333.	ug/l
Fluoranthene	240.	J	333.	ug/l
Fluorene	240.	J	333.	ug/l
Hexachlorobenzene		U	333.	ug/l
Hexachlorobutadiene		U	333.	ug/l
Hexachlorocyclopentadiene		U	433.	ug/l
Hexachloroethane		U	333.	ug/l
Indeno(1,2,3-c,d)pyrene		U	667.	ug/l
Isophorone		U	333.	ug/l
N-Nitrosodiphenylamine		U	667.	ug/l
N-Nitrosodipropylamine		U	333.	ug/l
Naphthalene	2560		333.	ug/l
Nitrobenzene		U	333.	ug/l
Phenanthrene	600.		333.	ug/l
Pyrene	240.	J	333.	ug/l
bis(2-Chloroethoxy)methane		U	333.	ug/l
bis(2-Chloroethyl) ether		U	333.	ug/l
bis(2-Chloroisopropyl)ether		U	333.	ug/l
bis(2-Ethylhexyl)phthalate		U	667.	ug/l
m-Nitroaniline		U	2000	ug/l
o-Nitroaniline		U	333.	ug/l
p-Nitroaniline		U	1720	ug/l
Pesticides Method: EPA 8080				Batch: 19997 Run Analyst: JEB DOA: 09/17/92 TOA: 1616 Prep Analyst: RLS DOP: 09/09/92 TOP: 1800
4,4'-DDD		U	0.100	ppb
4,4'-DDE		U	0.100	ppb
4,4'-DDT		U	0.100	ppb
Aldrin		U	0.0500	ppb
Dieldrin		U	0.500	ppb
Endosulfan I		U	0.100	ppb
Endosulfan II		U	0.100	ppb
Endosulfan sulfate		U	0.100	ppb
Endrin		U	0.100	ppb
Endrin ketone		U	0.100	ppb

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WI	99988779

CERTIFICATE OF ANALYSIS

Sample: 9209119-01 Client ID: Matrix: GroundH2O Description: MW-1
Sampled: 09/04/92 Received: 09/04/92 Page: 3
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Heptachlor		U	0.0500	ppb
Heptachlor epoxide		U	0.0500	ppb
Methoxychlor		U	0.500	ppb
PCB-1016		U	0.500	ppb
PCB-1221		U	0.500	ppb
PCB-1232		U	0.500	ppb
PCB-1242		U	0.500	ppb
PCB-1248		U	0.500	ppb
PCB-1254		U	1.00	ppb
PCB-1260		U	1.00	ppb
Toxaphene		U	1.00	ppb
alpha-BHC		U	0.0500	ppb
alpha-Chlordane		U	0.500	ppb
beta-BHC		U	0.0500	ppb
delta-BHC		U	0.0500	ppb
gamma-BHC		U	0.0500	ppb
gamma-Chlordane		U	0.500	ppb
Graphite Furnace	Method: EPA 7060			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1914 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic	3.00	J	5.00	ug/l
Graphite Furnace	Method: EPA 7421			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1914 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Lead	19.8		5.00	ug/l
Graphite Furnace	Method: EPA 7041			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1914 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Antimony	2.44	J	5.00	ug/l
Graphite Furnace	Method: EPA 7740			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1914 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium	0.250	J	5.00	ug/l
Graphite Furnace	Method: EPA 7841			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1914 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Thallium	0.890	J	5.00	ug/l
ICP	Method: EPA 6010			Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1157 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	0.0300	mg/l
Aluminum	1.34		0.0500	mg/l
Barium	0.279		0.0300	mg/l
Beryllium		U	0.0100	mg/l
Calcium	145.		0.0800	mg/l
Cadmium		U	0.0150	mg/l
Cobalt		U	0.0300	mg/l
Chromium	0.00685	J	0.0300	mg/l
Copper	0.0170	J	0.0300	mg/l
Iron	40.3		0.0450	mg/l
Potassium	5.85		0.500	mg/l
Magnesium	13.7		0.0300	mg/l
Manganese	0.892		0.0300	mg/l
Sodium	47.6		0.165	mg/l
Nickel	0.00562	J	0.0300	mg/l
Vanadium	0.00440	J	0.0300	mg/l
Zinc	0.0315	J	0.0317	mg/l
Mercury	Method: EPA 7470			Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury	0.0100	J	0.500	ug/l
Cyanide by RFA	Method: EPA 335.3			Batch: 19848 Run Analyst: JEN DOA: 09/09/92 TOA: 1500
Cyanide, Total	0.0785	JB	0.0167	mg/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-01 Client ID: NPS-CHS Matrix: Water Description: MW-1
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 1859
Methyl naphthalene (isomer)	240	J	--	ug/l
GC/MS VOA Method: EPA 8240				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1434
Camphor	35	J	--	ug/l
C9 alkylbenzene	30	J	--	ug/l
C9 alkylbenzene	35	J	--	ug/l
Benzene, trimethyl (isomer)	20	J	--	ug/l
C10 alkylbenzene	20	J	--	ug/l
1H Indene; 2,3 - dihydro	135	J	--	ug/l
Benzene, 1-propynyl	75	J	--	ug/l
C10 alkylbenzene	25	J	--	ug/l
Unknown	35	J	--	ug/l
Benzene, trimethyl (isomer)	35	J	--	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-01 Client ID: Matrix: GroundH2O Description: MW-2
Sampled: 09/03/92 Received: 09/03/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Volatiles Method: EPA 8240 extended				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1546
GCMS Library Search-VOA	YES			
GC/MS Volatiles Method: EPA 8240 extended				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1546
1,1,1-Trichloroethane		U	16.7	ug/l
1,1,2,2-Tetrachloroethane		U	16.7	ug/l
1,1,2-Trichloroethane		U	16.7	ug/l
1,1-Dichloroethane		U	16.7	ug/l
1,1-Dichloroethylene		U	16.7	ug/l
1,2-Dichloroethane		U	16.7	ug/l
1,2-Dichloropropane		U	16.7	ug/l
1,2-cis-Dichloroethylene		U	16.7	ug/l
1,2-trans-Dichloroethylene		U	16.7	ug/l
2-Butanone		U	83.3	ug/l
2-Hexanone		U	16.7	ug/l
4-Methyl-2-pentanone		U	16.7	ug/l
Acetone	140.		83.3	ug/l
Benzene		U	16.7	ug/l
Bromoform		U	16.7	ug/l
Carbon Disulfide	5.75	J	16.7	ug/l
Carbon Tetrachloride		U	16.7	ug/l
hlorobenzene		U	16.7	ug/l
hlorodibromomethane		U	16.7	ug/l
hloroethane		U	16.7	ug/l
hloroform		U	16.7	ug/l
Dichlorobromomethane		U	16.7	ug/l
Ethylbenzene		U	16.7	ug/l
Methyl Bromide		U	16.7	ug/l
Methyl Chloride		U	16.7	ug/l
Methylene Chloride	17.1	JB	16.7	ug/l
Styrene		U	16.7	ug/l
Tetrachloroethylene		U	16.7	ug/l
Toluene	2.38	J	16.7	ug/l
Trichloroethylene		U	16.7	ug/l
Vinyl Acetate		U	16.7	ug/l
Vinyl chloride		U	16.7	ug/l
Xylenes (TOTAL)		U	33.3	ug/l
cis-1,3-Dichloropropylene		U	16.7	ug/l
trans-1,3-Dichloropropylene		U	16.7	ug/l
GC/MS Extractables Method: EPA 8270				Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1143
GCMS Library Search-ACID				
GC/MS Extractables Method: EPA 8270				Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1143
GCMS Library Search-B/N				
GC/MS Extractables Method: EPA 8270				Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1143
				Prep Analyst: VLD DOP: 09/09/92 TOP: 1700
2,4,5-Trichlorophenol		U	83.3	ug/l
2,4,6-Trichlorophenol		U	83.3	ug/l
2,4-Dichlorophenol		U	83.3	ug/l
2,4-Dimethylphenol		U	83.3	ug/l
2,4-Dinitrophenol		U	750.	ug/l
2-Chlorophenol		U	83.3	ug/l
2-Nitrophenol		U	83.3	ug/l
2-methyl-4,6-dinitrophenol		U	83.3	ug/l
4-Nitrophenol		U	948.	ug/l
4-chloro-3-methyl phenol		U	83.3	ug/l
Benzoic Acid		U	1210	ug/l
Benzyl Alcohol		U	83.3	ug/l
Pentachlorophenol		U	83.3	ug/l
Phenol		U	83.3	ug/l
-Cresol		U	83.3	ug/l
-Cresol		U	83.3	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-01 Client ID: Matrix: GroundH2O Description: MW-2
Sampled: 09/03/92 Received: 09/03/92 Page: 2
Project: CITY00391 Manager: TDH

GC/MS Extractables Method: EPA 8270 Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1143
Prep Analyst: VLD DOP: 09/09/92 TOP: 1700

Parameter	Result	Qual	QL	Units
1,2,4-Trichlorobenzene		U	83.3	ug/l
1,2-Dichlorobenzene		U	83.3	ug/l
1,3-Dichlorobenzene		U	83.3	ug/l
1,4-Dichlorobenzene		U	83.3	ug/l
2,4-Dinitrotoluene		U	83.3	ug/l
2,6-Dinitrotoluene		U	83.3	ug/l
2-Chloronaphthalene		U	83.3	ug/l
2-Methylnaphthalene		U	83.3	ug/l
3,3'-Dichlorobenzidine		U	333.	ug/l
4-Bromophenyl phenyl ether		U	167.	ug/l
4-Chloroaniline		U	83.3	ug/l
4-Chlorophenyl phenyl ether		U	83.3	ug/l
Acenaphthene		U	83.3	ug/l
Acenaphthylene		U	83.3	ug/l
Anthracene		U	83.3	ug/l
Benzo(a)anthracene		U	83.3	ug/l
Benzo(a)pyrene		U	83.3	ug/l
Benzo(b)fluoranthene		U	93.5	ug/l
Benzo(ghi)perylene		U	83.3	ug/l
Benzo(k)fluoranthene		U	125.	ug/l
Butyl benzyl phthalate		U	83.3	ug/l
Chrysene		U	167.	ug/l
Di-n-butyl phthalate		U	167.	ug/l
Di-n-octyl phthalate		U	167.	ug/l
Dibenzo(a,h)anthracene		U	83.3	ug/l
Dibenzofuran		U	83.3	ug/l
Diethyl phthalate		U	83.3	ug/l
Dimethyl phthalate		U	83.3	ug/l
Fluoranthene		U	83.3	ug/l
Fluorene		U	83.3	ug/l
Hexachlorobenzene		U	83.3	ug/l
Hexachlorobutadiene		U	83.3	ug/l
Hexachlorocyclopentadiene		U	109.	ug/l
Hexachloroethane		U	83.3	ug/l
Indeno(1,2,3-c,d)pyrene		U	167.	ug/l
Isophorone		U	83.3	ug/l
N-Nitrosodiphenylamine		U	167.	ug/l
N-Nitrosodipropylamine		U	83.3	ug/l
Naphthalene		U	83.3	ug/l
Nitrobenzene		U	83.3	ug/l
Phenanthrene		U	83.3	ug/l
Pyrene		U	83.3	ug/l
bis(2-Chloroethoxy)methane		U	83.3	ug/l
bis(2-Chloroethyl) ether		U	83.3	ug/l
bis(2-Chloroisopropyl)ether		U	83.3	ug/l
bis(2-Ethylhexyl)phthalate		U	167.	ug/l
m-Nitroaniline		U	500.	ug/l
o-Nitroaniline		U	83.3	ug/l
p-Nitroaniline		U	430.	ug/l

Pesticides Method: EPA 8080 Batch: 19814 Run Analyst: JEB DOA: 09/14/92 TOA: 1932
Prep Analyst: JKP DOP: 09/04/92 TOP: 1700

Parameter	Result	Qual	QL	Units
4,4'-DDD		U	0.100	ppb
4,4'-DDE		U	0.100	ppb
4,4'-DDT		U	0.100	ppb
Aldrin		U	0.0500	ppb
Dieldrin		U	0.500	ppb
Endosulfan I		U	0.100	ppb
Endosulfan II		U	0.100	ppb
Endosulfan sulfate		U	0.100	ppb
Endrin		U	0.100	ppb
Endrin ketone		U	0.100	ppb

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CERTIFICATE OF ANALYSIS

Sample: 9209100-01 Client ID: Matrix: GroundH2O Description: MW-2
Sampled: 09/03/92 Received: 09/03/92 Page: 3
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Heptachlor		U	0.0500	ppb
Heptachlor epoxide		U	0.0500	ppb
Methoxychlor		U	0.500	ppb
PCB-1016		U	0.500	ppb
PCB-1221		U	0.500	ppb
PCB-1232		U	0.500	ppb
PCB-1242		U	0.500	ppb
PCB-1248		U	0.500	ppb
PCB-1254		U	1.00	ppb
PCB-1260		U	1.00	ppb
Toxaphene		U	1.00	ppb
alpha-BHC		U	0.0500	ppb
alpha-Chlordane		U	0.500	ppb
beta-BHC		U	0.0500	ppb
delta-BHC		U	0.0500	ppb
gamma-BHC		U	0.0500	ppb
gamma-Chlordane		U	0.500	ppb
Graphite Furnace	Method: EPA 7060			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1827 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic	5.40		5.00	ug/l
Graphite Furnace	Method: EPA 7421			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1827 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
ad	45.5		5.00	ug/l
Graphite Furnace	Method: EPA 7041			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1827 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Antimony	3.24	J	5.00	ug/l
Graphite Furnace	Method: EPA 7740			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1827 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium	0.700	J	5.00	ug/l
Graphite Furnace	Method: EPA 7841			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1827 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Thallium	1.59	J	5.00	ug/l
ICP	Method: EPA 6010			Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1134 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	0.0300	mg/l
Aluminum	4.68		0.0500	mg/l
Barium	0.303		0.0300	mg/l
Beryllium	0.000390	J	0.0100	mg/l
Calcium	267.		0.0800	mg/l
Cadmium		U	0.0150	mg/l
Cobalt	0.00152	J	0.0300	mg/l
Chromium	0.0147	J	0.0300	mg/l
Copper	0.0196	J	0.0300	mg/l
Iron	22.7		0.0450	mg/l
Potassium	43.6		0.500	mg/l
Magnesium	85.6		0.0300	mg/l
Manganese	0.739		0.0300	mg/l
Sodium	324.		0.165	mg/l
Nickel		U	0.0300	mg/l
Vanadium	0.0115	J	0.0300	mg/l
Zinc	0.0263	J	0.0317	mg/l
Mercury	Method: EPA 7470			Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury	0.0600	J	0.500	ug/l
Cyanide by RFA	Method: EPA 335.3			Batch: 19848 Run Analyst: JEN DOA: 09/09/92 TOA: 1500
anide, Total	0.0138	JB	0.0167	mg/l
lids Analyses	Method: EPA 160.1			Batch: 19778 Run Analyst: SLM DOA: 09/03/92 TOA: 1900

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CERTIFICATE OF ANALYSIS

Sample: 9209100-01 Client ID: Matrix: GroundH2O Description: MW-2
Sampled: 09/03/92 Received: 09/03/92 Page: 4
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Solids, Total Dissolved	1930	JB	1.67	mg/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-01 Client ID: NPS-CHS Matrix: Water Description: MW-2
Sampled: 09/03/92 Received: 09/03/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS VOA Method: EPA 8240			Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1546	
Naphthalene	600	J	--	ug/l
benzo[b]thiophene	25	J	--	ug/l
Naphthalene,dinethyl (isomer)	15	J	--	ug/l
Unkown hydrocarbon	30	J	--	ug/l
1-1'-biphenol	35	J	--	ug/l
GC/MS Extractables Method: EPA 8270				
None Found				

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CERTIFICATE OF ANALYSIS

Sample: 9209119-02 Client ID: Matrix: GroundH2O Description: MW-3
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Volatiles Method: EPA 8240 extended				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1509
GCMS Library Search-VOA	YES			
GC/MS Volatiles Method: EPA 8240 extended				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1509
1,1,1-Trichloroethane		U	16.7	ug/l
1,1,2,2-Tetrachloroethane		U	16.7	ug/l
1,1,2-Trichloroethane		U	16.7	ug/l
1,1-Dichloroethane		U	16.7	ug/l
1,1-Dichloroethylene		U	16.7	ug/l
1,2-Dichloroethane		U	16.7	ug/l
1,2-Dichloropropane		U	16.7	ug/l
1,2-cis-Dichloroethylene		U	16.7	ug/l
1,2-trans-Dichloroethylene		U	16.7	ug/l
2-Butanone		U	83.3	ug/l
2-Hexanone		U	16.7	ug/l
4-Methyl-2-pentanone		U	16.7	ug/l
Acetone	183.		83.3	ug/l
Benzene	10.6	J	16.7	ug/l
Bromoform		U	16.7	ug/l
Carbon Disulfide		U	16.7	ug/l
Carbon Tetrachloride		U	16.7	ug/l
hlorobenzene		U	16.7	ug/l
hlorodibromomethane		U	16.7	ug/l
loroethane		U	16.7	ug/l
hloroform		U	16.7	ug/l
Dichlorobromomethane		U	16.7	ug/l
Ethylbenzene	4.14	J	16.7	ug/l
Methyl Bromide		U	16.7	ug/l
Methyl Chloride		U	16.7	ug/l
Methylene Chloride	25.9	JB	16.7	ug/l
Styrene		U	16.7	ug/l
Tetrachloroethylene		U	16.7	ug/l
Toluene	22.2		16.7	ug/l
Trichloroethylene		U	16.7	ug/l
Vinyl Acetate		U	16.7	ug/l
Vinyl chloride		U	16.7	ug/l
Xylenes (TOTAL)	41.8		33.3	ug/l
cis-1,3-Dichloropropylene		U	16.7	ug/l
trans-1,3-Dichloropropylene		U	16.7	ug/l
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 1943
GCMS Library Search-ACID				
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 1943
GCMS Library Search-B/N				
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 1943 Prep Analyst: JKP DOP: 09/10/92 TOP: 1500
2,4,5-Trichlorophenol		U	83.3	ug/l
2,4,6-Trichlorophenol		U	83.3	ug/l
2,4-Dichlorophenol		U	83.3	ug/l
2,4-Dimethylphenol	10.5	J	83.3	ug/l
2,4-Dinitrophenol		U	750.	ug/l
2-Chlorophenol		U	83.3	ug/l
2-Nitrophenol		U	83.3	ug/l
2-methyl-4,6-dinitrophenol		U	83.3	ug/l
4-Nitrophenol		U	948.	ug/l
4-chloro-3-methyl phenol		U	83.3	ug/l
Benzoic Acid		U	1210	ug/l
Benzyl Alcohol		U	83.3	ug/l
Pentachlorophenol		U	83.3	ug/l
Phenol		U	83.3	ug/l
-Cresol		U	83.3	ug/l
-Cresol		U	83.3	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-02 Client ID: Matrix: GroundH2O Description: MW-3
Sampled: 09/04/92 Received: 09/04/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 1943 Prep Analyst: JKP DOP: 09/10/92 TOP: 1500
1,2,4-Trichlorobenzene		U	83.3	ug/l
1,2-Dichlorobenzene		U	83.3	ug/l
1,3-Dichlorobenzene		U	83.3	ug/l
1,4-Dichlorobenzene		U	83.3	ug/l
2,4-Dinitrotoluene		U	83.3	ug/l
2,6-Dinitrotoluene		U	83.3	ug/l
2-Chloronaphthalene		U	83.3	ug/l
2-Methylnaphthalene	130.		83.3	ug/l
3,3'-Dichlorobenzidine		U	333.	ug/l
4-Bromophenyl phenyl ether		U	167.	ug/l
4-Chloroaniline		U	83.3	ug/l
4-Chlorophenyl phenyl ether		U	83.3	ug/l
Acenaphthene	50.0	J	83.3	ug/l
Acenaphthylene		U	83.3	ug/l
Anthracene	50.0	J	83.3	ug/l
Benzo(a)anthracene		U	83.3	ug/l
Benzo(a)pyrene		U	83.3	ug/l
Benzo(b)fluoranthene		U	93.5	ug/l
Benzo(ghi)perylene		U	83.3	ug/l
Benzo(k)fluoranthene		U	125.	ug/l
Butyl benzyl phthalate		U	83.3	ug/l
Chrysene		U	167.	ug/l
Di-n-butyl phthalate		U	167.	ug/l
Di-n-octyl phthalate		U	167.	ug/l
Dibenzo(a,h)anthracene		U	83.3	ug/l
Dibenzofuran	80.0	J	83.3	ug/l
Diethyl phthalate		U	83.3	ug/l
Dimethyl phthalate		U	83.3	ug/l
Fluoranthene	80.0	J	83.3	ug/l
Fluorene	100.		83.3	ug/l
Hexachlorobenzene		U	83.3	ug/l
Hexachlorobutadiene		U	83.3	ug/l
Hexachlorocyclopentadiene		U	109.	ug/l
Hexachloroethane		U	83.3	ug/l
Indeno(1,2,3-c,d)pyrene		U	167.	ug/l
Isophorone		U	83.3	ug/l
N-Nitrosodiphenylamine		U	167.	ug/l
N-Nitrosodipropylamine		U	83.3	ug/l
Naphthalene	370.		83.3	ug/l
Nitrobenzene		U	83.3	ug/l
Phenanthrene	210.		83.3	ug/l
Pyrene	70.0	J	83.3	ug/l
bis(2-Chloroethoxy)methane		U	83.3	ug/l
bis(2-Chloroethyl) ether		U	83.3	ug/l
bis(2-Chloroisopropyl)ether		U	83.3	ug/l
bis(2-Ethylhexyl)phthalate		U	167.	ug/l
m-Nitroaniline		U	500.	ug/l
o-Nitroaniline		U	83.3	ug/l
p-Nitroaniline		U	430.	ug/l
Pesticides Method: EPA 8080				Batch: 19997 Run Analyst: JEB DOA: 09/18/92 TOA: 1732 Prep Analyst: RLS DOP: 09/09/92 TOP: 1800
4,4'-DDD		U	0.100	ppb
4,4'-DDE		U	0.100	ppb
4,4'-DDT		U	0.100	ppb
Aldrin		U	0.0500	ppb
Dieldrin		U	0.500	ppb
Endosulfan I		U	0.100	ppb
Endosulfan II		U	0.100	ppb
Endosulfan sulfate		U	0.100	ppb
Endrin		U	0.100	ppb
Endrin ketone		U	0.100	ppb

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CERTIFICATE OF ANALYSIS

Sample: 9209119-02 Client ID: Matrix: GroundH2O Description: MW-3
Sampled: 09/04/92 Received: 09/04/92 Page: 3
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Heptachlor		U	0.0500	ppb
Heptachlor epoxide		U	0.0500	ppb
Methoxychlor		U	0.500	ppb
PCB-1016		U	0.500	ppb
PCB-1221		U	0.500	ppb
PCB-1232		U	0.500	ppb
PCB-1242		U	0.500	ppb
PCB-1248		U	0.500	ppb
PCB-1254		U	1.00	ppb
PCB-1260		U	1.00	ppb
Toxaphene			0.00	
alpha-BHC		U	0.0500	ppb
alpha-Chlordane		U	0.500	ppb
beta-BHC		U	0.0500	ppb
delta-BHC		U	0.0500	ppb
gamma-BHC		U	0.0500	ppb
gamma-Chlordane		U	0.500	ppb
Graphite Furnace	Method: EPA 7060			Batch: 19965 Run Analyst: NRM DOA: 09/11/92 TOA: 1146 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic	3.99	J	5.00	ug/l
Graphite Furnace	Method: EPA 7421			Batch: 19965 Run Analyst: NRM DOA: 09/11/92 TOA: 1146 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
d	123.		6.67	ug/l
Graphite Furnace	Method: EPA 7041			Batch: 19965 Run Analyst: NRM DOA: 09/11/92 TOA: 1146 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Antimony	1.77	J	5.00	ug/l
Graphite Furnace	Method: EPA 7740			Batch: 19965 Run Analyst: NRM DOA: 09/11/92 TOA: 1146 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium	0.0100	J	5.00	ug/l
Graphite Furnace	Method: EPA 7841			Batch: 19965 Run Analyst: NRM DOA: 09/11/92 TOA: 1146 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Thallium	0.650	J	16.7	ug/l
ICP	Method: EPA 6010			Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1136 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	0.0300	mg/l
Aluminum	2.93		0.0500	mg/l
Barium	0.458		0.0300	mg/l
Beryllium	0.000320	J	0.0100	mg/l
Calcium	327.		0.0800	mg/l
Cadmium		U	0.0150	mg/l
Cobalt	0.000590	J	0.0300	mg/l
Chromium	0.0112	J	0.0300	mg/l
Copper	0.0237	J	0.0300	mg/l
Iron	34.9		0.0450	mg/l
Potassium	48.5		0.500	mg/l
Magnesium	188.		0.0300	mg/l
Manganese	2.58		0.0300	mg/l
Sodium	5100		0.165	mg/l
Nickel	0.0150	J	0.0300	mg/l
Vanadium	0.00114	J	0.0300	mg/l
Zinc	0.132		0.0317	mg/l
Mercury	Method: EPA 7470			Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury	0.700		0.500	ug/l
Cyanide by RFA	Method: EPA 335.3			Batch: 19848 Run Analyst: JEN DOA: 09/09/92 TOA: 1500
Cyanide, Total	0.00500	JB	0.0167	mg/l
ids Analyses	Method: EPA 160.1			Batch: 20066 Run Analyst: SLM DOA: 09/10/92 TOA: 2100

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CERTIFICATE OF ANALYSIS

Sample: 9209119-02 Client ID: Matrix: GroundH2O Description: MW-3
Sampled: 09/04/92 Received: 09/04/92 Page: 4
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Solids, Total Dissolved	6170	JB	1.67	mg/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-02 Client ID: NPS-CHS Matrix: Water Description: MW-3
Sampled: 09/04/92 Received: 09/04/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 1943
Benzene, 1-propynyl	70	J	--	ug/l
Methyl Naphthalene (isomer)	70	J	--	ug/l
GC/MS VOA Method: EPA 8240				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1434
Benzo [b] thiophene	45	J	--	ug/l
Benzene, trimethyl (isomer)	15	J	--	ug/l
1H Indene; 2,3 - dihydro	25	J	--	ug/l
Benzene, 1-propynyl	85	J	--	ug/l
Unknown	20	J	--	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-02 Client ID: Matrix: GroundH2O Description: MW-4
Sampled: 09/03/92 Received: 09/03/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Volatiles Method: EPA 8240 extended				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1359
GCMS Library Search-VOA	YES			
GC/MS Volatiles Method: EPA 8240 extended				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1359
1,1,1-Trichloroethane		U	16.7	ug/l
1,1,2,2-Tetrachloroethane		U	16.7	ug/l
1,1,2-Trichloroethane		U	16.7	ug/l
1,1-Dichloroethane		U	16.7	ug/l
1,1-Dichloroethylene		U	16.7	ug/l
1,2-Dichloroethane		U	16.7	ug/l
1,2-Dichloropropane		U	16.7	ug/l
1,2-cis-Dichloroethylene		U	16.7	ug/l
1,2-trans-Dichloroethylene		U	16.7	ug/l
2-Butanone		U	83.3	ug/l
2-Hexanone		U	16.7	ug/l
4-Methyl-2-pentanone		U	16.7	ug/l
Acetone	623.		167.	ug/l
Benzene		U	16.7	ug/l
Bromoform		U	16.7	ug/l
Carbon Disulfide		U	16.7	ug/l
Carbon Tetrachloride		U	16.7	ug/l
Chlorobenzene		U	16.7	ug/l
Chlorodibromomethane		U	16.7	ug/l
Chloroethane		U	16.7	ug/l
Chloroform		U	16.7	ug/l
Dichlorobromomethane		U	16.7	ug/l
Ethylbenzene		U	16.7	ug/l
Methyl Bromide		U	16.7	ug/l
Methyl Chloride		U	16.7	ug/l
Methylene Chloride	15.0	JB	16.7	ug/l
Styrene		U	16.7	ug/l
Tetrachloroethylene		U	16.7	ug/l
Toluene	4.10	J	16.7	ug/l
Trichloroethylene		U	16.7	ug/l
Vinyl Acetate		U	16.7	ug/l
Vinyl chloride		U	16.7	ug/l
Xylenes (TOTAL)		U	33.3	ug/l
cis-1,3-Dichloropropylene		U	16.7	ug/l
trans-1,3-Dichloropropylene		U	16.7	ug/l
GC/MS Extractables Method: EPA 8270				Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1227
GCMS Library Search-ACID				
GC/MS Extractables Method: EPA 8270				Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1227
GCMS Library Search-B/N				
GC/MS Extractables Method: EPA 8270				Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1227
				Prep Analyst: VLD DOP: 09/09/92 TOP: 1700
2,4,5-Trichlorophenol		U	93.7	ug/l
2,4,6-Trichlorophenol		U	93.7	ug/l
2,4-Dichlorophenol		U	93.7	ug/l
2,4-Dimethylphenol		U	93.7	ug/l
2,4-Dinitrophenol		U	843.	ug/l
2-Chlorophenol		U	93.7	ug/l
2-Nitrophenol		U	93.7	ug/l
2-methyl-4,6-dinitrophenol		U	93.7	ug/l
4-Nitrophenol		U	1070	ug/l
4-chloro-3-methyl phenol		U	93.7	ug/l
Benzoic Acid		U	1350	ug/l
Benzyl Alcohol		U	93.7	ug/l
Pentachlorophenol		U	93.7	ug/l
Phenol		U	93.7	ug/l
o-Cresol		U	93.7	ug/l
p-Cresol		U	93.7	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-02 Client ID: Matrix: GroundH2O Description: MW-4
Sampled: 09/03/92 Received: 09/03/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Extractables Method: EPA 8270				Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1227 Prep Analyst: VLD DOP: 09/09/92 TOP: 1700
1,2,4-Trichlorobenzene		U	93.7	ug/l
1,2-Dichlorobenzene		U	93.7	ug/l
1,3-Dichlorobenzene		U	93.7	ug/l
1,4-Dichlorobenzene		U	93.7	ug/l
2,4-Dinitrotoluene		U	93.7	ug/l
2,6-Dinitrotoluene		U	93.7	ug/l
2-Chloronaphthalene		U	93.7	ug/l
2-Methylnaphthalene		U	93.7	ug/l
3,3'-Dichlorobenzidine		U	375.	ug/l
4-Bromophenyl phenyl ether		U	187.	ug/l
4-Chloroaniline		U	93.7	ug/l
4-Chlorophenyl phenyl ether		U	93.7	ug/l
Acenaphthene		U	93.7	ug/l
Acenaphthylene		U	93.7	ug/l
Anthracene		U	93.7	ug/l
Benzo(a)anthracene		U	93.7	ug/l
Benzo(a)pyrene		U	93.7	ug/l
Benzo(b)fluoranthene		U	105.	ug/l
Benzo(ghi)perylene		U	93.7	ug/l
Benzo(k)fluoranthene		U	140.	ug/l
Butyl benzyl phthalate		U	93.7	ug/l
Chrysene		U	187.	ug/l
Di-n-butyl phthalate		U	187.	ug/l
Di-n-octyl phthalate		U	187.	ug/l
Dibenzo(a,h)anthracene		U	93.7	ug/l
Dibenzofuran		U	93.7	ug/l
Diethyl phthalate		U	93.7	ug/l
Dimethyl phthalate		U	93.7	ug/l
Fluoranthene		U	93.7	ug/l
Fluorene		U	93.7	ug/l
Hexachlorobenzene		U	93.7	ug/l
Hexachlorobutadiene		U	93.7	ug/l
Hexachlorocyclopentadiene		U	122.	ug/l
Hexachloroethane		U	93.7	ug/l
Indeno(1,2,3-c,d)pyrene		U	187.	ug/l
Isophorone		U	93.7	ug/l
N-Nitrosodiphenylamine		U	187.	ug/l
N-Nitrosodipropylamine		U	93.7	ug/l
Naphthalene		U	93.7	ug/l
Nitrobenzene		U	93.7	ug/l
Phenanthrene		U	93.7	ug/l
Pyrene		U	93.7	ug/l
bis(2-Chloroethoxy)methane		U	93.7	ug/l
bis(2-Chloroethyl) ether		U	93.7	ug/l
bis(2-Chloroisopropyl)ether		U	93.7	ug/l
bis(2-Ethylhexyl)phthalate		U	187.	ug/l
m-Nitroaniline		U	562.	ug/l
o-Nitroaniline		U	93.7	ug/l
p-Nitroaniline		U	483.	ug/l
Pesticides Method: EPA 8080				Batch: 19814 Run Analyst: JEB DOA: 09/14/92 TOA: 2054 Prep Analyst: JKP DOP: 09/04/92 TOP: 1700
4,4'-DDD		U	0.100	ppb
4,4'-DDE		U	0.100	ppb
4,4'-DDT		U	0.100	ppb
Aldrin		U	0.0500	ppb
Dieldrin		U	0.500	ppb
Endosulfan I		U	0.100	ppb
Endosulfan II		U	0.100	ppb
Endosulfan sulfate		U	0.100	ppb
Endrin		U	0.100	ppb
Endrin ketone		U	0.100	ppb

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CERTIFICATE OF ANALYSIS

Sample: 9209100-02 Client ID: Matrix: GroundH2O Description: MW-4
Sampled: 09/03/92 Received: 09/03/92 Page: 3
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Heptachlor		U	0.0500	ppb
Heptachlor epoxide		U	0.0500	ppb
Methoxychlor		U	0.500	ppb
PCB-1016		U	0.500	ppb
PCB-1221		U	0.500	ppb
PCB-1232		U	0.500	ppb
PCB-1242		U	0.500	ppb
PCB-1248		U	0.500	ppb
PCB-1254		U	1.00	ppb
PCB-1260		U	1.00	ppb
Toxaphene		U	1.00	ppb
alpha-BHC		U	0.0500	ppb
alpha-Chlordane		U	0.500	ppb
beta-BHC		U	0.0500	ppb
delta-BHC		U	0.0500	ppb
gamma-BHC		U	0.0500	ppb
gamma-Chlordane		U	0.500	ppb

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CERTIFICATE OF ANALYSIS

Sample: 9209100-02 Client ID: NPS-CHS Matrix: Water Description: MW-4
Sampled: 09/03/92 Received: 09/03/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS VOA Method: EPA 8240				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1359
Undecane	35	J	--	ug/l
Unknown	15	J	--	ug/l
Fenchone	65	J	--	ug/l
C10 alkyl benzene	115	J	--	ug/l
GC/MS Extractables Method: EPA 8270				Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1227
Fenchone	112	J	--	ug/l
Camphor	235	J	--	ug/l
Unknown	45	J	--	ug/l
Unknown	45	J	--	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-03 Client ID: Matrix: GroundH2O Description: MW-4
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Graphite Furnace	Method: EPA 7060			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1941 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic	5.56		5.00	ug/l
Graphite Furnace	Method: EPA 7421			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1941 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Lead	5.50		5.00	ug/l
Graphite Furnace	Method: EPA 7041			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1941 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Antimony	1.59	J	5.00	ug/l
Graphite Furnace	Method: EPA 7740			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1941 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium		U	5.00	ug/l
Graphite Furnace	Method: EPA 7841			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1941 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Thallium	1.96	J	5.00	ug/l
ICP	Method: EPA 6010			Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1138 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	0.0300	mg/l
Aluminum	0.490		0.0500	mg/l
Barium	0.0797		0.0300	mg/l
Beryllium	0.0000600	J	0.0100	mg/l
Calcium	178.		0.0800	mg/l
Cadmium		U	0.0150	mg/l
Cobalt		U	0.0300	mg/l
Chromium	0.00590	J	0.0300	mg/l
Copper	0.00323	J	0.0300	mg/l
Iron	4.00		0.0450	mg/l
Potassium	182.		0.500	mg/l
Magnesium	327.		0.0300	mg/l
Manganese	0.840		0.0300	mg/l
Sodium	5090		0.165	mg/l
Nickel		U	0.0300	mg/l
Vanadium		U	0.0300	mg/l
Zinc	0.00277	J	0.0317	mg/l
Mercury	Method: EPA 7470			Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury		U	0.500	ug/l
Cyanide by RFA	Method: EPA 335.3			Batch: 19848 Run Analyst: JEN DOA: 09/09/92 TOA: 1500
Cyanide, Total	0.00240	JB	0.0167	mg/l
Solids Analyses	Method: EPA 160.1			Batch: 20066 Run Analyst: SLM DOA: 09/10/92 TOA: 2100
Solids, Total Dissolved	8030	JB	1.67	mg/l

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WI	99988779

CERTIFICATE OF ANALYSIS

Sample: 9209100-03 Client ID: Matrix: GroundH2O Description: MW-5
Sampled: 09/03/92 Received: 09/03/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20699 Run Analyst: AGW DOA: 10/01/92 TOA: 0000
GCMS Library Search-B/N				
GC/MS Extractables Method: EPA 8270				Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1311 Prep Analyst: VLD DOP: 09/09/92 TOP: 1700
1,2,4-Trichlorobenzene		U	10.0	ug/l
1,2-Dichlorobenzene	0.816	J	10.0	ug/l
1,3-Dichlorobenzene		U	10.0	ug/l
1,4-Dichlorobenzene	0.905	J	10.0	ug/l
2,4-Dinitrotoluene		U	10.0	ug/l
2,6-Dinitrotoluene		U	10.0	ug/l
2-Chloronaphthalene		U	10.0	ug/l
2-Methylnaphthalene	7.00	J	10.0	ug/l
3,3'-Dichlorobenzidine		U	33.3	ug/l
4-Bromophenyl phenyl ether		U	16.7	ug/l
4-Chloroaniline		U	10.0	ug/l
4-Chlorophenyl phenyl ether		U	10.0	ug/l
Acenaphthene	21.0		10.0	ug/l
Acenaphthylene		U	10.0	ug/l
Anthracene	10.0		10.0	ug/l
Benzo(a)anthracene		U	10.0	ug/l
Benzo(a)pyrene		U	10.0	ug/l
Benzo(b)fluoranthene		U	10.0	ug/l
Benzo(ghi)perylene		U	10.0	ug/l
Benzo(k)fluoranthene		U	12.5	ug/l
Butyl benzyl phthalate		U	10.0	ug/l
Chrysene		U	16.7	ug/l
Di-n-butyl phthalate		U	16.7	ug/l
Di-n-octyl phthalate		U	16.7	ug/l
Dibenzo(a,h)anthracene		U	10.0	ug/l
Dibenzofuran	4.56	J	10.0	ug/l
Diethyl phthalate		U	10.0	ug/l
Dimethyl phthalate		U	10.0	ug/l
Fluoranthene	13.0		10.0	ug/l
Fluorene	18.0		10.0	ug/l
Hexachlorobenzene		U	10.0	ug/l
Hexachlorobutadiene		U	10.0	ug/l
Hexachlorocyclopentadiene		U	10.9	ug/l
Hexachloroethane		U	10.0	ug/l
Indeno(1,2,3-c,d)pyrene		U	16.7	ug/l
Isophorone		U	10.0	ug/l
N-Nitrosodiphenylamine		U	16.7	ug/l
N-Nitrosodipropylamine		U	10.0	ug/l
Naphthalene		U	10.0	ug/l
Nitrobenzene		U	10.0	ug/l
Phenanthrene	37.0		10.0	ug/l
Pyrene	12.0		10.0	ug/l
bis(2-Chloroethoxy)methane		U	10.0	ug/l
bis(2-Chloroethyl) ether		U	10.0	ug/l
bis(2-Chloroisopropyl)ether		U	10.0	ug/l
bis(2-Ethylhexyl)phthalate		U	16.7	ug/l
m-Nitroaniline		U	50.0	ug/l
o-Nitroaniline		U	10.0	ug/l
p-Nitroaniline		U	43.0	ug/l
PCB's Method: EPA 8080				Batch: 19995 Run Analyst: JLS DOA: 09/10/92 TOA: 1750 Prep Analyst: ECP DOP: 09/09/92 TOP: 1500
PCB-1016		U	0.500	ug/l
PCB-1221		U	0.500	ug/l
PCB-1232		U	0.500	ug/l
PCB-1242		U	0.500	ug/l
PCB-1248		U	0.500	ug/l
PCB-1254		U	0.500	ug/l
PCB-1260		U	0.500	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-03 Client ID: Matrix: GroundH2O Description: MW-5
Sampled: 09/03/92 Received: 09/03/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1262		U	0.500	ug/l
Graphite Furnace	Method: EPA 7060			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1841 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic	1.03	J	5.00	ug/l
Graphite Furnace	Method: EPA 7421			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1841 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Lead	4.25	J	5.00	ug/l
Graphite Furnace	Method: EPA 7740			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1841 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium	0.560	J	5.00	ug/l
ICP	Method: EPA 6010			Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1218 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	0.0300	mg/l
Barium	0.218		0.0300	mg/l
Cadmium	0.000560	J	0.0150	mg/l
Chromium	0.00319	J	0.0300	mg/l
Mercury	Method: EPA 7470			Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury		U	0.500	ug/l
Solids Analyses	Method: EPA 160.1			Batch: 19778 Run Analyst: SLM DOA: 09/03/92 TOA: 1900
Solids, Total Dissolved	1160	JB	1.67	mg/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-03 Client ID: NPS-CHS Matrix: Water Description: MW-5
Sampled: 09/03/92 Received: 09/03/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1311	
Dimethylnaphthalene (isomer)	5	J	--	ug/l
Unknown (aromatic)	6	J	--	ug/l
Unknown	9	J	--	ug/l
Unknown	9	J	--	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-04 Client ID: Matrix: GroundH2O Description: MW-6
Sampled: 09/03/92 Received: 09/03/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/16/92 TOA: 1355
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1355
				Prep Analyst: VLD DOP: 09/09/92 TOP: 1700
1,2,4-Trichlorobenzene		U	10.0	ug/l
1,2-Dichlorobenzene		U	10.0	ug/l
1,3-Dichlorobenzene		U	10.0	ug/l
1,4-Dichlorobenzene		U	10.0	ug/l
2,4-Dinitrotoluene		U	10.0	ug/l
2,6-Dinitrotoluene		U	10.0	ug/l
2-Chloronaphthalene		U	10.0	ug/l
2-Methylnaphthalene		U	10.0	ug/l
3,3'-Dichlorobenzidine		U	33.3	ug/l
4-Bromophenyl phenyl ether		U	16.7	ug/l
4-Chloroaniline		U	10.0	ug/l
4-Chlorophenyl phenyl ether		U	10.0	ug/l
Acenaphthene	76.0		10.0	ug/l
Acenaphthylene	51.0		10.0	ug/l
Anthracene	20.0		10.0	ug/l
Benzo(a)anthracene		U	10.0	ug/l
Benzo(a)pyrene		U	10.0	ug/l
Benzo(b)fluoranthene		U	10.0	ug/l
Benzo(ghi)perylene		U	10.0	ug/l
Benzo(k)fluoranthene		U	12.5	ug/l
Butyl benzyl phthalate		U	10.0	ug/l
Chrysene		U	16.7	ug/l
Di-n-butyl phthalate		U	16.7	ug/l
Di-n-octyl phthalate		U	16.7	ug/l
Dibenzo(a,h)anthracene		U	10.0	ug/l
Dibenzofuran	71.0		10.0	ug/l
Diethyl phthalate		U	10.0	ug/l
Dimethyl phthalate		U	10.0	ug/l
Fluoranthene	22.0		10.0	ug/l
Fluorene	89.0		10.0	ug/l
Hexachlorobenzene		U	10.0	ug/l
Hexachlorobutadiene		U	10.0	ug/l
Hexachlorocyclopentadiene		U	10.9	ug/l
Hexachloroethane		U	10.0	ug/l
Indeno(1,2,3-c,d)pyrene		U	16.7	ug/l
Isophorone		U	10.0	ug/l
N-Nitrosodiphenylamine		U	16.7	ug/l
N-Nitrosodipropylamine		U	10.0	ug/l
Naphthalene	1130		83.3	ug/l
Nitrobenzene		U	10.0	ug/l
Phenanthrene	150.		83.3	ug/l
Pyrene	18.0		10.0	ug/l
bis(2-Chloroethoxy)methane		U	10.0	ug/l
bis(2-Chloroethyl) ether		U	10.0	ug/l
bis(2-Chloroisopropyl)ether		U	10.0	ug/l
bis(2-Ethylhexyl)phthalate		U	16.7	ug/l
m-Nitroaniline		U	50.0	ug/l
o-Nitroaniline		U	10.0	ug/l
p-Nitroaniline		U	43.0	ug/l
PCB's Method: EPA 8080				Batch: 19995 Run Analyst: JLS DOA: 09/11/92 TOA: 0739
				Prep Analyst: ECP DOP: 09/09/92 TOP: 1500
PCB-1016		U	0.500	ug/l
PCB-1221		U	0.500	ug/l
PCB-1232		U	0.500	ug/l
PCB-1242		U	0.500	ug/l
PCB-1248		U	0.500	ug/l
PCB-1254		U	0.500	ug/l
PCB-1260		U	0.500	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-04 Client ID: Matrix: GroundH2O Description: MW-6
Sampled: 09/03/92 Received: 09/03/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1262		U	0.500	ug/l
Graphite Furnace	Method: EPA 7060			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1845 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic	6.01		5.00	ug/l
Graphite Furnace	Method: EPA 7421			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1845 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Lead	10.1		5.00	ug/l
Graphite Furnace	Method: EPA 7740			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1845 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium	0.640	J	5.00	ug/l
ICP	Method: EPA 6010			Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1220 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	0.0300	mg/l
Barium	0.235		0.0300	mg/l
Cadmium		U	0.0150	mg/l
Chromium	0.00980	J	0.0300	mg/l
Mercury	Method: EPA 7470			Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury		U	0.500	ug/l
Solids Analyses	Method: EPA 160.1			Batch: 19778 Run Analyst: SLM DOA: 09/03/92 TOA: 1900
Solids, Total Dissolved	1510	JB	1.67	mg/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-04 Client ID: NPS-CHS Matrix: Water Description: MW-6
Sampled: 09/03/92 Received: 09/03/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1355	
Dimethyl benzene (isomer)	32	J	--	ug/l
Dimethyl benzene (isomer)	19	J	--	ug/l
Trimethyl benzene (isomer)	24	J	--	ug/l
2,3-dihydro-1H-Indene	43	J	--	ug/l
1-propynyl-benzene	88	J	--	ug/l
1,1'-Biphenyl	20	J	--	ug/l
Dimethyl naphthalene (isomer)	16	J	--	ug/l
Dimethyl naphthalene (isomer)	21	J	--	ug/l
3-(2 phenylethyl) phenol	27	J	--	ug/l
9H - Carbazole	42	J	--	ug/l
Fenchone	16	J	--	ug/l
Benzo [b] thiophene	5	J	--	ug/l
Methyl naphthalene (isomer)	8	J	--	ug/l
Dimethyl naphthalene (isomer)	11	J	--	ug/l
Unknown	28	J	--	ug/l
Unknown	46	J	--	ug/l
Unknown	30	J	--	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-05 Client ID: Matrix: GroundH2O Description: MW-7
Sampled: 09/03/92 Received: 09/03/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/16/92 TOA: 1438
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1438 Prep Analyst: VLD DOP: 09/09/92 TOP: 1700
1,2,4-Trichlorobenzene		U	83.3	ug/l
1,2-Dichlorobenzene		U	83.3	ug/l
1,3-Dichlorobenzene		U	83.3	ug/l
1,4-Dichlorobenzene		U	83.3	ug/l
2,4-Dinitrotoluene		U	83.3	ug/l
2,6-Dinitrotoluene		U	83.3	ug/l
2-Chloronaphthalene		U	83.3	ug/l
2-Methylnaphthalene	60.0	J	83.3	ug/l
3,3'-Dichlorobenzidine		U	333.	ug/l
4-Bromophenyl phenyl ether		U	167.	ug/l
4-Chloroaniline		U	83.3	ug/l
4-Chlorophenyl phenyl ether		U	83.3	ug/l
Acenaphthene	110.		83.3	ug/l
Acenaphthylene		U	83.3	ug/l
Anthracene		U	83.3	ug/l
Benzo(a)anthracene		U	83.3	ug/l
Benzo(a)pyrene		U	83.3	ug/l
Benzo(b)fluoranthene		U	93.5	ug/l
Benzo(ghi)perylene		U	83.3	ug/l
Benzo(k)fluoranthene		U	125.	ug/l
Butyl benzyl phthalate		U	83.3	ug/l
Chrysene		U	167.	ug/l
Di-n-butyl phthalate		U	167.	ug/l
Di-n-octyl phthalate		U	167.	ug/l
Dibenzo(a,h)anthracene		U	83.3	ug/l
Dibenzofuran	60.0	J	83.3	ug/l
Diethyl phthalate		U	83.3	ug/l
Dimethyl phthalate		U	83.3	ug/l
Fluoranthene		U	83.3	ug/l
Fluorene	90.0		83.3	ug/l
Hexachlorobenzene		U	83.3	ug/l
Hexachlorobutadiene		U	83.3	ug/l
Hexachlorocyclopentadiene		U	109.	ug/l
Hexachloroethane		U	83.3	ug/l
Indeno(1,2,3-c,d)pyrene		U	167.	ug/l
Isophorone		U	83.3	ug/l
N-Nitrosodiphenylamine		U	167.	ug/l
N-Nitrosodipropylamine		U	83.3	ug/l
Naphthalene	90.0		83.3	ug/l
Nitrobenzene		U	83.3	ug/l
Phenanthrene	90.0		83.3	ug/l
Pyrene	120.		83.3	ug/l
bis(2-Chloroethoxy)methane		U	83.3	ug/l
bis(2-Chloroethyl) ether		U	83.3	ug/l
bis(2-Chloroisopropyl)ether		U	83.3	ug/l
bis(2-Ethylhexyl)phthalate		U	167.	ug/l
m-Nitroaniline		U	500.	ug/l
o-Nitroaniline		U	83.3	ug/l
p-Nitroaniline		U	430.	ug/l
PCB's Method: EPA 8080				Batch: 19995 Run Analyst: JLS DOA: 09/10/92 TOA: 1909 Prep Analyst: ECP DOP: 09/09/92 TOP: 1500
PCB-1016		U	0.500	ug/l
PCB-1221		U	0.500	ug/l
PCB-1232		U	0.500	ug/l
PCB-1242		U	0.500	ug/l
PCB-1248	1.23		0.500	ug/l
PCB-1254		U	0.500	ug/l
PCB-1260		U	0.500	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-05 Client ID: Matrix: GroundH2O Description: MW-7
Sampled: 09/03/92 Received: 09/03/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1262		U	0.500	ug/l
Graphite Furnace Method: EPA 7060				Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1850 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic	1.51	J	5.00	ug/l
Graphite Furnace Method: EPA 7421				Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1850 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Lead	1.71	J	5.00	ug/l
Graphite Furnace Method: EPA 7740				Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1850 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium	0.360	J	5.00	ug/l
ICP Method: EPA 6010				Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1150 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	0.0300	mg/l
Barium	0.137		0.0300	mg/l
Cadmium		U	0.0150	mg/l
Chromium	0.00314	J	0.0300	mg/l
Mercury Method: EPA 7470				Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury		U	0.500	ug/l
Solids Analyses Method: EPA 160.1				Batch: 19778 Run Analyst: SLM DOA: 09/03/92 TOA: 1900
Solids, Total Dissolved	2900	JB	1.67	mg/l

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WI	99988779

CERTIFICATE OF ANALYSIS

Sample: 9209100-05 Client ID: NPS-CHS Matrix: Water Description: MW-7
Sampled: 09/03/92 Received: 09/03/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270 Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1438				
Methyl naphthalene (isomer)	70	J	--	ug/l

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SC	10120
VA	00151
TN	02934
WI	99988779

CERTIFICATE OF ANALYSIS

Sample: 9209100-06 Client ID: Matrix: GroundH2O Description: MW-8
Sampled: 09/03/92 Received: 09/03/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/16/92 TOA: 1522
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1522 Prep Analyst: VLD DOP: 09/09/92 TOP: 1700
1,2,4-Trichlorobenzene		U	83.3	ug/l
1,2-Dichlorobenzene		U	83.3	ug/l
1,3-Dichlorobenzene		U	83.3	ug/l
1,4-Dichlorobenzene		U	83.3	ug/l
2,4-Dinitrotoluene		U	83.3	ug/l
2,6-Dinitrotoluene		U	83.3	ug/l
2-Chloronaphthalene		U	83.3	ug/l
2-Methylnaphthalene	80.0	J	83.3	ug/l
3,3'-Dichlorobenzidine		U	333.	ug/l
4-Bromophenyl phenyl ether		U	167.	ug/l
4-Chloroaniline		U	83.3	ug/l
4-Chlorophenyl phenyl ether		U	83.3	ug/l
Acenaphthene	60.0	J	83.3	ug/l
Acenaphthylene		U	83.3	ug/l
Anthracene		U	83.3	ug/l
Benzo(a)anthracene		U	83.3	ug/l
Benzo(a)pyrene		U	83.3	ug/l
Benzo(b)fluoranthene		U	93.5	ug/l
Benzo(ghi)perylene		U	83.3	ug/l
Benzo(k)fluoranthene		U	125.	ug/l
Butyl benzyl phthalate		U	83.3	ug/l
Chrysene		U	167.	ug/l
Di-n-butyl phthalate		U	167.	ug/l
Di-n-octyl phthalate		U	167.	ug/l
Dibenzo(a,h)anthracene		U	83.3	ug/l
Dibenzofuran	47.9	J	83.3	ug/l
Diethyl phthalate		U	83.3	ug/l
Dimethyl phthalate		U	83.3	ug/l
Fluoranthene		U	83.3	ug/l
Fluorene	50.0	J	83.3	ug/l
Hexachlorobenzene		U	83.3	ug/l
Hexachlorobutadiene		U	83.3	ug/l
Hexachlorocyclopentadiene		U	109.	ug/l
Hexachloroethane		U	83.3	ug/l
Indeno(1,2,3-c,d)pyrene		U	167.	ug/l
Isophorone		U	83.3	ug/l
N-Nitrosodiphenylamine		U	167.	ug/l
N-Nitrosodipropylamine		U	83.3	ug/l
Naphthalene	570.		83.3	ug/l
Nitrobenzene		U	83.3	ug/l
Phenanthrene	120.		83.3	ug/l
Pyrene		U	83.3	ug/l
bis(2-Chloroethoxy)methane		U	83.3	ug/l
bis(2-Chloroethyl) ether		U	83.3	ug/l
bis(2-Chloroisopropyl)ether		U	83.3	ug/l
bis(2-Ethylhexyl)phthalate		U	167.	ug/l
m-Nitroaniline		U	500.	ug/l
o-Nitroaniline		U	83.3	ug/l
p-Nitroaniline		U	430.	ug/l
PCB's Method: EPA 8080				Batch: 19995 Run Analyst: JLS DOA: 09/10/92 TOA: 1949 Prep Analyst: ECP DOP: 09/09/92 TOP: 1500
PCB-1016		U	0.500	ug/l
PCB-1221		U	0.500	ug/l
PCB-1232		U	0.500	ug/l
PCB-1242		U	0.500	ug/l
PCB-1248		U	0.500	ug/l
PCB-1254		U	0.500	ug/l
PCB-1260		U	0.500	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-06 Client ID: Matrix: GroundH2O Description: MW-8
Sampled: 09/03/92 Received: 09/03/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter		Result	Qual	QL	Units
PCB-1262			U	0.500	ug/l
Graphite Furnace	Method: EPA 7060				Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1854 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic		20.0		5.00	ug/l
Graphite Furnace	Method: EPA 7421				Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1854 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Lead		14.7		5.00	ug/l
Graphite Furnace	Method: EPA 7740				Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1854 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium			U	5.00	ug/l
ICP	Method: EPA 6010				Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1224 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver			U	0.0300	mg/l
Barium		0.272		0.0300	mg/l
Cadmium			U	0.0150	mg/l
Chromium		0.0309		0.0300	mg/l
Mercury	Method: EPA 7470				Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury			U	0.500	ug/l
Solids Analyses	Method: EPA 160.1				Batch: 20015 Run Analyst: SLM DOA: 09/09/92 TOA: 2000
Solids, Total Dissolved		4580	JB	1.67	mg/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-06 Client ID: NPS-CHS Matrix: Water Description: MW-8
Sampled: 09/03/92 Received: 09/03/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 20000 Run Analyst: AGW DOA: 09/17/92 TOA: 1817	
Dimethyl Benzene (isomer)	12	J	--	ug/l
1,1 - Biphenyl	12	J	--	ug/l
2,3-diydro - 1H - Indene	15	J	--	ug/l
1 - propynyl benzene	36	J	--	ug/l
Dimethyl naphthalene (isomer)	11	J	--	ug/l
9H - Carbozole	24	J	--	ug/l
Unknown hydrocarbon	27	J	--	ug/l
Trimethyl benzene (isomer)	8	J	--	ug/l
Methyl naphthalene (isomer)	6	J	--	ug/l
Dimethyl naphthalene (isomer)	8	J	--	ug/l
Dibenzothiophene	7	J	--	ug/l
Unknown (aromatic)	9	J	--	ug/l
Unknown	12	J	--	ug/l
Unknown	63	J	--	ug/l
Unknown	27	J	--	ug/l
Unknown	110	J	--	ug/l
Unknown	56	J	--	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-04 Client ID: Matrix: GroundH2O Description: MW-9
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/17/92 TOA: 2026
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 2026 Prep Analyst: JKP DOP: 09/10/92 TOP: 1500
1,2,4-Trichlorobenzene		U	10.0	ug/l
1,2-Dichlorobenzene		U	10.0	ug/l
1,3-Dichlorobenzene		U	10.0	ug/l
1,4-Dichlorobenzene		U	10.0	ug/l
2,4-Dinitrotoluene		U	10.0	ug/l
2,6-Dinitrotoluene		U	10.0	ug/l
2-Chloronaphthalene		U	10.0	ug/l
2-Methylnaphthalene	72.0		10.0	ug/l
3,3'-Dichlorobenzidine		U	33.3	ug/l
4-Bromophenyl phenyl ether		U	16.7	ug/l
4-Chloroaniline		U	10.0	ug/l
4-Chlorophenyl phenyl ether		U	10.0	ug/l
Acenaphthene	109.		10.0	ug/l
Acenaphthylene	31.0		10.0	ug/l
Anthracene	22.0		10.0	ug/l
Benzo(a)anthracene		U	10.0	ug/l
Benzo(a)pyrene		U	10.0	ug/l
Benzo(b)fluoranthene		U	10.0	ug/l
Benzo(ghi)perylene		U	10.0	ug/l
Benzo(k)fluoranthene		U	12.5	ug/l
Butyl benzyl phthalate		U	10.0	ug/l
Chrysene		U	16.7	ug/l
Di-n-butyl phthalate		U	16.7	ug/l
Di-n-octyl phthalate		U	16.7	ug/l
Dibenzo(a,h)anthracene		U	10.0	ug/l
Dibenzofuran	53.0		10.0	ug/l
Diethyl phthalate		U	10.0	ug/l
Dimethyl phthalate		U	10.0	ug/l
Fluoranthene	35.0		10.0	ug/l
Fluorene	76.0		10.0	ug/l
Hexachlorobenzene		U	10.0	ug/l
Hexachlorobutadiene		U	10.0	ug/l
Hexachlorocyclopentadiene		U	10.9	ug/l
Hexachloroethane		U	10.0	ug/l
Indeno(1,2,3-c,d)pyrene		U	16.7	ug/l
Isophorone		U	10.0	ug/l
N-Nitrosodiphenylamine		U	16.7	ug/l
N-Nitrosodipropylamine		U	10.0	ug/l
Naphthalene	240.		83.3	ug/l
Nitrobenzene		U	10.0	ug/l
Phenanthrene	99.0		10.0	ug/l
Pyrene	26.0		10.0	ug/l
bis(2-Chloroethoxy)methane		U	10.0	ug/l
bis(2-Chloroethyl) ether		U	10.0	ug/l
bis(2-Chloroisopropyl)ether		U	10.0	ug/l
bis(2-Ethylhexyl)phthalate		U	16.7	ug/l
m-Nitroaniline		U	50.0	ug/l
o-Nitroaniline		U	10.0	ug/l
p-Nitroaniline		U	43.0	ug/l
PCB's Method: EPA 8080				Batch: 20051 Run Analyst: JLS DOA: 09/12/92 TOA: 0400 Prep Analyst: ECP DOP: 09/10/92 TOP: 1500
PCB-1016		U	0.500	ug/l
PCB-1221		U	0.500	ug/l
PCB-1232		U	0.500	ug/l
PCB-1242		U	0.500	ug/l
PCB-1248		U	0.500	ug/l
PCB-1254		U	0.500	ug/l
PCB-1260		U	0.500	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-04 Client ID: Matrix: GroundH2O Description: MW-9
Sampled: 09/04/92 Received: 09/04/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1262		U	0.500	ug/l
Graphite Furnace	Method: EPA 7060			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1948 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic	3.59	J	5.00	ug/l
Graphite Furnace	Method: EPA 7421			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1948 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Lead	162.		6.67	ug/l
Graphite Furnace	Method: EPA 7740			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1948 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium	0.330	J	5.00	ug/l
ICP	Method: EPA 6010			Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1232 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	0.0300	mg/l
Barium	0.408		0.0300	mg/l
Cadmium	0.00138	J	0.0150	mg/l
Chromium	0.0206	J	0.0300	mg/l
Mercury	Method: EPA 7470			Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury	0.840		0.500	ug/l
Solids Analyses	Method: EPA 160.1			Batch: 20066 Run Analyst: SLM DOA: 09/10/92 TOA: 2100
Solids, Total Dissolved	3900	JB	1.67	mg/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-04 Client ID: NPS-CHS Matrix: Water Description: MW-9
Sampled: 09/04/92 Received: 09/04/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 2026	
Alpha-pinene	18	J	--	ug/l
C10 Alkyl benzene	14	J	--	ug/l
2,3-diydro - 1H - Indene	13	J	--	ug/l
Methyl naphthalene (isomer)	13	J	--	ug/l
Dimethyl naphthalene (isomer)	13	J	--	ug/l
Dimethyl naphthalene (isomer)	17	J	--	ug/l
(3-(2-phenylethyl) phenol	13	J	--	ug/l
9H - Carbozole	12	J	--	ug/l
4H - Cyclopenta [def] phenanthrene	15	J	--	ug/l
1,1' - Biphenyl	6	J	--	ug/l
Dimethyl naphthalene (isomer)	7	J	--	ug/l
Dimethyl naphthalene (isomer)	7	J	--	ug/l
Dimethyl naphthalene (isomer)	5	J	--	ug/l
Unknown	8	J	--	ug/l
Dibenzofuran, methyl (isomer)	8	J	--	ug/l
Dibenzofuran, methyl (isomer)	9	J	--	ug/l
Unknown	9	J	--	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-07 Client ID: Matrix: GroundH2O Description: MW-10
Sampled: 09/03/92 Received: 09/03/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/16/92 TOA: 1606
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1606 Prep Analyst: VLD DOP: 09/09/92 TOP: 1700
1,2,4-Trichlorobenzene		U	83.3	ug/l
1,2-Dichlorobenzene		U	83.3	ug/l
1,3-Dichlorobenzene		U	83.3	ug/l
1,4-Dichlorobenzene		U	83.3	ug/l
2,4-Dinitrotoluene		U	83.3	ug/l
2,6-Dinitrotoluene		U	83.3	ug/l
2-Chloronaphthalene		U	83.3	ug/l
2-Methylnaphthalene		U	83.3	ug/l
3,3'-Dichlorobenzidine		U	333.	ug/l
4-Bromophenyl phenyl ether		U	167.	ug/l
4-Chloroaniline		U	83.3	ug/l
4-Chlorophenyl phenyl ether		U	83.3	ug/l
Acenaphthene		U	83.3	ug/l
Acenaphthylene		U	83.3	ug/l
Anthracene		U	83.3	ug/l
Benzo(a)anthracene		U	83.3	ug/l
Benzo(a)pyrene		U	83.3	ug/l
Benzo(b)fluoranthene		U	93.5	ug/l
Benzo(ghi)perylene		U	83.3	ug/l
Benzo(k)fluoranthene		U	125.	ug/l
Butyl benzyl phthalate		U	83.3	ug/l
Chrysene		U	167.	ug/l
Di-n-butyl phthalate		U	167.	ug/l
Di-n-octyl phthalate		U	167.	ug/l
Dibenzo(a,h)anthracene		U	83.3	ug/l
Dibenzofuran		U	83.3	ug/l
Diethyl phthalate		U	83.3	ug/l
Dimethyl phthalate		U	83.3	ug/l
Fluoranthene		U	83.3	ug/l
Fluorene		U	83.3	ug/l
Hexachlorobenzene		U	83.3	ug/l
Hexachlorobutadiene		U	83.3	ug/l
Hexachlorocyclopentadiene		U	109.	ug/l
Hexachloroethane		U	83.3	ug/l
Indeno(1,2,3-c,d)pyrene		U	167.	ug/l
Isophorone		U	83.3	ug/l
N-Nitrosodiphenylamine		U	167.	ug/l
N-Nitrosodipropylamine		U	83.3	ug/l
Naphthalene		U	83.3	ug/l
Nitrobenzene		U	83.3	ug/l
Phenanthrene		U	83.3	ug/l
Pyrene		U	83.3	ug/l
bis(2-Chloroethoxy)methane		U	83.3	ug/l
bis(2-Chloroethyl) ether		U	83.3	ug/l
bis(2-Chloroisopropyl)ether		U	83.3	ug/l
bis(2-Ethylhexyl)phthalate		U	167.	ug/l
m-Nitroaniline		U	500.	ug/l
o-Nitroaniline		U	83.3	ug/l
p-Nitroaniline		U	430.	ug/l
PCB's Method: EPA 8080				Batch: 19995 Run Analyst: JLS DOA: 09/10/92 TOA: 2028 Prep Analyst: ECP DOP: 09/09/92 TOP: 1500
PCB-1016		U	0.500	ug/l
PCB-1221		U	0.500	ug/l
PCB-1232		U	0.500	ug/l
PCB-1242		U	0.500	ug/l
PCB-1248	4.91		0.500	ug/l
PCB-1254		U	0.500	ug/l
PCB-1260		U	0.500	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209100-07 Client ID: Matrix: GroundH2O Description: MW-10
Sampled: 09/03/92 Received: 09/03/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1262		U	0.500	ug/l
Graphite Furnace	Method: EPA 7060			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1910 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic	5.33		5.00	ug/l
Graphite Furnace	Method: EPA 7421			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1910 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Lead	216.		6.67	ug/l
Graphite Furnace	Method: EPA 7740			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1910 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium	0.580	J	5.00	ug/l
ICP	Method: EPA 6010			Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1226 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	0.0300	mg/l
Barium	0.226		0.0300	mg/l
Cadmium	0.0000800	J	0.0150	mg/l
Chromium	0.0278	J	0.0300	mg/l
Mercury	Method: EPA 7470			Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury	0.370	J	0.500	ug/l
Solids Analyses	Method: EPA 160.1			Batch: 19778 Run Analyst: SLM DOA: 09/03/92 TOA: 1900
Solids, Total Dissolved	1100	JB	1.67	mg/l

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TN	02934
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CERTIFICATE OF ANALYSIS

Sample: 9209100-07 Client ID: NPS-CHS Matrix: Water Description: MW-10
Sampled: 09/03/92 Received: 09/03/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270 Batch: 19940 Run Analyst: AGW DOA: 09/16/92 TOA: 1606				
None Found		--		ug/l

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TN	02934
WI	99988779

CERTIFICATE OF ANALYSIS

Sample: 9209119-06 Client ID: Matrix: GroundH2O Description: MW-11
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/16/92 TOA: 1817
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/17/92 TOA: 1817 Prep Analyst: JKP DOP: 09/10/92 TOP: 1500
1,2,4-Trichlorobenzene		U	83.3	ug/l
1,2-Dichlorobenzene		U	83.3	ug/l
1,3-Dichlorobenzene		U	83.3	ug/l
1,4-Dichlorobenzene		U	83.3	ug/l
2,4-Dinitrotoluene		U	83.3	ug/l
2,6-Dinitrotoluene		U	83.3	ug/l
2-Chloronaphthalene		U	83.3	ug/l
2-Methylnaphthalene	140.		83.3	ug/l
3,3'-Dichlorobenzidine		U	333.	ug/l
4-Bromophenyl phenyl ether		U	167.	ug/l
4-Chloroaniline		U	83.3	ug/l
4-Chlorophenyl phenyl ether		U	83.3	ug/l
Acenaphthene	130.		83.3	ug/l
Acenaphthylene		U	83.3	ug/l
Anthracene		U	83.3	ug/l
Benzo(a)anthracene		U	83.3	ug/l
Benzo(a)pyrene		U	83.3	ug/l
Benzo(b)fluoranthene		U	93.5	ug/l
Benzo(ghi)perylene		U	83.3	ug/l
Benzo(k)fluoranthene		U	125.	ug/l
Butyl benzyl phthalate		U	83.3	ug/l
Chrysene		U	167.	ug/l
Di-n-butyl phthalate		U	167.	ug/l
Di-n-octyl phthalate		U	167.	ug/l
Dibenzo(a,h)anthracene		U	83.3	ug/l
Dibenzofuran	44.2	J	83.3	ug/l
Diethyl phthalate		U	83.3	ug/l
Dimethyl phthalate		U	83.3	ug/l
Fluoranthene		U	83.3	ug/l
Fluorene	46.9	J	83.3	ug/l
Hexachlorobenzene		U	83.3	ug/l
Hexachlorobutadiene		U	83.3	ug/l
Hexachlorocyclopentadiene		U	109.	ug/l
Hexachloroethane		U	83.3	ug/l
Indeno(1,2,3-c,d)pyrene		U	167.	ug/l
Isophorone		U	83.3	ug/l
N-Nitrosodiphenylamine		U	167.	ug/l
N-Nitrosodipropylamine		U	83.3	ug/l
Naphthalene	290.		83.3	ug/l
Nitrobenzene		U	83.3	ug/l
Phenanthrene	70.0	J	83.3	ug/l
Pyrene		U	83.3	ug/l
bis(2-Chloroethoxy)methane		U	83.3	ug/l
bis(2-Chloroethyl) ether		U	83.3	ug/l
bis(2-Chloroisopropyl)ether		U	83.3	ug/l
bis(2-Ethylhexyl)phthalate		U	167.	ug/l
m-Nitroaniline		U	500.	ug/l
o-Nitroaniline		U	83.3	ug/l
p-Nitroaniline		U	430.	ug/l
PCB's Method: EPA 8080				Batch: 20051 Run Analyst: JLS DOA: 09/12/92 TOA: 0440 Prep Analyst: ECP DOP: 09/10/92 TOP: 1500
PCB-1016		U	0.500	ug/l
PCB-1221		U	0.500	ug/l
PCB-1232		U	0.500	ug/l
PCB-1242		U	0.500	ug/l
PCB-1248		U	0.500	ug/l
PCB-1254		U	0.500	ug/l
PCB-1260		U	0.500	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-06 Client ID: Matrix: GroundH2O Description: MW-11
Sampled: 09/04/92 Received: 09/04/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1262		U	0.500	ug/l
Graphite Furnace Method: EPA 7060				Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1958 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic	42.1		5.00	ug/l
Graphite Furnace Method: EPA 7421				Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1958 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Lead	7.14		5.00	ug/l
Graphite Furnace Method: EPA 7740				Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1958 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium	0.220	J	5.00	ug/l
ICP Method: EPA 6010				Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1234 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	0.0300	mg/l
Barium	0.137		0.0300	mg/l
Cadmium		U	0.0150	mg/l
Chromium	0.0103	J	0.0300	mg/l
Mercury Method: EPA 7470				Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury		U	0.500	ug/l
Solids Analyses Method: EPA 160.1				Batch: 20066 Run Analyst: SLM DOA: 09/10/92 TOA: 2100
Solids, Total Dissolved	4620	JB	1.67	mg/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-06 Client ID: NPS-CHS Matrix: Water Description: MW-11
Sampled: 09/04/92 Received: 09/04/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270				Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2058
1H Indene; 2,3 - dihydro	60	J	--	ug/l
Dimethyl naphthalene (isomer)	90	J	--	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-15 Client ID: Matrix: Misc. Description: MW-12
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20699 Run Analyst: HNM DOA: 09/24/92 TOA: 0013
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 20140 Run Analyst: HNM DOA: 09/24/92 TOA: 0013 Prep Analyst: JKP DOP: 09/18/92 TOP: 1700
1,2,4-Trichlorobenzene		U	222000	ug/kg
1,2-Dichlorobenzene		U	222000	ug/kg
1,3-Dichlorobenzene		U	222000	ug/kg
1,4-Dichlorobenzene		U	222000	ug/kg
2,4-Dinitrotoluene		U	222000	ug/kg
2,6-Dinitrotoluene		U	222000	ug/kg
2-Chloronaphthalene		U	222000	ug/kg
2-Methylnaphthalene	2160000		222000	ug/kg
3,3'-Dichlorobenzidine		U	445000	ug/kg
4-Bromophenyl phenyl ether		U	445000	ug/kg
4-Chloroaniline		U	222000	ug/kg
4-Chlorophenyl phenyl ether		U	222000	ug/kg
Acenaphthene	773000		222000	ug/kg
Acenaphthylene		U	222000	ug/kg
Anthracene	507000		222000	ug/kg
Benzo(a)anthracene	507000		222000	ug/kg
Benzo(a)pyrene	347000		222000	ug/kg
Benzo(b)fluoranthene		U	415000	ug/kg
Benzo(ghi)perylene	187000	J	222000	ug/kg
Benzo(k)fluoranthene	587000		555000	ug/kg
Butyl benzyl phthalate		U	222000	ug/kg
Chrysene	400000	J	445000	ug/kg
Di-n-butyl phthalate		U	445000	ug/kg
Di-n-octyl phthalate		U	445000	ug/kg
Dibenzo(a,h)anthracene		U	222000	ug/kg
Dibenzofuran	347000		222000	ug/kg
Diethyl phthalate		U	222000	ug/kg
Dimethyl phthalate		U	222000	ug/kg
Fluoranthene	1040000		222000	ug/kg
Fluorene	667000		222000	ug/kg
Hexachlorobenzene		U	222000	ug/kg
Hexachlorobutadiene		U	222000	ug/kg
Hexachlorocyclopentadiene		U	485000	ug/kg
Hexachloroethane		U	222000	ug/kg
Indeno(1,2,3-c,d)pyrene	187000	J	445000	ug/kg
Isophorone		U	222000	ug/kg
N-Nitrosodiphenylamine		U	445000	ug/kg
N-Nitrosodipropylamine		U	222000	ug/kg
Naphthalene	2530000		222000	ug/kg
Nitrobenzene		U	222000	ug/kg
Phenanthrene	2050000		222000	ug/kg
Pyrene	1230000		222000	ug/kg
bis(2-Chloroethoxy)methane		U	222000	ug/kg
bis(2-Chloroethyl) ether		U	222000	ug/kg
bis(2-Chloroisopropyl)ether		U	222000	ug/kg
bis(2-Ethylhexyl)phthalate		U	445000	ug/kg
m-Nitroaniline		U	2220000	ug/kg
o-Nitroaniline		U	222000	ug/kg
p-Nitroaniline		U	1920000	ug/kg
PCB's Method: EPA 8080				Batch: 20141 Run Analyst: JLS DOA: 09/19/92 TOA: 0035 Prep Analyst: LMJ DOP: 09/18/92 TOP: 1200
PCB-1016		U	2.20	mg/kg
PCB-1221		U	2.20	mg/kg
PCB-1232		U	2.20	mg/kg
PCB-1242		U	2.20	mg/kg
PCB-1248		U	2.20	mg/kg
PCB-1254		U	2.20	mg/kg
PCB-1260		U	2.20	mg/kg

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CERTIFICATE OF ANALYSIS

Sample: 9209119-15 Client ID: Matrix: Misc. Description: MW-12
Sampled: 09/04/92 Received: 09/04/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1262		U	2.20	mg/kg
ICP	Method: EPA 6010			Batch: 20119 Run Analyst: JSS DOA: 09/14/92 TOA: 1604 Prep Analyst: RMJ DOP: 09/14/92 TOP: 1225
Silver		U	2.50	mg/kg
Arsenic	5.53		3.73	mg/kg
Barium	14.9		2.50	mg/kg
Cadmium	0.230	J	2.50	mg/kg
Chromium	2.80		2.50	mg/kg
Lead	24.1		3.90	mg/kg
Selenium	1.16	J	10.2	mg/kg
Mercury	Method: EPA 7471			Batch: 20182 Run Analyst: ALK DOA: 09/15/92 TOA: 1300 Prep Analyst: ALK DOP: 09/14/92 TOP: 1300
Mercury	604.		145.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9209119-15 Client ID: NPS-CHS Matrix: Water Description: MW-12
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 20699 Run Analyst: HMN DOA: 09/24/92 TOA: 0013	
1H Indene; 2,3 - dihydro	2133	J	--	ug/l
Methyl naphthalene (isomer)	4533	J	--	ug/l
1,1-Biphenyl	1600	J	--	ug/l
Ethyl naphthalene (isomer)	3466	J	--	ug/l
Dimethyl naphthalene (isomer)	5333	J	--	ug/l
Dimethyl naphthalene (isomer)	9600	J	--	ug/l
Dimethyl naphthalene (isomer)	3466	J	--	ug/l
Trimethyl naphthalene (isomer)	1866	J	--	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-05 Client ID: Matrix: GroundH2O Description: Field Blank
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Volatiles Method: EPA 8240 extended				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1141
GCMS Library Search-VOA	YES			
GC/MS Volatiles Method: EPA 8240 extended				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1141
1,1,1-Trichloroethane		U	3.33	ug/l
1,1,2,2-Tetrachloroethane		U	3.33	ug/l
1,1,2-Trichloroethane		U	3.33	ug/l
1,1-Dichloroethane		U	3.33	ug/l
1,1-Dichloroethylene		U	3.33	ug/l
1,2-Dichloroethane		U	3.33	ug/l
1,2-Dichloropropane		U	3.33	ug/l
1,2-cis-Dichloroethylene		U	3.33	ug/l
1,2-trans-Dichloroethylene		U	3.33	ug/l
2-Butanone		U	16.7	ug/l
2-Hexanone		U	3.33	ug/l
4-Methyl-2-pentanone		U	3.33	ug/l
Acetone	79.3		16.7	ug/l
Benzene		U	3.33	ug/l
Bromoform		U	3.33	ug/l
Carbon Disulfide		U	3.33	ug/l
Carbon Tetrachloride		U	3.33	ug/l
Chlorobenzene		U	3.33	ug/l
Chlorodibromomethane		U	3.33	ug/l
Chloroethane		U	3.33	ug/l
Chloroform		U	3.33	ug/l
Dichlorobromomethane		U	3.33	ug/l
Ethylbenzene		U	3.33	ug/l
Methyl Bromide		U	3.33	ug/l
Methyl Chloride		U	3.33	ug/l
Methylene Chloride	2.80	JB	3.33	ug/l
Styrene		U	3.33	ug/l
Tetrachloroethylene		U	3.33	ug/l
Toluene		U	3.33	ug/l
Trichloroethylene		U	3.33	ug/l
Vinyl Acetate		U	3.33	ug/l
Vinyl chloride		U	3.33	ug/l
Xylenes (TOTAL)		U	6.67	ug/l
cis-1,3-Dichloropropylene		U	3.33	ug/l
trans-1,3-Dichloropropylene		U	3.33	ug/l
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 2109
GCMS Library Search-ACID				
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 2109
GCMS Library Search-B/N				
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 2109 Prep Analyst: JKP DOP: 09/10/92 TOP: 1500
2,4,5-Trichlorophenol		U	10.0	ug/l
2,4,6-Trichlorophenol		U	10.0	ug/l
2,4-Dichlorophenol		U	10.0	ug/l
2,4-Dimethylphenol		U	10.0	ug/l
2,4-Dinitrophenol		U	75.0	ug/l
2-Chlorophenol		U	10.0	ug/l
2-Nitrophenol		U	10.0	ug/l
2-methyl-4,6-dinitrophenol		U	50.0	ug/l
4-Nitrophenol		U	94.8	ug/l
4-chloro-3-methyl phenol		U	10.0	ug/l
Benzoic Acid		U	121.	ug/l
Benzyl Alcohol		U	10.0	ug/l
Pentachlorophenol		U	10.0	ug/l
Phenol		U	10.0	ug/l
o-Cresol		U	10.0	ug/l
p-Cresol		U	10.0	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-05 Client ID: Matrix: GroundH2O Description: Field Blank
Sampled: 09/04/92 Received: 09/04/92 Page: 2
Project: CITY00391 Manager: TDH

GC/MS Extractables Method: EPA 8270 Batch: 20000 Run Analyst: AGW DOA: 09/16/92 TOA: 2109
Prep Analyst: JKP DOP: 09/10/92 TOP: 1500

Parameter	Result	Qual	QL	Units
1,2,4-Trichlorobenzene		U	10.0	ug/l
1,2-Dichlorobenzene		U	10.0	ug/l
1,3-Dichlorobenzene		U	10.0	ug/l
1,4-Dichlorobenzene		U	10.0	ug/l
2,4-Dinitrotoluene		U	10.0	ug/l
2,6-Dinitrotoluene		U	10.0	ug/l
2-Chloronaphthalene		U	10.0	ug/l
2-Methylnaphthalene		U	10.0	ug/l
3,3'-Dichlorobenzidine		U	33.3	ug/l
4-Bromophenyl phenyl ether		U	16.7	ug/l
4-Chloroaniline		U	10.0	ug/l
4-Chlorophenyl phenyl ether		U	10.0	ug/l
Acenaphthene		U	10.0	ug/l
Acenaphthylene		U	10.0	ug/l
Anthracene		U	10.0	ug/l
Benzo(a)anthracene		U	10.0	ug/l
Benzo(a)pyrene		U	10.0	ug/l
Benzo(b)fluoranthene		U	10.0	ug/l
Benzo(ghi)perylene		U	10.0	ug/l
Benzo(k)fluoranthene		U	12.5	ug/l
Butyl benzyl phthalate		U	10.0	ug/l
Chrysene		U	16.7	ug/l
Di-n-butyl phthalate		U	16.7	ug/l
Di-n-octyl phthalate		U	16.7	ug/l
Dibenzo(a,h)anthracene		U	10.0	ug/l
Dibenzofuran		U	10.0	ug/l
Diethyl phthalate		U	10.0	ug/l
Dimethyl phthalate		U	10.0	ug/l
Fluoranthene		U	10.0	ug/l
Fluorene		U	10.0	ug/l
Hexachlorobenzene		U	10.0	ug/l
Hexachlorobutadiene		U	10.0	ug/l
Hexachlorocyclopentadiene		U	10.9	ug/l
Hexachloroethane		U	10.0	ug/l
Indeno(1,2,3-c,d)pyrene		U	16.7	ug/l
Isophorone		U	10.0	ug/l
N-Nitrosodiphenylamine		U	16.7	ug/l
N-Nitrosodipropylamine		U	10.0	ug/l
Naphthalene		U	10.0	ug/l
Nitrobenzene		U	10.0	ug/l
Phenanthrene		U	10.0	ug/l
Pyrene		U	10.0	ug/l
bis(2-Chloroethoxy)methane		U	10.0	ug/l
bis(2-Chloroethyl) ether		U	10.0	ug/l
bis(2-Chloroisopropyl)ether		U	10.0	ug/l
bis(2-Ethylhexyl)phthalate		U	16.7	ug/l
m-Nitroaniline		U	50.0	ug/l
o-Nitroaniline		U	10.0	ug/l
p-Nitroaniline		U	43.0	ug/l

Pesticides Method: EPA 8080 Batch: 19997 Run Analyst: JEB DOA: 09/14/92 TOA: 2257
Prep Analyst: RLS DOP: 09/09/92 TOP: 1800

Parameter	Result	Qual	QL	Units
4,4'-DDD		U	0.100	ppb
4,4'-DDE		U	0.100	ppb
4,4'-DDT		U	0.100	ppb
Aldrin		U	0.0500	ppb
Dieldrin		U	0.500	ppb
Endosulfan I		U	0.100	ppb
Endosulfan II		U	0.100	ppb
Endosulfan sulfate		U	0.100	ppb
Endrin		U	0.100	ppb
Endrin ketone		U	0.100	ppb

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CERTIFICATE OF ANALYSIS

Sample: 9209119-05 Client ID: Matrix: GroundH2O Description: Field Blank
Sampled: 09/04/92 Received: 09/04/92 Page: 3
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Heptachlor		U	0.0500	ppb
Heptachlor epoxide		U	0.0500	ppb
Methoxychlor		U	0.500	ppb
PCB-1016		U	0.500	ppb
PCB-1221		U	0.500	ppb
PCB-1232		U	0.500	ppb
PCB-1242		U	0.500	ppb
PCB-1248		U	0.500	ppb
PCB-1254		U	1.00	ppb
PCB-1260		U	1.00	ppb
Toxaphene		U	1.00	ppb
alpha-BHC		U	0.0500	ppb
alpha-Chlordane		U	0.500	ppb
beta-BHC		U	0.0500	ppb
delta-BHC		U	0.0500	ppb
gamma-BHC		U	0.0500	ppb
gamma-Chlordane		U	0.500	ppb
Graphite Furnace	Method: EPA 7060			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1953 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic		U	5.00	ug/l
Graphite Furnace	Method: EPA 7421			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1953 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
ead	0.360	J	5.00	ug/l
Graphite Furnace	Method: EPA 7041			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1953 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Antimony	1.32	J	5.00	ug/l
Graphite Furnace	Method: EPA 7740			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1953 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium	0.170	J	5.00	ug/l
Graphite Furnace	Method: EPA 7841			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 1953 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Thallium	1.09	J	5.00	ug/l
ICP	Method: EPA 6010			Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1211 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver	0.0000400	J	0.0300	mg/l
Aluminum	0.0168	J	0.0500	mg/l
Barium	0.000680	J	0.0300	mg/l
Beryllium	0.0000600	J	0.0100	mg/l
Calcium	0.0539	J	0.0800	mg/l
Cadmium	0.00176	J	0.0150	mg/l
Cobalt		U	0.0300	mg/l
Chromium		U	0.0300	mg/l
Copper	0.00129	J	0.0300	mg/l
Iron	0.0739		0.0450	mg/l
Potassium		U	0.500	mg/l
Magnesium		U	0.0300	mg/l
Manganese	0.00575	J	0.0300	mg/l
Sodium	0.0711	J	0.165	mg/l
Nickel		U	0.0300	mg/l
Vanadium		U	0.0300	mg/l
Zinc	0.00349	J	0.0317	mg/l
Mercury	Method: EPA 7470			Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury		U	0.500	ug/l
Cyanide by RFA	Method: EPA 335.3			Batch: 19848 Run Analyst: JEN DOA: 09/09/92 TOA: 1500
Cyanide, Total		UJB	0.0167	mg/l
olids Analyses	Method: EPA 160.1			Batch: 20066 Run Analyst: SLM DOA: 09/10/92 TOA: 2100

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Sample: 9209119-05 Client ID: Matrix: GroundH2O Description: Field Blank
Sampled: 09/04/92 Received: 09/04/92 Page: 4
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Solids, Total Dissolved		UJB	1.67	mg/l

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Sample: 9209119-05 Client ID: NPS-CHS Matrix: Water Description: Field Blank
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1141
None Found			--	ug/l
GC/MS VOA Method: EPA 8240				Batch: 20003 Run Analyst: JCB DOA: 09/04/92 TOA: 1434
2-Propanol	9		--	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-13 Client ID: Matrix: GroundH2O Description: Trip Blank
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDB

Parameter	Result	Qual	QL	Units
GC/MS Volatiles Method: EPA 8240 extended				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1216
GCMS Library Search-VOA				
GC/MS Volatiles Method: EPA 8240 extended				Batch: 20003 Run Analyst: JCB DOA: 09/10/92 TOA: 1216
1,1,1-Trichloroethane		U	3.33	ug/l
1,1,2,2-Tetrachloroethane		U	3.33	ug/l
1,1,2-Trichloroethane		U	3.33	ug/l
1,1-Dichloroethane		U	3.33	ug/l
1,1-Dichloroethylene		U	3.33	ug/l
1,2-Dichloroethane		U	3.33	ug/l
1,2-Dichloropropane		U	3.33	ug/l
1,2-cis-Dichloroethylene		U	3.33	ug/l
1,2-trans-Dichloroethylene		U	3.33	ug/l
2-Butanone		U	16.7	ug/l
2-Hexanone		U	3.33	ug/l
4-Methyl-2-pentanone		U	3.33	ug/l
Acetone	132.		83.3	ug/l
Benzene		U	3.33	ug/l
Bromoform		U	3.33	ug/l
Carbon Disulfide		U	3.33	ug/l
Carbon Tetrachloride		U	3.33	ug/l
Chlorobenzene		U	3.33	ug/l
hlorodibromomethane		U	3.33	ug/l
hloroethane		U	3.33	ug/l
hloroform		U	3.33	ug/l
Dichlorobromomethane		U	3.33	ug/l
Ethylbenzene		U	3.33	ug/l
Methyl Bromide		U	3.33	ug/l
Methyl Chloride		U	3.33	ug/l
Methylene Chloride	2.60	JB	3.33	ug/l
Styrene		U	3.33	ug/l
Tetrachloroethylene		U	3.33	ug/l
Toluene		U	3.33	ug/l
Trichloroethylene		U	3.33	ug/l
Vinyl Acetate		U	3.33	ug/l
Vinyl chloride		U	3.33	ug/l
Xylenes (TOTAL)		U	6.67	ug/l
cis-1,3-Dichloropropylene		U	3.33	ug/l
trans-1,3-Dichloropropylene		U	3.33	ug/l
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/17/92 TOA: 2113
GCMS Library Search-ACID				
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/17/92 TOA: 2113
GCMS Library Search-B/N				
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/17/92 TOA: 2113
				Prep Analyst: JKP DOP: 09/10/92 TOP: 1500
2,4,5-Trichlorophenol		U	10.0	ug/l
2,4,6-Trichlorophenol		U	10.0	ug/l
2,4-Dichlorophenol		U	10.0	ug/l
2,4-Dimethylphenol		U	10.0	ug/l
2,4-Dinitrophenol		U	75.0	ug/l
2-Chlorophenol		U	10.0	ug/l
2-Nitrophenol		U	10.0	ug/l
2-methyl-4,6-dinitrophenol		U	50.0	ug/l
4-Nitrophenol		U	94.8	ug/l
4-chloro-3-methyl phenol		U	10.0	ug/l
Benzoic Acid		U	121.	ug/l
Benzyl Alcohol		U	10.0	ug/l
Pentachlorophenol		U	10.0	ug/l
Phenol		U	10.0	ug/l
o-Cresol		U	10.0	ug/l
-Cresol		U	10.0	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-13 Client ID: Matrix: GroundH2O Sampled: 09/04/92 Description: Trip Blank Received: 09/04/92 Page: 2

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/17/92 TOA: 2113 Prep Analyst: JKP DOP: 09/10/92 TOP: 1500
1,2,4-Trichlorobenzene		U	10.0	ug/l
1,2-Dichlorobenzene		U	10.0	ug/l
1,3-Dichlorobenzene		U	10.0	ug/l
1,4-Dichlorobenzene		U	10.0	ug/l
2,4-Dinitrotoluene		U	10.0	ug/l
2,6-Dinitrotoluene		U	10.0	ug/l
2-Chloronaphthalene		U	10.0	ug/l
2-Methylnaphthalene		U	10.0	ug/l
3,3'-Dichlorobenzidine		U	33.3	ug/l
4-Bromophenyl phenyl ether		U	16.7	ug/l
4-Chloroaniline		U	10.0	ug/l
4-Chlorophenyl phenyl ether		U	10.0	ug/l
Acenaphthene		U	10.0	ug/l
Acenaphthylene		U	10.0	ug/l
Anthracene		U	10.0	ug/l
Benzo(a)anthracene		U	10.0	ug/l
Benzo(a)pyrene		U	10.0	ug/l
Benzo(b)fluoranthene		U	10.0	ug/l
Benzo(ghi)perylene		U	10.0	ug/l
Benzo(k)fluoranthene		U	12.5	ug/l
[illegible]utyl benzyl phthalate		U	10.0	ug/l
[illegible]hrysene		U	16.7	ug/l
[illegible]-n-butyl phthalate		U	16.7	ug/l
Di-n-octyl phthalate		U	16.7	ug/l
Dibenzo(a,h)anthracene		U	10.0	ug/l
Dibenzofuran		U	10.0	ug/l
Diethyl phthalate		U	10.0	ug/l
Dimethyl phthalate		U	10.0	ug/l
Fluoranthene		U	10.0	ug/l
Fluorene		U	10.0	ug/l
Hexachlorobenzene		U	10.0	ug/l
Hexachlorobutadiene		U	10.0	ug/l
Hexachlorocyclopentadiene		U	10.9	ug/l
Hexachloroethane		U	10.0	ug/l
Indeno(1,2,3-c,d)pyrene		U	16.7	ug/l
Isophorone		U	10.0	ug/l
N-Nitrosodiphenylamine		U	16.7	ug/l
N-Nitrosodipropylamine		U	10.0	ug/l
Naphthalene		U	10.0	ug/l
Nitrobenzene		U	10.0	ug/l
Phenanthrene		U	10.0	ug/l
Pyrene		U	10.0	ug/l
bis(2-Chloroethoxy)methane		U	10.0	ug/l
bis(2-Chloroethyl) ether		U	10.0	ug/l
bis(2-Chloroisopropyl)ether		U	10.0	ug/l
bis(2-Ethylhexyl)phthalate		U	16.7	ug/l
m-Nitroaniline		U	50.0	ug/l
o-Nitroaniline		U	10.0	ug/l
p-Nitroaniline		U	43.0	ug/l
Pesticides Method: EPA 8080				Batch: 19997 Run Analyst: JEB DOA: 09/14/92 TOA: 2338 Prep Analyst: RLS DOP: 09/09/92 TOP: 1800
4,4'-DDD		U	0.100	ppb
4,4'-DDE		U	0.100	ppb
4,4'-DDT		U	0.100	ppb
Aldrin		U	0.0500	ppb
Dieldrin		U	0.500	ppb
Endosulfan I		U	0.100	ppb
Endosulfan II		U	0.100	ppb
Endosulfan sulfate		U	0.100	ppb
[illegible]ndrin		U	0.100	ppb
[illegible]ndrin ketone		U	0.100	ppb

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CERTIFICATE OF ANALYSIS

Sample: 9209119-13 Client ID: Matrix: GroundH2O Description: Trip Blank
Sampled: 09/04/92 Received: 09/04/92 Page: 3
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Heptachlor		U	0.0500	ppb
Heptachlor epoxide		U	0.0500	ppb
Methoxychlor		U	0.500	ppb
PCB-1016		U	0.500	ppb
PCB-1221		U	0.500	ppb
PCB-1232		U	0.500	ppb
PCB-1242		U	0.500	ppb
PCB-1248		U	0.500	ppb
PCB-1254		U	1.00	ppb
PCB-1260		U	1.00	ppb
Toxaphene		U	1.00	ppb
alpha-BHC		U	0.0500	ppb
alpha-Chlordane		U	0.500	ppb
beta-BHC		U	0.0500	ppb
delta-BHC		U	0.0500	ppb
gamma-BHC		U	0.0500	ppb
gamma-Chlordane		U	0.500	ppb
Graphite Furnace	Method: EPA 7060			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 2025 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic	0.0300	J	5.00	ug/l
Graphite Furnace	Method: EPA 7421			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 2025 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Lead	1.56	J	5.00	ug/l
Graphite Furnace	Method: EPA 7041			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 2025 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Antimony	0.910	J	5.00	ug/l
Graphite Furnace	Method: EPA 7740			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 2025 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium		U	5.00	ug/l
Graphite Furnace	Method: EPA 7841			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 2025 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Thallium	1.06	J	5.00	ug/l
ICP	Method: EPA 6010			Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1209 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	0.0300	mg/l
Aluminum	0.0113	J	0.0500	mg/l
Barium	0.000850	J	0.0300	mg/l
Beryllium	0.0000600	J	0.0100	mg/l
Calcium	0.0928		0.0800	mg/l
Cadmium		U	0.0150	mg/l
Cobalt	0.000330	J	0.0300	mg/l
Chromium		U	0.0300	mg/l
Copper	0.00214	J	0.0300	mg/l
Iron	0.0698		0.0450	mg/l
Potassium		U	0.500	mg/l
Magnesium		U	0.0300	mg/l
Manganese	0.00169	J	0.0300	mg/l
Sodium	0.112	J	0.165	mg/l
Nickel	0.00203	J	0.0300	mg/l
Vanadium		U	0.0300	mg/l
Zinc	0.00328	J	0.0317	mg/l
Mercury	Method: EPA 7470			Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury		U	0.500	ug/l
Cyanide by RFA	Method: EPA 335.3			Batch: 19848 Run Analyst: JEN DOA: 09/09/92 TOA: 1500
Cyanide, Total		UJB	0.0167	mg/l
Solids Analyses	Method: EPA 160.1			Batch: 20066 Run Analyst: SLM DOA: 09/10/92 TOA: 2100

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CERTIFICATE OF ANALYSIS

Sample: 9209119-13 Client ID: Matrix: GroundH2O Description: Trip Blank
Sampled: 09/04/92 Received: 09/04/92 Page: 4
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Solids, Total Dissolved	1.00	JB	1.67	mg/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-13 Client ID: NPS-CHS Matrix: Soil Description: Trip Blank
Sampled: 09/04/92 Received: 09/04/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270 Batch: 19373 Run Analyst: AGW DOA: 09/01/92 TOA: 2354				
Unknown hydrocarbon	9	J	--	ug/l
GC/MS VOA Method: EPA 8240 Batch: 19438 Run Analyst: MKP DOA: 08/28/92 TOA: 2111				
2 - propanol	12	J	--	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-08 Client ID: Matrix: Soil Description: SD-1
Sampled: 09/04/92 Received: 09/04/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19879 Run Analyst: BDK DOA: 09/09/92 TOA: 0800
Evaporative Loss @ 105 C	67.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: HNM DOA: 09/16/92 TOA: 1540
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19937 Run Analyst: HNM DOA: 09/16/92 TOA: 1540 Prep Analyst: LMJ DOP: 09/09/92 TOP: 1500
1,2,4-Trichlorobenzene		U	8420	ug/kg
1,2-Dichlorobenzene		U	8420	ug/kg
1,3-Dichlorobenzene		U	8420	ug/kg
1,4-Dichlorobenzene		U	8420	ug/kg
2,4-Dinitrotoluene		U	8420	ug/kg
2,6-Dinitrotoluene		U	8420	ug/kg
2-Chloronaphthalene		U	8420	ug/kg
2-Methylnaphthalene		U	8420	ug/kg
3,3'-Dichlorobenzidine		U	16800	ug/kg
4-Bromophenyl phenyl ether		U	16800	ug/kg
4-Chloroaniline		U	8420	ug/kg
4-Chlorophenyl phenyl ether		U	8420	ug/kg
Acenaphthene		U	8420	ug/kg
Acenaphthylene		U	8420	ug/kg
nthracene		U	8420	ug/kg
enzo(a)anthracene	2020	J	8420	ug/kg
enzo(a)pyrene	1010	J	8420	ug/kg
Benzo(b)fluoranthene		U	15700	ug/kg
Benzo(ghi)perylene		U	8420	ug/kg
Benzo(k)fluoranthene		U	21000	ug/kg
Butyl benzyl phthalate		U	8420	ug/kg
Chrysene	2020	J	16800	ug/kg
Di-n-butyl phthalate		U	16800	ug/kg
Di-n-octyl phthalate		U	16800	ug/kg
Dibenzo(a,h)anthracene		U	8420	ug/kg
Dibenzofuran		U	8420	ug/kg
Diethyl phthalate		U	8420	ug/kg
Dimethyl phthalate	6330	J	8420	ug/kg
Fluoranthene	3740	J	8420	ug/kg
Fluorene		U	8420	ug/kg
Hexachlorobenzene		U	8420	ug/kg
Hexachlorobutadiene		U	8420	ug/kg
Hexachlorocyclopentadiene		U	18300	ug/kg
Hexachloroethane		U	8420	ug/kg
Indeno(1,2,3-c,d)pyrene		U	16800	ug/kg
Isophorone		U	8420	ug/kg
N-Nitrosodiphenylamine		U	16800	ug/kg
N-Nitrosodipropylamine		U	8420	ug/kg
Naphthalene		U	8420	ug/kg
Nitrobenzene		U	8420	ug/kg
Phenanthrene		U	8420	ug/kg
Pyrene	4340	J	8420	ug/kg
bis(2-Chloroethoxy)methane		U	8420	ug/kg
bis(2-Chloroethyl) ether		U	8420	ug/kg
bis(2-Chloroisopropyl)ether		U	8420	ug/kg
bis(2-Ethylhexyl)phthalate		U	16800	ug/kg
m-Nitroaniline		U	84200	ug/kg
o-Nitroaniline		U	8420	ug/kg
p-Nitroaniline		U	72300	ug/kg
PCB's Method: EPA 8080				Batch: 19936 Run Analyst: JLS DOA: 09/11/92 TOA: 0541 Prep Analyst: LMJ DOP: 09/09/92 TOP: 1500
PCB-1016		U	168.	ug/kg
PCB-1221		U	168.	ug/kg
PCB-1232		U	168.	ug/kg
CB-1242		U	168.	ug/kg

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CERTIFICATE OF ANALYSIS

Sample: 9209119-08 Client ID: Matrix: Soil Description: SD-1
Sampled: 09/04/92 Received: 09/04/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	168.	ug/kg
PCB-1254		U	168.	ug/kg
PCB-1260		U	168.	ug/kg
PCB-1262		U	168.	ug/kg
ICP	Method: EPA 6010			Batch: 19980 Run Analyst: JSS DOA: 09/11/92 TOA: 1604 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	15.2		3.10	mg/kg
Barium	18.1		2.50	mg/kg
Cadmium		U	2.50	mg/kg
Chromium	21.1		2.50	mg/kg
Lead	62.6		3.23	mg/kg
Selenium		U	8.47	mg/kg
Mercury	Method: EPA 7471			Batch: 19893 Run Analyst: ALK DOA: 09/09/92 TOA: 1400 Prep Analyst: ALK DOP: 09/09/92 TOP: 0900
Mercury	50.0	J	167.	ug/kg

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Sample: 9209119-08 Client ID: NPS-CHS Matrix: Soil Description: SD-01
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19973 Run Analyst: HNM DOA: 09/16/92 TOA: 1540	
None Found		--		ug/l

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Sample: 9209119-10 Client ID: Matrix: Soil Description: SD-2
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19879 Run Analyst: BDK DOA: 09/09/92 TOA: 0800
Evaporative Loss @ 105 C	31.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: HNM DOA: 09/16/92 TOA: 1629
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19937 Run Analyst: HNM DOA: 09/16/92 TOA: 1629
				Prep Analyst: LMJ DOP: 09/09/92 TOP: 1500
1,2,4-Trichlorobenzene		U	4030	ug/kg
1,2-Dichlorobenzene		U	4030	ug/kg
1,3-Dichlorobenzene		U	4030	ug/kg
1,4-Dichlorobenzene		U	4030	ug/kg
2,4-Dinitrotoluene		U	4030	ug/kg
2,6-Dinitrotoluene		U	4030	ug/kg
2-Chloronaphthalene		U	4030	ug/kg
2-Methylnaphthalene		U	4030	ug/kg
3,3'-Dichlorobenzidine		U	8050	ug/kg
4-Bromophenyl phenyl ether		U	8050	ug/kg
4-Chloroaniline		U	4030	ug/kg
4-Chlorophenyl phenyl ether		U	4030	ug/kg
Acenaphthene		U	4030	ug/kg
Acenaphthylene		U	4030	ug/kg
nthracene		U	4030	ug/kg
enzo(a)anthracene		U	4030	ug/kg
Benzo(a)pyrene	483.	J	4030	ug/kg
Benzo(b)fluoranthene		U	7530	ug/kg
Benzo(ghi)perylene		U	4030	ug/kg
Benzo(k)fluoranthene		U	10100	ug/kg
Butyl benzyl phthalate		U	4030	ug/kg
Chrysene	1060	J	8050	ug/kg
Di-n-butyl phthalate		U	8050	ug/kg
Di-n-octyl phthalate		U	8050	ug/kg
Dibenzo(a,h)anthracene		U	4030	ug/kg
Dibenzofuran		U	4030	ug/kg
Diethyl phthalate		U	4030	ug/kg
Dimethyl phthalate	2900	J	4030	ug/kg
Fluoranthene	1340	J	4030	ug/kg
Fluorene		U	4030	ug/kg
Hexachlorobenzene		U	4030	ug/kg
Hexachlorobutadiene		U	4030	ug/kg
Hexachlorocyclopentadiene		U	8780	ug/kg
Hexachloroethane		U	4030	ug/kg
Indeno(1,2,3-c,d)pyrene		U	8050	ug/kg
Isophorone		U	4030	ug/kg
N-Nitrosodiphenylamine		U	8050	ug/kg
N-Nitrosodipropylamine		U	4030	ug/kg
Naphthalene		U	4030	ug/kg
Nitrobenzene		U	4030	ug/kg
Phenanthrene		U	4030	ug/kg
Pyrene		U	4030	ug/kg
bis(2-Chloroethoxy)methane		U	4030	ug/kg
bis(2-Chloroethyl) ether		U	4030	ug/kg
bis(2-Chloroisopropyl)ether		U	4030	ug/kg
bis(2-Ethylhexyl)phthalate		U	8050	ug/kg
m-Nitroaniline		U	40300	ug/kg
o-Nitroaniline		U	4030	ug/kg
p-Nitroaniline		U	34700	ug/kg
PCB's Method: EPA 8080				Batch: 19936 Run Analyst: JLS DOA: 09/11/92 TOA: 1502
				Prep Analyst: LMJ DOP: 09/09/92 TOP: 1500
PCB-1016		U	805.	ug/kg
PCB-1221		U	805.	ug/kg
PCB-1232		U	805.	ug/kg
CB-1242		U	805.	ug/kg

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Sample: 9209119-10 Client ID: Matrix: Soil Description: SD-2
Sampled: 09/04/92 Received: 09/04/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	805.	ug/kg
PCB-1254	2740		805.	ug/kg
PCB-1260	688.	J	805.	ug/kg
PCB-1262		U	805.	ug/kg
ICP	Method: EPA 6010			Batch: 19980 Run Analyst: JSS DOA: 09/11/92 TOA: 1617 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	28.4		15.6	mg/kg
Barium	177.		2.60	mg/kg
Cadmium	2.09	J	2.93	mg/kg
Chromium	170.		5.22	mg/kg
Lead	1140		16.3	mg/kg
Selenium		U	8.53	mg/kg
Mercury	Method: EPA 7471			Batch: 19893 Run Analyst: ALK DOA: 09/09/92 TOA: 1400 Prep Analyst: ALK DOP: 09/09/92 TOP: 0900
Mercury	215.		167.	ug/kg

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Sample: 9209119-10 Client ID: NPS-CHS Matrix: Soil Description: SD-02
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19973 Run Analyst: HNM DOA: 09/16/92 TOA: 1629	
None Found		--		ug/l

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Sample: 9209119-12 Client ID: Matrix: Soil Description: SD-3
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19879 Run Analyst: BDK DOA: 09/09/92 TOA: 0800
Evaporative Loss @ 105 C	23.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/16/92 TOA: 1720
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 19937 Run Analyst: HNM DOA: 09/16/92 TOA: 1720
				Prep Analyst: LMJ DOP: 09/09/92 TOP: 1500
1,2,4-Trichlorobenzene		U	3600	ug/kg
1,2-Dichlorobenzene		U	3600	ug/kg
1,3-Dichlorobenzene		U	3600	ug/kg
1,4-Dichlorobenzene		U	3600	ug/kg
2,4-Dinitrotoluene		U	3600	ug/kg
2,6-Dinitrotoluene		U	3600	ug/kg
2-Chloronaphthalene		U	3600	ug/kg
2-Methylnaphthalene		U	3600	ug/kg
3,3'-Dichlorobenzidine		U	7220	ug/kg
4-Bromophenyl phenyl ether		U	7220	ug/kg
4-Chloroaniline		U	3600	ug/kg
4-Chlorophenyl phenyl ether		U	3600	ug/kg
Acenaphthene		U	3600	ug/kg
Acenaphthylene		U	3600	ug/kg
Anthracene		U	3600	ug/kg
Benzo(a)anthracene		U	3600	ug/kg
Benzo(a)pyrene		U	3600	ug/kg
Benzo(b)fluoranthene		U	6750	ug/kg
Benzo(ghi)perylene		U	3600	ug/kg
Benzo(k)fluoranthene		U	9020	ug/kg
Butyl benzyl phthalate		U	3600	ug/kg
Chrysene		U	7220	ug/kg
Di-n-butyl phthalate		U	7220	ug/kg
Di-n-octyl phthalate		U	7220	ug/kg
Dibenzo(a,h)anthracene		U	3600	ug/kg
Dibenzofuran		U	3600	ug/kg
Diethyl phthalate		U	3600	ug/kg
Dimethyl phthalate	2680	J	3600	ug/kg
Fluoranthene		U	3600	ug/kg
Fluorene		U	3600	ug/kg
Hexachlorobenzene		U	3600	ug/kg
Hexachlorobutadiene		U	3600	ug/kg
Hexachlorocyclopentadiene		U	7870	ug/kg
Hexachloroethane		U	3600	ug/kg
Indeno(1,2,3-c,d)pyrene		U	7220	ug/kg
Isophorone		U	3600	ug/kg
N-Nitrosodiphenylamine		U	7220	ug/kg
N-Nitrosodipropylamine		U	3600	ug/kg
Naphthalene		U	3600	ug/kg
Nitrobenzene		U	3600	ug/kg
Phenanthrene		U	3600	ug/kg
Pyrene		U	3600	ug/kg
bis(2-Chloroethoxy)methane		U	3600	ug/kg
bis(2-Chloroethyl) ether		U	3600	ug/kg
bis(2-Chloroisopropyl)ether		U	3600	ug/kg
bis(2-Ethylhexyl)phthalate		U	7220	ug/kg
m-Nitroaniline		U	36000	ug/kg
o-Nitroaniline		U	3600	ug/kg
p-Nitroaniline		U	31000	ug/kg
PCB's Method: EPA 8080				Batch: 19936 Run Analyst: JLS DOA: 09/11/92 TOA: 0700
				Prep Analyst: LMJ DOP: 09/09/92 TOP: 1500
PCB-1016		U	72.2	ug/kg
PCB-1221		U	72.2	ug/kg
PCB-1232		U	72.2	ug/kg
PCB-1242		U	72.2	ug/kg

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Sample: 9209119-12 Client ID: Matrix: Soil Description: SD-3
Sampled: 09/04/92 Received: 09/04/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	72.2	ug/kg
PCB-1254		U	72.2	ug/kg
PCB-1260		U	72.2	ug/kg
PCB-1262		U	72.2	ug/kg
ICP	Method: EPA 6010			Batch: 19980 Run Analyst: JSS DOA: 09/11/92 TOA: 1609 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	8.26		3.15	mg/kg
Barium	32.3		2.50	mg/kg
Cadmium		U	2.50	mg/kg
Chromium	16.1		2.50	mg/kg
Lead	209.		3.28	mg/kg
Selenium		U	8.60	mg/kg
Mercury	Method: EPA 7471			Batch: 19893 Run Analyst: ALK DOA: 09/09/92 TOA: 1400 Prep Analyst: ALK DOP: 09/09/92 TOP: 0900
Mercury	57.1	J	159.	ug/kg

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Sample: 9209119-12 Client ID: NPS-CHS Matrix: Soil Description: SD-03
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 19937 Run Analyst: HNM DOA: 09/16/92 TOA: 1720	
None Found		--		ug/l

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Sample: 9209119-14 Client ID: Matrix: Soil Description: SD-4
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
Other Organic Tests Method: EPA 160.3				Batch: 19985 Run Analyst: BDK DOA: 09/10/92 TOA: 0900
Evaporative Loss @ 105 C	35.0		0.00	wt%
GC/MS Extractables Method: EPA 8270				Batch: 20552 Run Analyst: HNM DOA: 09/23/92 TOA: 2237
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 20100 Run Analyst: HNM DOA: 09/23/92 TOA: 2237
				Prep Analyst: VLD DOP: 09/11/92 TOP: 1600
1,2,4-Trichlorobenzene		U	427.	ug/kg
1,2-Dichlorobenzene		U	427.	ug/kg
1,3-Dichlorobenzene		U	427.	ug/kg
1,4-Dichlorobenzene		U	427.	ug/kg
2,4-Dinitrotoluene		U	427.	ug/kg
2,6-Dinitrotoluene		U	427.	ug/kg
2-Chloronaphthalene		U	427.	ug/kg
2-Methylnaphthalene		U	427.	ug/kg
3,3'-Dichlorobenzidine		U	855.	ug/kg
4-Bromophenyl phenyl ether		U	855.	ug/kg
4-Chloroaniline		U	427.	ug/kg
4-Chlorophenyl phenyl ether		U	427.	ug/kg
Acenaphthene		U	427.	ug/kg
cenaphthylene		U	427.	ug/kg
nthracene		U	427.	ug/kg
enzo(a)anthracene		U	427.	ug/kg
enzo(a)pyrene		U	427.	ug/kg
Benzo(b)fluoranthene		U	798.	ug/kg
Benzo(ghi)perylene		U	427.	ug/kg
Benzo(k)fluoranthene		U	1070	ug/kg
Butyl benzyl phthalate		U	427.	ug/kg
Chrysene		U	855.	ug/kg
Di-n-butyl phthalate		U	855.	ug/kg
Di-n-octyl phthalate		U	855.	ug/kg
Dibenzo(a,h)anthracene		U	427.	ug/kg
Dibenzofuran		U	427.	ug/kg
Diethyl phthalate		U	427.	ug/kg
Dimethyl phthalate		U	427.	ug/kg
Fluoranthene		U	427.	ug/kg
Fluorene		U	427.	ug/kg
Hexachlorobenzene		U	427.	ug/kg
Hexachlorobutadiene		U	427.	ug/kg
Hexachlorocyclopentadiene		U	932.	ug/kg
Hexachloroethane		U	427.	ug/kg
Indeno(1,2,3-c,d)pyrene		U	855.	ug/kg
Isophorone		U	427.	ug/kg
N-Nitrosodiphenylamine		U	855.	ug/kg
N-Nitrosodipropylamine		U	427.	ug/kg
Naphthalene		U	427.	ug/kg
Nitrobenzene		U	427.	ug/kg
Phenanthrene		U	427.	ug/kg
Pyrene		U	427.	ug/kg
bis(2-Chloroethoxy)methane		U	427.	ug/kg
bis(2-Chloroethyl) ether		U	427.	ug/kg
bis(2-Chloroisopropyl)ether		U	427.	ug/kg
bis(2-Ethylhexyl)phthalate		U	855.	ug/kg
m-Nitroaniline		U	4270	ug/kg
o-Nitroaniline		U	427.	ug/kg
p-Nitroaniline		U	3680	ug/kg
PCB's Method: EPA 8080				Batch: 20077 Run Analyst: JLS DOA: 09/16/92 TOA: 0032
				Prep Analyst: VLD DOP: 09/11/92 TOP: 1600
PCB-1016		U	85.5	ug/kg
PCB-1221		U	85.5	ug/kg
CB-1232		U	85.5	ug/kg
CB-1242		U	85.5	ug/kg

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Sample: 9209119-14 Client ID: Matrix: Soil Description: SD-4
Sampled: 09/04/92 Received: 09/04/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1248		U	85.5	ug/kg
PCB-1254		U	85.5	ug/kg
PCB-1260		U	85.5	ug/kg
PCB-1262		U	85.5	ug/kg
ICP	Method: EPA 6010			Batch: 19980 Run Analyst: JSS DOA: 09/11/92 TOA: 1611 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	2.50	mg/kg
Arsenic	8.65		3.17	mg/kg
Barium	7.17		2.50	mg/kg
Cadmium		U	2.50	mg/kg
Chromium	9.57		2.50	mg/kg
Lead	8.29		3.30	mg/kg
Selenium	1.08	J	8.67	mg/kg
Mercury	Method: EPA 7471			Batch: 19893 Run Analyst: ALK DOA: 09/09/92 TOA: 1400 Prep Analyst: ALK DOP: 09/09/92 TOP: 0900
Mercury	20.0	J	167.	ug/kg

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Sample: 9209119-14 Client ID: NPS-CHS Matrix: Water Description: SD-4
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 20552 Run Analyst: HMN DOA: 09/23/92 TOA: 2237	
2- pentanone -4 hydroxy -4 -methy	2666	JAB	--	ug/kg

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Sample: 9209119-07 Client ID: Matrix: GroundH2O Description: SW-1
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/17/92 TOA: 1901
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/17/92 TOA: 1901 Prep Analyst: JKP DOP: 09/10/92 TOP: 1500
1,2,4-Trichlorobenzene		U	10.0	ug/l
1,2-Dichlorobenzene		U	10.0	ug/l
1,3-Dichlorobenzene		U	10.0	ug/l
1,4-Dichlorobenzene		U	10.0	ug/l
2,4-Dinitrotoluene		U	10.0	ug/l
2,6-Dinitrotoluene		U	10.0	ug/l
2-Chloronaphthalene		U	10.0	ug/l
2-Methylnaphthalene		U	10.0	ug/l
3,3'-Dichlorobenzidine		U	33.3	ug/l
4-Bromophenyl phenyl ether		U	16.7	ug/l
4-Chloroaniline		U	10.0	ug/l
4-Chlorophenyl phenyl ether		U	10.0	ug/l
Acenaphthene		U	10.0	ug/l
Acenaphthylene		U	10.0	ug/l
Anthracene		U	10.0	ug/l
Benzo(a)anthracene		U	10.0	ug/l
enzo(a)pyrene		U	10.0	ug/l
enzo(b)fluoranthene		U	10.0	ug/l
enzo(ghi)perylene		U	10.0	ug/l
Benzo(k)fluoranthene		U	12.5	ug/l
Butyl benzyl phthalate		U	10.0	ug/l
Chrysene		U	16.7	ug/l
Di-n-butyl phthalate		U	16.7	ug/l
Di-n-octyl phthalate		U	16.7	ug/l
Dibenzo(a,h)anthracene		U	10.0	ug/l
Dibenzofuran		U	10.0	ug/l
Diethyl phthalate		U	10.0	ug/l
Dimethyl phthalate		U	10.0	ug/l
Fluoranthene		U	10.0	ug/l
Fluorene		U	10.0	ug/l
Hexachlorobenzene		U	10.0	ug/l
Hexachlorobutadiene		U	10.0	ug/l
Hexachlorocyclopentadiene		U	10.9	ug/l
Hexachloroethane		U	10.0	ug/l
Indeno(1,2,3-c,d)pyrene		U	16.7	ug/l
Isophorone		U	10.0	ug/l
N-Nitrosodiphenylamine		U	16.7	ug/l
N-Nitrosodipropylamine		U	10.0	ug/l
Naphthalene		U	10.0	ug/l
Nitrobenzene		U	10.0	ug/l
Phenanthrene		U	10.0	ug/l
Pyrene		U	10.0	ug/l
bis(2-Chloroethoxy)methane		U	10.0	ug/l
bis(2-Chloroethyl) ether		U	10.0	ug/l
bis(2-Chloroisopropyl)ether		U	10.0	ug/l
bis(2-Ethylhexyl)phthalate		U	16.7	ug/l
m-Nitroaniline		U	50.0	ug/l
o-Nitroaniline		U	10.0	ug/l
p-Nitroaniline		U	43.0	ug/l
PCB's Method: EPA 8080				Batch: 20051 Run Analyst: JLS DOA: 09/12/92 TOA: 0519 Prep Analyst: ECP DOP: 09/10/92 TOP: 1500
PCB-1016		U	0.500	ug/l
PCB-1221		U	0.500	ug/l
PCB-1232		U	0.500	ug/l
PCB-1242		U	0.500	ug/l
PCB-1248		U	0.500	ug/l
B-1254		U	0.500	ug/l
B-1260		U	0.500	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-07 Client ID: Matrix: GroundH20 Description: SW-1
Sampled: 09/04/92 Received: 09/04/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1262		U	0.500	ug/l
Graphite Furnace	Method: EPA 7060			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 2012 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic	0.950	J	5.00	ug/l
Graphite Furnace	Method: EPA 7421			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 2012 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Lead		U	5.00	ug/l
Graphite Furnace	Method: EPA 7740			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 2012 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium		U	5.00	ug/l
ICP	Method: EPA 6010			Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1236 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver	0.000520	J	0.0300	mg/l
Barium	0.0172	J	0.0300	mg/l
Cadmium		U	0.0150	mg/l
Chromium	0.00374	J	0.0300	mg/l
Mercury	Method: EPA 7470			Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury		U	0.500	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-07 Client ID: NPS-CHS Matrix: Water Description: SW-1
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 2000 Run Analyst: AGW DOA: 09/17/92 TOA: 1901	
Unknown	10	J	--	ug/l
Unknown	42	J	--	ug/l
Unknown	27	J	--	ug/l
Unknown	77	J	--	ug/l
Unknown	11	J	--	ug/l
Unknown	12	J	--	ug/l
Unknown	10	J	--	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-09 Client ID: Matrix: GroundH2O Description: SW-2
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/17/92 TOA: 1945
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/17/92 TOA: 1945
				Prep Analyst: JKP DOP: 09/10/92 TOP: 1500
1,2,4-Trichlorobenzene		U	10.0	ug/l
1,2-Dichlorobenzene		U	10.0	ug/l
1,3-Dichlorobenzene		U	10.0	ug/l
1,4-Dichlorobenzene		U	10.0	ug/l
2,4-Dinitrotoluene		U	10.0	ug/l
2,6-Dinitrotoluene		U	10.0	ug/l
2-Chloronaphthalene		U	10.0	ug/l
2-Methylnaphthalene	3.87	J	10.0	ug/l
3,3'-Dichlorobenzidine		U	33.3	ug/l
4-Bromophenyl phenyl ether		U	16.7	ug/l
4-Chloroaniline		U	10.0	ug/l
4-Chlorophenyl phenyl ether		U	10.0	ug/l
Acenaphthene		U	10.0	ug/l
Acenaphthylene		U	10.0	ug/l
Anthracene		U	10.0	ug/l
Benzo(a)anthracene		U	10.0	ug/l
Benzo(a)pyrene		U	10.0	ug/l
Benzo(b)fluoranthene		U	10.0	ug/l
Benzo(ghi)perylene		U	10.0	ug/l
Benzo(k)fluoranthene		U	12.5	ug/l
Butyl benzyl phthalate		U	10.0	ug/l
Chrysene		U	16.7	ug/l
Di-n-butyl phthalate		U	16.7	ug/l
Di-n-octyl phthalate		U	16.7	ug/l
Dibenzo(a,h)anthracene		U	10.0	ug/l
Dibenzofuran		U	10.0	ug/l
Diethyl phthalate		U	10.0	ug/l
Dimethyl phthalate		U	10.0	ug/l
Fluoranthene		U	10.0	ug/l
Fluorene		U	10.0	ug/l
Hexachlorobenzene		U	10.0	ug/l
Hexachlorobutadiene		U	10.0	ug/l
Hexachlorocyclopentadiene		U	10.9	ug/l
Hexachloroethane		U	10.0	ug/l
Indeno(1,2,3-c,d)pyrene		U	16.7	ug/l
Isophorone		U	10.0	ug/l
N-Nitrosodiphenylamine		U	16.7	ug/l
N-Nitrosodipropylamine		U	10.0	ug/l
Naphthalene	2.87	J	10.0	ug/l
Nitrobenzene		U	10.0	ug/l
Phenanthrene		U	10.0	ug/l
Pyrene		U	10.0	ug/l
bis(2-Chloroethoxy)methane		U	10.0	ug/l
bis(2-Chloroethyl) ether		U	10.0	ug/l
bis(2-Chloroisopropyl)ether		U	10.0	ug/l
bis(2-Ethylhexyl)phthalate		U	16.7	ug/l
m-Nitroaniline		U	50.0	ug/l
o-Nitroaniline		U	10.0	ug/l
p-Nitroaniline		U	43.0	ug/l
PCB's Method: EPA 8080				Batch: 20051 Run Analyst: JLS DOA: 09/12/92 TOA: 0558
				Prep Analyst: ECP DOP: 09/10/92 TOP: 1500
PCB-1016		U	0.500	ug/l
PCB-1221		U	0.500	ug/l
PCB-1232		U	0.500	ug/l
PCB-1242		U	0.500	ug/l
PCB-1248		U	0.500	ug/l
PCB-1254		U	0.500	ug/l
PCB-1260		U	0.500	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-09 Client ID: Matrix: GroundH2O Description: SW-2
Sampled: 09/04/92 Received: 09/04/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1262		U	0.500	ug/l
Graphite Furnace	Method: EPA 7060			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 2016 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic	1.95	J	5.00	ug/l
Graphite Furnace	Method: EPA 7421			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 2016 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Lead	56.0		5.00	ug/l
Graphite Furnace	Method: EPA 7740			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 2016 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium	0.0900	J	5.00	ug/l
ICP	Method: EPA 6010			Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1238 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver	0.000180	J	0.0300	mg/l
Barium	0.0239	J	0.0300	mg/l
Cadmium	0.000720	J	0.0150	mg/l
Chromium	0.00806	J	0.0300	mg/l
Mercury	Method: EPA 7470			Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury	0.00400	J	0.500	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-09 Client ID: NPS-CHS Matrix: Water Description: SW-2
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 20000 Run Analyst: AGW DOA: 09/17/92 TOA: 1945	
Unknown	13		—	ug/l
Unknown	9		—	ug/l
Unknown	22		—	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-11 Client ID: Matrix: GroundH2O Description: SW-3
Sampled: 09/04/92 Received: 09/04/92 Page: 1
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
GC/MS Extractables Method: EPA 8270				Batch: 20354 Run Analyst: AGW DOA: 09/17/92 TOA: 2029
GCMS Library Search-B/N	YES			
GC/MS Extractables Method: EPA 8270				Batch: 20000 Run Analyst: AGW DOA: 09/17/92 TOA: 2029 Prep Analyst: JKP DOP: 09/10/92 TOP: 1500
1,2,4-Trichlorobenzene		U	10.0	ug/l
1,2-Dichlorobenzene		U	10.0	ug/l
1,3-Dichlorobenzene		U	10.0	ug/l
1,4-Dichlorobenzene		U	10.0	ug/l
2,4-Dinitrotoluene		U	10.0	ug/l
2,6-Dinitrotoluene		U	10.0	ug/l
2-Chloronaphthalene		U	10.0	ug/l
2-Methylnaphthalene		U	10.0	ug/l
3,3'-Dichlorobenzidine		U	33.3	ug/l
4-Bromophenyl phenyl ether		U	16.7	ug/l
4-Chloroaniline		U	10.0	ug/l
4-Chlorophenyl phenyl ether		U	10.0	ug/l
Acenaphthene		U	10.0	ug/l
Acenaphthylene		U	10.0	ug/l
Anthracene		U	10.0	ug/l
Benzo(a)anthracene		U	10.0	ug/l
Benzo(a)pyrene		U	10.0	ug/l
Benzo(b)fluoranthene		U	10.0	ug/l
Benzo(ghi)perylene		U	10.0	ug/l
Benzo(k)fluoranthene		U	12.5	ug/l
Butyl benzyl phthalate		U	10.0	ug/l
Chrysene		U	16.7	ug/l
Di-n-butyl phthalate		U	16.7	ug/l
Di-n-octyl phthalate		U	16.7	ug/l
Dibenzo(a,h)anthracene		U	10.0	ug/l
Dibenzofuran		U	10.0	ug/l
Diethyl phthalate		U	10.0	ug/l
Dimethyl phthalate		U	10.0	ug/l
Fluoranthene		U	10.0	ug/l
Fluorene		U	10.0	ug/l
Hexachlorobenzene		U	10.0	ug/l
Hexachlorobutadiene		U	10.0	ug/l
Hexachlorocyclopentadiene		U	10.9	ug/l
Hexachloroethane		U	10.0	ug/l
Indeno(1,2,3-c,d)pyrene		U	16.7	ug/l
Isophorone		U	10.0	ug/l
N-Nitrosodiphenylamine		U	16.7	ug/l
N-Nitrosodipropylamine		U	10.0	ug/l
Naphthalene		U	10.0	ug/l
Nitrobenzene		U	10.0	ug/l
Phenanthrene		U	10.0	ug/l
Pyrene		U	10.0	ug/l
bis(2-Chloroethoxy)methane		U	10.0	ug/l
bis(2-Chloroethyl) ether		U	10.0	ug/l
bis(2-Chloroisopropyl)ether		U	10.0	ug/l
bis(2-Ethylhexyl)phthalate		U	16.7	ug/l
m-Nitroaniline		U	50.0	ug/l
o-Nitroaniline		U	10.0	ug/l
p-Nitroaniline		U	43.0	ug/l
PCB's Method: EPA 8080				Batch: 20051 Run Analyst: JLS DOA: 09/12/92 TOA: 0638 Prep Analyst: ECP DOP: 09/10/92 TOP: 1500
PCB-1016		U	0.500	ug/l
PCB-1221		U	0.500	ug/l
PCB-1232		U	0.500	ug/l
PCB-1242		U	0.500	ug/l
PCB-1248		U	0.500	ug/l
PCB-1254		U	0.500	ug/l
PCB-1260		U	0.500	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-11 Client ID: Matrix: GroundH2O Description: SW-3
Sampled: 09/04/92 Received: 09/04/92 Page: 2
Project: CITY00391 Manager: TDH

Parameter	Result	Qual	QL	Units
PCB-1262		U	0.500	ug/l
Graphite Furnace	Method: EPA 7060			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 2021 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Arsenic	3.30	J	5.00	ug/l
Graphite Furnace	Method: EPA 7421			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 2021 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Lead	6.18		5.00	ug/l
Graphite Furnace	Method: EPA 7740			Batch: 19965 Run Analyst: NRM DOA: 09/10/92 TOA: 2021 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Selenium	0.0900	J	5.00	ug/l
ICP	Method: EPA 6010			Batch: 19975 Run Analyst: JSS DOA: 09/11/92 TOA: 1240 Prep Analyst: FGD DOP: 09/10/92 TOP: 1630
Silver		U	0.0300	mg/l
Barium	0.0225	J	0.0300	mg/l
Cadmium		U	0.0150	mg/l
Chromium	0.0141	J	0.0300	mg/l
Mercury	Method: EPA 7470			Batch: 19977 Run Analyst: ALK DOA: 09/11/92 TOA: 1230 Prep Analyst: ALK DOP: 09/10/92 TOP: 1300
Mercury		U	0.500	ug/l

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CERTIFICATE OF ANALYSIS

Sample: 9209119-11 Client ID: NPS-CHS Matrix: Water Description: SW-3
Sampled: 09/04/92 Received: 09/04/92 Page: 1

Project: CITY00391 Manager: TDH

Parameter	Result	Qual	CRDL	Units
GC/MS Extractables Method: EPA 8270			Batch: 20000 Run Analyst: AGW DOA: 09/17/92 TOA: 2029	
Unknown	9		--	ug/l
Unknown	37		--	ug/l
Unknown	8		--	ug/l
Unknown	14		--	ug/l
Unknown	22		--	ug/l
Unknown	4		--	ug/l

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CI 74 [illegible] 391

CHAIN OF CUSTODY RECORD

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Page 1 of ___ 9208 318 S.4 Quote #8522

Client Name / Facility Name: National Park Service - Chas Harbor Site

Collected By / Company: T. Hutto, Gen. Eng. Labs

SAMPLE ANALYSIS REQUIRED(x) - use remarks area to specify specific compounds or methods

← Use F or P in the boxes to indicate whether sample was filtered and/or preserved

SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# of containers	pH, conductivity	TOC / DOC	TOX	Chloride, Fluoride, Sulfate	Nitrite/Nitrate	VOC - Specify Method required	METALS - specify	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	Cyanide	Coliform - specify type	~~[illegible]~~		TDH Remarks
NPS-CHS [illegible]	8/18/92	7:45		X	X		20																		
NPS-CHS [illegible]	8/18/92	12:24		X	X		1						~~X~~	X	~~X~~			~~X~~	X	X			~~X~~		TCL-BN Metals = 8 SMWA

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Jan Hutto	8/18/92	18:09					

Relinquished by:	Date	Time	Received by lab by:	Date	Time	Remarks
			[illegible]	8-18-92	18:05	

White • sample collector Yellow • file Pink • with report

CHAIN OF CUSTODY RECORD

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Charleston, South Carolina 29417
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Page 1 of 1 9305343

Client Name / Facility Name: Chas. Harbor Site
City of Chas/Nat. Park Service

Collected By / Company: T. Hutte, G.E.L.

Use F or P in the boxes to indicate whether sample was filtered and/or preserved ← 03522.4

SAMPLE ANALYSIS REQUIRED(x) - use remarks area to specify specific compounds or methods

SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# of containers	pH, conductivity	TOC / DOC	TOX	Chloride, Fluoride, Sulfate	Nitrite/Nitrate	VOC - Specify Method required	METALS -specify	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	Cyanide	Coliform - specify type			Remarks
NPS-CHS; S-8, 0"-6"	8/19/92	07:00		X	X		2							X					X	X					TCL-B/N
NPS-CHS; S-8, 3'-4'	8/19/92	07:10		X	X		2							X					X	X					Metals = 8 SDWA
NPS-CHS; S-5 19'-23'	8/19/92	09:00		X	X		1							X					X	X					See quote 3522 gr.4
NPS-CHS; S-8 26'-30'	8/19/92	10:00		X	X		2							X					X	X					for add. details
NPS-CHS; S-6, 0"-6"	8/19/92	1710		X	X		2							X					X	X					
NPS-CHS; S-6, 3'-4'	8/19/92	1720		X	X		2							X					X	X					

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Jon Hutte	8/19/92	1827					

Relinquished by:	Date	Time	Received by lab by:	Date	Time	Remarks
			[illegible]	8-19-92	1827	

White • sample collector Yellow • file Pink • with report

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Page 1 of 1

Client Name / Facility Name: CHAS. HARBOR SITE
National Park Service / City of Chas

Collected By / Company: F. Hutto, G.E.L.

SAMPLE ANALYSIS REQUIRED(x) - use remarks area to specify specific compounds or methods

← Use F or P in the boxes to indicate whether sample was filtered and/or preserved

	SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# of containers	pH, conductivity	TOC / DOC	TOX	Chloride, Fluoride, Sulfate	Nitrite/Nitrate	VOC - Specify Method required	METALS -specify	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	Cyanide	Coliform - specify type			Remarks
01	NPS-CHS; S-6, 12.5'-14'	08/20/92	0700		X	X		2							X				X		X					Metals = SMWA B/N = TCL list Q = 3522.4
02	NPS-CHS; S-6, 18'-20'	08/20/92	0715		X	X		1							X				X		X					
03	NPS-CHS; S-9, 0"-6"	08/20/92	10:30		X	X		2							X				X		X					
04	NPS-CHS; S-9, 3'-4'	08/20/92	10:45		X	X		2	X						X				X		X					
05	NPS-CHS; S-9, 13'-17'	08/20/92	11:30		X	X		2							X				X		X					
06	NPS-CHS; S-9, 23'-25'	08/20/92	1:00		X	X		2							X				X		X					

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
F. Hutto	08/20/92	17:25					

Relinquished by:	Date	Time	Received by lab by:	Date	Time	Remarks
			[illegible]	8-20-92	1725	

White • sample collector Yellow • file Pink • with report

9208391

CHAIN OF CUSTODY RECORD

General Engineering Laboratories
2040 Savage Road
Charleston, South Carolina 29414
PO Box 30712
Charleston, South Carolina 29417
803-556-8171

Page 1 of 1 City 00391

Client Name / Facility Name: Chas. Harbor Site
National Park Service / City of Chas

Collected By / Company: T. H. [illegible], GEL

SAMPLE ANALYSIS REQUIRED(x) - use remarks area to specify specific compounds or methods

← Use F or P in the boxes to indicate whether sample was filtered and/or preserved

City 00391
Quote 3522

	SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# of containers	pH, conductivity	TOC / DOC	TOX	Chloride, Fluoride, Sulfate	Nitrite/Nitrate	VOC - Specify Method required	METALS -specify	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	Cyanide	Coliform - specify type			Remarks
01	NPS-CHS; S-1 0'-6'	8/21/92	2:20		X	X		2							X					X	X					TCL BN SDWA metals Group 4
02	NPS-CHS; S-4, 3'-4'	8/21/92	2:10		X	X		2							X					X	X					TCL BN SDWA metals Group 4
04	NPS-CHS S-4; 11'-12'	8/21/92	2:35		X	X		2						X	X	X	X		X	X	X	X				Full TCL / TAL list Group 5
03	NPS-CHS S-4; 15'-17'	8/21/92	2:50		X	X		2							X					X	X					TCL BN SDWA Metals Group 4

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
T. H. [illegible]	8/21/92	16:57					

Relinquished by:	Date	Time	Received by lab by:	Date	Time	Remarks
			[illegible]	8-21-92	16:57	

White • sample collector Yellow • file Pink • with report

CIT [illegible]391

CHAIN OF CUSTODY RECORD

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Charleston, South Carolina 29414
PO Box 30712
Charleston, South Carolina 29417
803-556-8171

Page 1 of 1 9208408

Client Name / Facility Name: [illegible] Service / [illegible] Chas Harbor

Collected By / Company: T. [illegible], GEL

SAMPLE ANALYSIS REQUIRED(x) - use remarks area to specify specific compounds or methods

← Use F or P in the boxes to indicate whether sample was filtered and/or preserved

QUOTE 3522

	SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# of containers	pH, conductivity	TOC / DOC	TOX	Chloride, Fluoride, Sulfate	Nitrite/Nitrate	VOC - Specify Method required	METALS - specify	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	Cyanide	Coliform - specify type			TDH Remarks	
01	NPS-CHS; S-3, [illegible]	8/24/92	4:20		X	X		2							X					X	X					Metals = 8 SDWA; BN = TCL list	Gr.4
02	NPS-CHS S-3, 3'-4'		3:00		X	X		2							X					X	X					" " " "	Gr.4
04	NPS-CHS, S-3, 9'-15'		3:30		X	X		2						X	X	X			X	X	X	X				Full TCL/TAL	Gr.5
03	NPS-CHS, S-3, 17'-[illegible]		4:10		X	X		2							X					X	X					metals = 8 SDWA, BN = TCL list	Gr.4

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
[signature]	8/24/92	1803					

Relinquished by:	Date	Time	Received by lab by:	Date	Time	Remarks
			[signature]	8-24-92	1803	

White • sample collector Yellow • file Pink • with report

CIT 00039

CHAIN OF CUSTODY RECORD

General Engineeri ratories
2040 Savage Road
Charleston, South Carolina 29414
PO Box 30712
Charleston, South Carolina 29417
803-556-8171

Page 1 of 1 9208437

Client Name / Facility Name: National Park Service / City of Chas. Chas. Harbor site

Collected By / Company: T. Hatch, GEL

SAMPLE ANALYSIS REQUIRED(x) - use remarks area to specify specific compounds or methods

← Use F or P in the boxes to indicate whether sample was filtered and/or preserved

Quote 3522

	SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# of containers	pH, conductivity	TOC / DOC	TOX	Chloride, Fluoride, Sulfate	Nitrite/Nitrate	VOC - Specify Method required	METALS -specify	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	Cyanide	Coliform - specify type			TDH Remarks
.01	NPS-CHS; S-1, 0"-6"	8/25/92	2:25		X	X		2							X					X	X					BN = TCL list metals = 8 SDWA Gr. 4
.02	NPS-CHS; S-1, 3'-4'		11:15		X	X		2							X					X	X					same Gr. 4
.03	NPS-CHS; S-1, 7'-9'		11:30		X	X		2							X	X	X		X	X	X	X				Full TCL w/TICs Gr. 5
.03	NPS-CHS; S-1, 13'-15'		1:15		X	X		2							X					X	X					BN = TCL List metals = 8 SDWA Gr. 4
.04	NPS-CHS; S-12, 3'-4'		3:35		X	X		2							X					X	X					Gr. 4
.05	NPS-CHS; S-12, 13'-15'		8:15		X	X		2							X					X	X					Gr. 4
.06	NPS-CHS; S-12, 19'-21'		8:35		X	X		2							X					X	X					Gr. 4

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
T. Hatch	8/25/92	1844					

Relinquished by:	Date	Time	Received by lab by:	Date	Time	Remarks
			Donna L Ward	8-25-92	1844	

White • sample collector Yellow • file Pink • with report

CITY [illegible] 391

CHAIN OF CUSTODY RECORD

General Engineeri[illegible]ratories
2040 Savage Road
Charleston, South Carolina 29414
PO Box 30712
Charleston, South Carolina 29417
803-556-8171

Page 1 of 1 9308465

Client Name / Facility Name: National Park Service / City of Chas. Chas. Har. Site

Collected By / Company: T. Hutte, G.E.L.

SAMPLE ANALYSIS REQUIRED(x) - use remarks area to specify specific compounds or methods

← Use F or P in the boxes to indicate whether sample was filtered and/or preserved

Quote 3522

	SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# of containers	pH, conductivity	TOC / DOC	TOX	Chloride, Fluoride, Sulfate	Nitrite/Nitrate	VOC - Specify Method required	METALS -specify	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	Cyanide	Coliform - specify type			TDH Remarks
01	NPS-CHS; S-11, 3'-4'	8/26/92	7:24		X	X		2							X					X	X					metals = SDWA list B/N = TCL list Group 4
02	NPS-CHS; S-11, 27'-31'	8/26/92	10:20		X	X		2							X					X	X					" Group 4

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
T. Hutte	8/26/92	15:55					

Relinquished by:	Date	Time	Received by lab by:	Date	Time	Remarks
			[illegible]	8/26/92	1555	

White • sample collector Yellow • file Pink • with report

CHAIN OF CUSTODY RECORD

General Engineeri[illegible]oratories
2040 Savage Road
Charleston, South Carolina 29414
PO Box 30712
Charleston, South Carolina 29417
803-556-8171

Page ____ of ____

Client Name / Facility Name: City of Charleston (Aquarium site) City 00391

Collected By / Company:

SAMPLE ANALYSIS REQUIRED(x) - use remarks area to specify specific compounds or methods

← *Use F or P in the boxes to indicate whether sample was filtered and/or preserved*

SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# of containers	pH, conductivity	TOC / DOC	TOX	Chloride, Fluoride, Sulfate	Nitrite/Nitrate	VOC - Specify Method required	METALS -specify	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	Cyanide	Coliform - specify type			3522.4 Remarks
NPS-CHS, S-10, 3'-4'	9/2/92	1500		X			2																		

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
[signature]	9/2/92	1620					

Relinquished by:	Date	Time	Received by lab by:	Date	Time	Remarks
			[signature]	9-2-92	1620	

White • sample collector Yellow • file Pink • with report

CHAIN OF CUSTODY RECORD

General Engineeri[illegible]ratories
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Charleston, South Carolina 29414
PO Box 30712
Charleston, South Carolina 29417
803-556-8171

Page 1 of 1 9209100

Client Name / Facility Name: City of Charleston / Harbor Site City 00391

Collected By / Company: Surasky, Weeks / Gen. Eng. Labs

SAMPLE ANALYSIS REQUIRED(x) - use remarks area to specify specific compounds or methods

← Use F or P in the boxes to indicate whether sample was filtered and/or preserved

	SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# of containers	pH, conductivity	TOC / DOC	TOX	Chloride, Fluoride, Sulfate	Nitrite/Nitrate	VOC - Specify Method required (P)	METALS -specify (P)	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	Cyanide (P)	Coliform - specify type	TDS		Remarks (TDH)
.06	MW-8	9-3-92	1315	✓				6							1					2	2			1		SDWA Metals Pres. w/ HNO_3 TCL B/N EXT. .2
.07	MW-10	9-3-92	1415	✓				6							1					2	2			1		" .2
.04	MW-6	9-3-92	1445	✓				6							1					2	2			1		" .2
.05	MW-7	9-3-92	1630	✓				6							1					2	2			1		" .2
.03	MW-5	9-3-92	1645	✓				6							1					2	2			1		" .2
.02	MW-4	9-3-92	1815	✓				10						4					2	2	2					(TCL VOC's Pres. w/ HCL.) (TCL B/N + Acid EXT.) .1
.01	MW-2	9-3-92	1830	✓				13						4	1				2	2	2	1		1		TCL VOC's TCL B/N + Acid EXT. TAL Metals Pres. w/ HNO_3 Cyan Pres. w/ NaOH .1

(MW-4 Poor Recharge will Evacuate again and Sample CYAN, TDS, and Metals on 9/4/92)

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
[signature]	9-3-92	1912					

Relinquished by:	Date	Time	Received by lab by:	Date	Time	Remarks
			[signature]	9-3-92	1912	

White • sample collector Yellow • file Pink • with report

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2040 Savage Road
Charleston, South Carolina 29414
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Charleston, South Carolina 29[illegible]
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CHAIN OF CUSTODY RECORD

Page 1 of 2 Q69119

Client Name / Facility Name: [illegible] Charleston / Harbor Site City 00391

Collected By / Company: Burton Sorensen, Weeks / Gen. Eng. Labs

SAMPLE ANALYSIS REQUIRED(x) - use remarks area to specify specific compounds or methods

← Use F or P in the boxes to indicate whether sample was filtered and/or preserved

	SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# of containers	pH, conductivity	TOC / DOC	TOX	Chloride, Fluoride, Sulfate	Nitrite/Nitrate	VOC - Specify Method required (P)	METALS - specify (P)	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	Cyanide (P)	Coliform - specify type	TDS		Remarks
7	[illegible]-1	9-4-92	[illegible]				✓	5							1					2	2					[illegible] metals pres. w/ HNO3 TCL B/N EXT. .6
8	*SD-1	9-4-92	[illegible]		✓			2							✓					✓	✓					[illegible] sample .6
9	[illegible]	9-4-92	415				✓	5							1					2	2					.6
10	*SD-2	9-4-92	105		✓			2							✓					✓	✓					.6
13	[illegible]-4	9-4-92	1120	✓				3							1							1		1		TAL metals pres. w/ HNO3 Cyan pres. w/ NaOH
1	[illegible]-3	9-4-92	[illegible]				✓	5							1					2	2					.6
2	*SD-3	9-4-92	[illegible]		✓			2							✓					✓	✓					.6
2	[illegible]	9-4-92	[illegible]	✓				13						4	1				2	2	2	1		1		.1
4	[illegible]	9-4-92	1400	✓				5							1					2	2			1		.2
5	[illegible]	9-4-92	1530	✓				5							1					2	2					.2
5	[illegible]	9-4-92	1510	✓				1																		See Product sample Analysis for All Parameters. .2
1	[illegible]-1	9-4-92	1545	✓				13						4	1				2	2	2	1		1		.1
5	[illegible]	9-4-92	1430				✓	13						4	1				2	2	2	1		1		.3

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
[illegible]	9-4-92	1628					

Relinquished by:	Date	Time	Received by lab by:	Date	Time	Remarks
			[illegible]	9-4-92	1628	

White • sample collector Yellow • file Pink • with report

4209

CHAIN OF CUSTODY RECORD

General Engineering Laboratories
2040 Savage Road
Charleston, South Carolina 29414
PO Box 30712
Charleston, South Carolina 29417
803-556-8171

Client Name / Facility Name: City of Charleston / Harbor Site City 00391

Collected By / Company: Porter, Sowasky, Weeks / Gen. Eng. Lab

SAMPLE ANALYSIS REQUIRED(x) - use remarks area to specify specific compounds or methods

Use F or P in the boxes to indicate whether sample was filtered and/or preserved

	SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# of containers	pH, conductivity	TOC / DOC	TOX	Chloride, Fluoride, Sulfate	Nitrite/Nitrate	VOC - Specify Method required	METALS -specify	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	Cyanide	Coliform - specify type	TDS		Remarks
13	Trip Blank	9-2-92	1400				✓	13						4	1				2	2	2	1		1		TCL VOC'S PRES. W/HCL TAL METALS PRES. W/HNO3
14	SD-4	9-4-92	1350		✓			2							✓					✓	✓					CYAN PRES. W/NaOH TCL B/N + Acid EXT.

TDH

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
[signature]	9-4-92	1628					

Relinquished by:	Date	Time	Received by lab by:	Date	Time	Remarks
			[signature]	9-4-92	1628	

White • sample collector Yellow • file Pink • with report

General Engineeri[illegible]ratories
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PO Box 30712
Charleston, South Carolina 29417
803-556-8171

CHAIN OF CUSTODY RECORD

Page 1 of 1 CITY

Client Name / Facility Name: CITY OF CHAS / CHAS. S.C.

Collected By / Company: SEABROOK / GEN. ENG LABS

SAMPLE ANALYSIS REQUIRED(x) - use remarks area to specify specific compounds or methods

← Use F or P in the boxes to indicate whether sample was filtered and/or preserved

SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# of containers	pH, conductivity	TOC / DOC	TOX	Chloride, Fluoride, Sulfate	Nitrite/Nitrate	VOC - Specify Method required	METALS -specify	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	Cyanide	Coliform - specify type			Remarks
MW-12	9-15-92	14/22	✓				1																1		

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
Thomas H. Seabrook	9/15/92	1515					

Relinquished by:	Date	Time	Received by lab by:	Date	Time	Remarks
			C Bell	9-15-92	1515	Thirty Vitro samples for Lab # 9209119-15 per TJK

White • sample collector Yellow • file Pink • with report

APPENDIX XI

MONITORING WELL DEVELOPMENT
AND
SAMPLING TECHNIQUES

APPENDIX XI

MONITORING WELL DEVELOPMENT AND SAMPLING TECHNIQUES

On August 31, 1992, five days following the installation of the last well, the wells were checked for LNAPLs and DNAPLs (free product) using an interface probe. No free product was detected in any of the wells except MW-12. Approximately 0.2 foot of DNAPL was detected in the bottom of this well. Field notes documenting these measurements are included in this appendix.

All of the wells were developed, except MW-12, by pumping and bailing. Well MW-12 was not developed due to the presence of free product. Field notes documenting the sequence of well development, the volume of water purged from each well, and field measurements of pH and conductivity are included in this appendix. Development water was contained in a tank on the site.

At least 24 hours following development, groundwater samples were collected from all monitoring wells except for MW-12. A sample of product was collected from this well instead of groundwater. Field notes documenting the sequence of sample collection are included in this appendix. Sample collection procedures and field measurements were conducted in accordance with accepted DHEC and EPA protocols. The following table shows sample bottle container types and sizes, and sample preservatives and holding times.

Sample Type	Container	Sample Preservative	Holding Time
Base Neutral/ Acid Extractables/ PCBs	2-1 l amber glass with teflon lined cap per fraction	4°C	7 days to extract 40 days to analyze
VOCs	4-40 ml vials with teflon lined septum	HCl; 4°C	14 days
Metals	500 ml polyethylene with polyethylene cap	HNO_3 pH<2	6 months
TDS	500 ml polyethylene with polyethylene cap	4°C	7 days
Cyanide	500 ml polyethylene with polyethylene cap	NaOH pH>12, 4°C	14 days

After measuring the depth to groundwater, the wells were evacuated to remove stagnant water. Laboratory cleaned teflon bailers were used to evacuate and sample the

wells. A separate bailer was used for each well. The evacuation water was contained in a tank on the site. All pertinent field information for each well is recorded on the Field Data Information Sheets included in this appendix. This information includes:

- Date of sampling
- Well identification
- Total well depth
- Method of evacuation and sample collection
- Field analyses with time and volume evacuated
- Name of collector
- Depth to groundwater
- Volume of water in casing
- General observations
- Well integrity

Trip blanks were included with the coolers used to store the groundwater samples during the sample collection process and transportation back to the laboratory. Following collection of samples from approximately one-half of the wells, a field blank was collected.

At the completion of each day of sampling, sampling personnel transported the samples to the General Engineering Laboratories. Upon arrival at the laboratory, the samples were relinquished by the sampling personnel to laboratory personnel. These transactions are documented on the Chain-of-Custody Records included in Appendix X.

measurements taken before development.

wellID	TWD	DGW	PRODUCT.
W-8	31.07	4.83	0.0
W-10	19.00	5.90	0.0
W-6	17.66	4.94	0.0
W-7	17.95	5.14	0.0
W-5	18.09	6.57	0.0
W-4	16.67	7.56	0.0
W-2	14.36	4.70	0.0
W-3	18.60	5.68	0.0
W-9	22.41	6.01	0.0
W-11	29.55	4.71	0.0
W-12	19.62	5.51	.20
W-1	14.57	5.02	0.0

W-12 product thickness estimated, while trying to measure exact thickness product was disperced making precise measurement difficult. W-12 will not be developed as interface probe was coated with product

GENERAL ENGINEERING LABORATORIES
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(803) 556-5171

Subject CITY 00391
Date 8/31/92 Checked by SLS
Page

Sequence of well development.

MW-8	9/1/92	completed @	1000 hrs.
MW-10	9/1/92	"	1430 hrs.
MW-6	9/1/92	"	1715 hrs.
MW-7	9/2/92	"	1100 hrs.
MW-5	9/2/92	"	1300 hrs.
MW-4	9/2/92	"	1400 hrs.
MW-2	9/2/92	"	1600 hrs.
MW-3	9/3/92	"	1030 hrs.
MW-9	9/3/92	"	1200 hrs.
MW-11	9/3/92	"	1300 hrs.
MW-1	9/3/92	"	1400 hrs.

MW-12 no development well contained free product.

General Engineering Laboratories
Well Development Data Sheet

Client Code CITY 00391 Well ID MW-1 Tech DWW/KA Date 9/3/92

Volume Purged	pH	Cond.	Temp.	Turbidity	
0	6.95	3280	24.6	4	Water black w/ very strong odor.
10 gal	6.75	1701	26.7	4	Water black w/ very strong rotten odor
20 gal	6.96	2128	26.1	4	No change, well pumped dry
30 gal	6.76	1351	26.3	4	Black water w/ very strong rotten odor.
40 gal	6.84	1994	25.8	4	Black water, strong odor. Well pumped dry
					Developed

General Engineering Laboratories
Well Development Data Sheet

Client Code CITY/60391 Well ID MW-2 Tech SAS/DWW Date 9/2/91

Volume Purged	pH	Cond.	Temp	Turbidity	
Ø	7.15	4330	24.9	4	moderate creosote odor.
10	7.17	4650	24.5	4	slight odor very little sediment
25	7.14	3650	25.1	2	no sediment.

General Engineering Laboratories
Well Development Data Sheet

Client Code CITY00391 **Well ID** MW-9 **Tech** DWW/SAS **Date** 9/3/92

Volume Purged	pH	Cond.	Temp.	Turbidity	
0	6.94	13100	22.8	4	Strong odor signs of sheen
10 gals	6.98	9840	24.1	4	Strong odor, dark black in color, definite sheen on top
20 gals	6.97	7760	25.6	4	No change
30 gals	6.99	6590	26.2	4	Sheen, strong odor, dark in color
40 gals	6.96	7980	25.2	4	No change
50 gals	7.16	7680	26.0	4	No change
60 gals	6.96	6480	26.1	4	No change
70 gals	6.91	6240	26.0	4	No change
					Developed

General Engineering Laboratories
Well Development Data Sheet

Client Code CITY00791 Well ID MW-3 Tech SAB/DWW Date 9/3/92

Volume Purged	pH	Cond.	Temp.	Turbidity	
Ø	6.97	1305	25.2	4	Strong organic odor. Black water
15 gals	6.67	1148	25.7	4	Still strong odor and very blackwater
30 gals	6.79	1237	25.6	4	Very strong odor. Black water
45 gals	6.74	1156	25.1	4	Very strong odor, Blackwater
55 gals	6.92	1163	26.7	4	No change in odor turbidity. Well dewatered.

General Engineering Laboratories
Well Development Data Sheet

Client Code CITY00391 Well ID MW-4 Tech SA/DWW Date 9/2/91

Volume Purged	pH	Cond.	Temp.	Turbidity	
Ø	7.15	7550	24.7	2	strong odor no sediment
1.5	6.8	5510	25.0	2	odor same as MW-10 + MW-5
3.0	6.88	5870	24.3	2	"
4.5	6.92	5320	23.6	2	"
6.0	6.97	5680	23.4	2	"
well bailed dry @ 6.0 gal let well recharge					
and check pH measurement again					
after recharge.	6.93	5720	23.6	1	same odor as above.

General Engineering Laboratories
Well Development Data Sheet

Client Code CITY00391 Well ID MW-5 Tech SAS/DWW Date 9/2/92

Volume Purged	pH	Cond.	Temp.	Turbidity	
Ø	6.68	5190	23.9	4	Strong odor not creosote like as MW-10 high sediment content
15	7.09	4870	24.7	3	Slight odor very little sediment
30	6.92	4150	24.7	4	Slight odor no sediment high turb.
45	6.89	4770	25.2	4	"
55	6.99	4120	25.9	3	slight odor no sediment
70	6.85	4180	25.8	4	"

General Engineering Laboratories
Well Development Data Sheet

Client Code CITY00391 Well ID MW-6 Tech SAS/DWCS Date 9/1/92

Volume Purged	pH	Cond.	Temp.	Turbidity	
Ø	6.53	4,640	25.3	4	strong creosote odor approx 1/10 of boiler filled with silt. Heavy flow
10	6.69	3,730	25.6	4	strong odor no sheen,
12.5	6.93	3290	26.0	3	well cleared some after recharge light odor no sediment.
15	7.03	3670	25.3	2	no sediment slight odor low turb.

General Engineering Laboratories
Well Development Data Sheet

Client Code CITY00391 Well ID MW-7 Tech SAS/DWW Date 9/1/92 / 9/2/92

Volume Purged	pH	Cond.	Temp.	Turbidity	
Ø	6.80	8,890	29.3	4	strong creosote odor, sediment high
5	7.29	9,840	29.7	4	"
7.5	7.07	8730	28.8	4	moderate odor
12.5	7.10	8200	26.5	4	moderate odor high sediment content
17.5	6.61	8670	26.6	4	moderate odor very little sediment
22.5	6.81	8390	26.6	3	slight odor very little sediment.
27.5	6.86	8270	26.6	2	"
32.5	7.08	8620	26.7	2	"
37.5	7.05	8710	26.5	2	"
42.5	7.02	8280	26.7	2	slight odor no sediment.

General Engineering Laboratories
Well Development Data Sheet

Client Code CITY 00391 Well ID MW-8 Tech SAS/DWW Date 9/01/92

Volume Purged	pH	Cond.	Temp.	Turbidity	Odor
Ø	6.21	7980	22.3	3	Small amounts of 4 [illegible] found at bottom of MW-8 also strong odor 4
min [illegible] 10 gals	6.84	9170	26.5	4	
20 gals	6.90	10850	28.0	4	4
30 gals	6.95	10890	29.0	4	4
40 gals	6.93	11410	30.1	4	4
50 gals	6.90	11540	30.5	4	4
60 gals	6.96	11620	30.8	3	4
70 gals	6.91	11760	31.3	2	4
80 gals	6.95	11770	31.7	1	3
90 gals	6.91	11910	32.1	1	3
100 gals	6.91	11870	32.0	1	3

General Engineering Laboratories
Well Development Data Sheet

Client Code CITY 00391 Well ID MW-10 Tech SLS/DWW Date 9/1/92

Volume Purged	pH	Cond.	Temp.	Turbidity	odor
Ø	6.99	2,300	25.0	4	high odor not identified very thick oily substance @ bottom of well.
10	6.89	2,900	27.7	4	odor still the same sheen on surface of decant water.
20	7.37	3,580	36.6	4	odor slight sheen gone.
30	6.98	2,860	27.5	4	odor moderate
40	7.06	2,890	27.8	4	odor moderate
50	6.59	2,810	28.3	4	"
60	7.02	3,050	28.6	4	"
70	6.93	2,920	28.4	4	"
80	7.05	2,850	28.6	4	"
90	7.06	2,840	28.6	4	"
100	6.99	2,370	28.3	3	slight odor.

General Engineering Laboratories
Well Development Data Sheet

Client Code CITY0391 Well ID MW-11 Tech DW/SAS Date 9/3/92

Volume Purged	pH	Cond.	Temp.	Turbidity	
0	6.71	14360	23.1	4	Strong odor. Water green in color
10 gals	6.72	10540	23.1	4	Strong odor, water green in color
20 gals	6.73	5940	24.2	4	No change.
30 gals	6.70	12380	23.0	4	No change
40 gals	6.72	9910	23.3	4	No change
50 gals	6.72	10620	23.3	4	No change
					Developed

Sequence of sample collection

MW-8	9/3/92	collected @	1315	
MW-10	9/3/92	"	1415	
MW-6	9/3/92	"	1445	
MW-7	9/3/92	"	1630	
MW-5	9/3/92	"	1645	
MW-4	9/3/92	"	1815	
MW-2	9/3/92	"	1830	
MW-3	9/4/92	"	1345	
MW-9	9/4/92	"	1400	
MW-11	9/4/92	"	1530	
MW-1	9/4/92	"	1545	
MW-12	9/4/92	"	1510	free prod. only

MW-4 collected VOC's, Acid + BN ext. on 9/3/92 @ 1815
collected cyan. TDS + Metals on 9/4/92 @ 0925

GENERAL ENGINEERING LABORATORIES
2040 Savage Road
Charleston, SC 29414
803/558-8171

Subject

Date

Calculation

Page

Field Data Information Sheet for Ground-Water Sampling

Page ___ of ___

General Engineering Laboratories
2040 Savage Road
Charleston, SC 29414

Date (yr/mo/day) 92/09/13 (4)
Field Personnel Surasky, Weeks, BUXTON
Facility Name Charleston Harbor Site (CITY00391)
EPA ID #
Well ID # MW-1
___ Upgradient ___ Downgradient
Weather Conditions Raining / Clear / Windy / ~~Partly Cloudy~~ / Warm / Cool
Air Temperature °C
Total Well Depth (TWD) = 14.81 1/100 ft
Depth to Groundwater (DGW) = 4.55 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 10.26 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 1.67 gal
3 Casing Volumes = 5.25 gal = Standard Evacuation Volume
Method of Well Evacuation GEL Teflon Bailer
Method of Sample Collection GEL Teflon Bailer
Total Volume of Water Removed 5.25 gal

Casing Diameter 2 inches
Casing Material PVC
Top Elevation 1/100 ft
Height of Riser 1/100 ft
Surface Elevation 1/100 ft
Screened Interval 1/100 ft
Bottom of Pump, if dedicated (depth/elevation) 1/100 ft
Steel Guard Pipe Around Casing YES ✓ NO ___
Locking Cap YES ✓ NO ___
Protective Abutment YES ✓ NO ___
Well Integrity Satisfactory YES ✓ NO ___
Well Yield LOW ___ MODERATE ✓ HIGH ___
Remarks final volume evacuated @ 1504
final sample collected @ 1545
turb @ time of collection 4

FIELD ANALYSES

VOLUME PURGED (gallons)	1.75	3.50	5.25				
TIME (military)	1458	1501	1504				
pH (S.U.)	6.56	6.67	6.69				
Sp. Cond. (µmhos/cm)	1244	1297	1331				
Water Temp. (°C)	26.3	25.9	25.7				
TURBIDITY (subjective) *	4	4	4				
ODOR (subjective) **	4	4	4				

* (1) Clear (2) Slight (3) Moderate (4) High ** (1) None (2) Faint (3) Moderate (4) Strong

COMMENTS/OBSERVATIONS Sampled@ 1545

fldinfo 2/88

Field Data Information Sheet for Ground-Water Sampling

Page ___ of ___

General Engineering Laboratories
2040 Savage Road
Charleston, SC 29414

Date (yr/mo/day) 92 / 09 / 3 , 4

Field Personnel Surasky, Weeks

Facility Name Charleston Harbor Site (CITY00391)

EPA ID #

Well ID # MW-2

___ Upgradient ___ Downgradient

Weather Conditions Raining / Clear / Windy / Partly Cloudy / Warm / Cool

Air Temperature 30.2 °C

Total Well Depth (TWD) = 15.00 1/100 ft

Depth to Groundwater (DGW) = 5.28 1/100 ft

Length of Water Column (LWC) = TWD - DGW = 9.72 1/100 ft

1 Casing Volume (OCV) = LWC x 0.163 = 1.58 gal

3 Casing Volumes = 4.74 gal = Standard Evacuation Volume

Method of Well Evacuation GEL Teflon Bailer

Method of Sample Collection GEL Teflon Bailer

Total Volume of Water Removed 5.25 gal

Casing Diameter 2 inches

Casing Material PVC

Top Elevation 1/100 ft

Height of Riser 1/100 ft

Surface Elevation 1/100 ft

Screened Interval 1/100 ft

Bottom of Pump, if dedicated (depth/elevation) 1/100 ft

Steel Guard Pipe Around Casing YES ✓ NO ___

Locking Cap YES ✓ NO ___

Protective Abutment YES ✓ NO ___

Well Integrity Satisfactory YES ✓ NO ___

Well Yield LOW ___ MODERATE ✓ HIGH ___

Remarks final volume evacuated @ 1743
final sample collected @ 1830
turb @ time of collection.

FIELD ANALYSES

VOLUME PURGED (gallons)	1.75	3.50	5.25				
TIME (military)	1737	1740	1743				
pH (S.U.)	6.73	6.79	6.83				
Sp. Cond. (µmhos/cm)	3410	3330	3440				
Water Temp. (°C)	25.4	25.1	24.9				
TURBIDITY (subjective) *	4	4	3				
ODOR (subjective) **	3	3	3				

* (1) Clear (2) Slight (3) Moderate (4) High ** (1) None (2) Faint (3) Moderate (4) Strong

COMMENTS/OBSERVATIONS Sampled@ 1830

fldinfo 2/88

Field Data Information Sheet for Ground-Water Sampling

Page ___ of ___

General Engineering Laboratories
2040 Savage Road
Charleston, SC 29414

Date (yr/mo/day) 92/09/3(4)
Field Personnel Surasky, Weeks, Buxton
Facility Name Charleston Harbor Site (CITY00391)
EPA ID #
Well ID # MW-3
___ Upgradient ___ Downgradient
Weather Conditions Raining / Clear / Windy / Partly Cloudy / Warm / Cool
Air Temperature 26.0 °C
Total Well Depth (TWD) = 18.75 1/100 ft
Depth to Groundwater (DGW) = 5.20 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 13.55 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 2.21 gal
3 Casing Volumes = 6.63 gal = Standard Evacuation Volume
Method of Well Evacuation GEL Teflon Bailer
Method of Sample Collection GEL Teflon Bailer
Total Volume of Water Removed 6.75 gal

Casing Diameter 2 inches
Casing Material PVC
Top Elevation 1/100 ft
Height of Riser 1/100 ft
Surface Elevation 1/100 ft
Screened Interval 1/100 ft
Bottom of Pump, if dedicated (depth/elevation) 1/100 ft
Steel Guard Pipe Around Casing YES ✓ NO ___
Locking Cap YES ✓ NO ___
Protective Abutment YES ✓ NO ___
Well Integrity Satisfactory YES ✓ NO ___
Well Yield LOW ___ MODERATE ___ HIGH ✓
Remarks final volume evacuated @ 1145
final sample collected @ 1345
turb. @ time of collection 1-2

FIELD ANALYSES

VOLUME PURGED (gallons)	2.25	4.5	6.75				
TIME (military)	1135	1140	1145				
pH (S.U.)	6.30	6.56	6.62				
Sp. Cond. (µmhos/cm)	10660	10590	10530				
Water Temp. (°C)	26.7	26.6	26.5				
TURBIDITY (subjective) *	3	3	3				
ODOR (subjective) **	4	4	4				

* (1) Clear (2) Slight (3) Moderate (4) High ** (1) None (2) Faint (3) Moderate (4) Strong

COMMENTS/OBSERVATIONS Sampled @ 1345

fldinfo 2/88

Page ___ of ___

Field Data Information Sheet for Ground-Water Sampling

General Engineering Laboratories
2040 Savage Road
Charleston, SC 29414

Date (yr/mo/day) 92/09/3(4)
Field Personnel Surasky, Weeks
Facility Name Charleston Harbor Site (CITY00391)
EPA ID #
Well ID # MW-4
___ Upgradient ___ Downgradient
Weather Conditions Raining / Clear / Windy / Partly Cloudy / Warm / Cool
Air Temperature 29.4 °C
Total Well Depth (TWD) = 16.66 1/100 ft
Depth to Groundwater (DGW) = 10.67 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 5.99 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = .98 gal
3 Casing Volumes = 2.94 gal = Standard Evacuation Volume
Method of Well Evacuation GEL Teflon Bailer
Method of Sample Collection GEL Teflon Bailer
Total Volume of Water Removed ___ gal

Casing Diameter 2 inches
Casing Material PVC
Top Elevation ___ 1/100 ft
Height of Riser ___ 1/100 ft
Surface Elevation ___ 1/100 ft
Screened Interval ___ 1/100 ft
Bottom of Pump, if dedicated (depth/elevation) ___ 1/100 ft
Steel Guard Pipe Around Casing YES ✓ NO ___
Locking Cap YES ✓ NO ___
Protective Abutment YES ✓ NO ___
Well Integrity Satisfactory YES ✓ NO ___
Well Yield LOW ✓ MODERATE ___ HIGH ___
Remarks final volume was taken @ 0925

FIELD ANALYSES

VOLUME PURGED (gallons)	1.0	2.0	3.0				
TIME (military)	0915	0920	0925				
pH (S.U.)	6.66	6.81	6.95				
Sp. Cond. (µmhos/cm)	10,770	10,490	11,840				
Water Temp. (°C)	23.8	23.6	23.1				
TURBIDITY (subjective) *	1	1	1				
ODOR (subjective) **	3	3	3				

* (1) Clear (2) Slight (3) Moderate (4) High ** (1) None (2) Faint (3) Moderate (4) Strong

COMMENTS/OBSERVATIONS Sampled@

fldinfo 2/88

Page ___ of ___

Field Data Information Sheet for Ground-Water Sampling

General Engineering Laboratories
2040 Savage Road
Charleston, SC 29414

Date (yr/mo/day) 92/09/03/4
Field Personnel Surasky, Weeks
Facility Name Charleston Harbor Site (CITY00391)
EPA ID #
Well ID # MW-4
___ Upgradient ___ Downgradient
Weather Conditions Raining / Clear / Windy / Partly Cloudy / Warm / Cool
Air Temperature 29.6 °C
Total Well Depth (TWD) = 16.66 1/100 ft
Depth to Groundwater (DGW) = 8.76 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 7.90 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 1.29 gal
3 Casing Volumes = 3.87 gal = Standard Evacuation Volume
Method of Well Evacuation GEL Teflon Bailer
Method of Sample Collection GEL Teflon Bailer
Total Volume of Water Removed 4.50 gal

Casing Diameter 2 inches
Casing Material PVC
Top Elevation 1/100 ft
Height of Riser 1/100 ft
Surface Elevation 1/100 ft
Screened Interval 1/100 ft
Bottom of Pump, if dedicated (depth/elevation) 1/100 ft
Steel Guard Pipe Around Casing YES ✓ NO ___
Locking Cap YES ✓ NO ___
Protective Abutment YES ✓ NO ___
Well Integrity Satisfactory YES ✓ NO ___
Well Yield LOW ___ MODERATE ✓ HIGH ___
Remarks final volume evacuated @ 1720
final sample collected @ 1900
turb. @ time of collection 1

FIELD ANALYSES

VOLUME PURGED (gallons)	1.50	3.00	4.50				
TIME (military)	1715	1717	1720				
pH (S.U.)	6.67	6.78	6.81				
Sp. Cond. (µmhos/cm)	6990	9430	10340				
Water Temp. (°C)	25.3	24.0	22.9				
TURBIDITY (subjective) *	1	1	1				
ODOR (subjective) **	3	3	3				

* (1) Clear (2) Slight (3) Moderate (4) High ** (1) None (2) Faint (3) Moderate (4) Strong

COMMENTS/OBSERVATIONS Sampled@ 1815

fldinfo 2/88

Page ___ of ___

Field Data Information Sheet for Ground-Water Sampling

General Engineering Laboratories
2040 Savage Road
Charleston, SC 29414

Date (yr/mo/day) 92/09/24
Field Personnel Surasky, Weeks
Facility Name Charleston Harbor Site (CITY00391)
EPA ID #
Well ID # MW-5
___ Upgradient ___ Downgradient
Weather Conditions Raining / Clear / Windy / Partly Cloudy / Warm / Cool
Air Temperature 29.9 °C
Total Well Depth (TWD) = 18.30 1/100 ft
Depth to Groundwater (DGW) = 6.79 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 11.51 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 1.88 gal
3 Casing Volumes = 5.64 gal = Standard Evacuation Volume
Method of Well Evacuation GEL Teflon Bailer
Method of Sample Collection GEL Teflon Bailer
Total Volume of Water Removed 6 gal

Casing Diameter 2 inches
Casing Material PVC
Top Elevation 1/100 ft
Height of Riser 1/100 ft
Surface Elevation 1/100 ft
Screened Interval 1/100 ft
Bottom of Pump, if dedicated (depth/elevation) 1/100 ft
Steel Guard Pipe Around Casing YES ✓ NO ___
Locking Cap YES ✓ NO ___
Protective Abutment YES ✓ NO ___
Well Integrity Satisfactory YES ✓ NO ___
Well Yield LOW ___ MODERATE ✓ HIGH ___
Remarks final volume evacuated @ 1557
final sample collected @ 1645
turb. @ time of collection 1

FIELD ANALYSES

VOLUME PURGED (gallons)	2	4	6				
TIME (military)	1550	1554	1557				
pH (S.U.)	6.58	6.61	6.63				
Sp. Cond. (µmhos/cm)	2169	2300	2600				
Water Temp. (°C)	27.5	26.7	26.0				
TURBIDITY (subjective) *	3	2	2				
ODOR (subjective) **	2	2	2				

* (1) Clear (2) Slight (3) Moderate (4) High ** (1) None (2) Faint (3) Moderate (4) Strong

COMMENTS/OBSERVATIONS Sampled@ 1645

fldinfo 2/88

Page ___ of ___

Field Data Information Sheet for Ground-Water Sampling

General Engineering Laboratories
2040 Savage Road
Charleston, SC 29414

Date (yr/mo/day) 92/09/04
Field Personnel Surasky, Weeks
Facility Name Charleston Harbor Site (CITY00391)
EPA ID # ___
Well ID # MW-6
___ Upgradient ___ Downgradient
Weather Conditions Raining / Clear / Windy / Partly Cloudy / Warm / Cool
Air Temperature 29.9 °C
Total Well Depth (TWD) = 18.12 1/100 ft
Depth to Groundwater (DGW) = 4.63 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 13.49 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 2.20 gal
3 Casing Volumes = 6.60 gal = Standard Evacuation Volume
Method of Well Evacuation GEL Teflon Bailer
Method of Sample Collection GEL Teflon Bailer
Total Volume of Water Removed 2.50 gal

Casing Diameter 2 inches
Casing Material PVC
Top Elevation ___ 1/100 ft
Height of Riser ___ 1/100 ft
Surface Elevation ___ 1/100 ft
Screened Interval ___ 1/100 ft
Bottom of Pump, if dedicated (depth/elevation) ___ 1/100 ft
Steel Guard Pipe Around Casing YES ✓ NO ___
Locking Cap YES ✓ NO ___
Protective Abutment YES ✓ NO ___
Well Integrity Satisfactory YES ✓ NO ___
Well Yield LOW ✓ MODERATE ___ HIGH ___
Remarks well bailed dry @ 2.5 gal. 1404 hrs.
measured after recharge @ 1436 hrs.
final sample collected @ 1445 hrs @ time of collection 2

FIELD ANALYSES

VOLUME PURGED (gallons)	2.25	4.50	6.75	Bailed dry @ 2.5	After recharge		
TIME (military)	1402	1404		1404	1436		
pH (S.U.)	6.49	6.6		6.68	6.67		
Sp. Cond. (µmhos/cm)	2970			3130	3070		
Water Temp. (°C)	26.1			25.4	25.7		
TURBIDITY (subjective) *	4			4	2		
ODOR (subjective) **	2			2	2		

* (1) Clear (2) Slight (3) Moderate (4) High ** (1) None (2) Faint (3) Moderate (4) Strong

COMMENTS/OBSERVATIONS Sampled @ 1445

fldinfo 2/88

Page ___ of ___

Field Data Information Sheet for Ground-Water Sampling

General Engineering Laboratories
2040 Savage Road
Charleston, SC 29414

Date (yr/mo/day) 92/09/24
Field Personnel Surasky, Weeks
Facility Name Charleston Harbor Site (CITY00391)
EPA ID #
Well ID # MW-7
___ Upgradient ___ Downgradient
Weather Conditions Raining / Clear / Windy / Partly Cloudy / Warm / Cool
Air Temperature 29.9 °C
Total Well Depth (TWD) = 18.04 1/100 ft
Depth to Groundwater (DGW) = 5.41 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 12.63 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 2.06 gal
3 Casing Volumes = 6.18 gal = Standard Evacuation Volume
Method of Well Evacuation GEL Teflon Bailer
Method of Sample Collection GEL Teflon Bailer
Total Volume of Water Removed 6.75 gal

Casing Diameter 2 inches
Casing Material PVC
Top Elevation 1/100 ft
Height of Riser 1/100 ft
Surface Elevation 1/100 ft
Screened Interval 1/100 ft
Bottom of Pump, if dedicated (depth/elevation) 1/100 ft
Steel Guard Pipe Around Casing YES ✓ NO ___
Locking Cap YES ✓ NO ___
Protective Abutment YES ✓ NO ___
Well Integrity Satisfactory YES ✓ NO ___
Well Yield LOW ___ MODERATE ✓ HIGH ___
Remarks final volume evacuated @ 1505
final sample collected @ 1630
turb @ time of collection 1

FIELD ANALYSES

VOLUME PURGED (gallons)	2.25	4.50	6.75				
TIME (military)	1455	1459	1505				
pH (S.U.)	6.58	6.65	6.69				
Sp. Cond. (µmhos/cm)	6280	8920	7180				
Water Temp. (°C)	26.8	25.7	24.8				
TURBIDITY (subjective) *	3	4	3				
ODOR (subjective) **	3	3	3				

* (1) Clear (2) Slight (3) Moderate (4) High ** (1) None (2) Faint (3) Moderate (4) Strong

COMMENTS/OBSERVATIONS Sampled@ 1630

fldinfo 2/88

Field Data Information Sheet for Ground-Water Sampling

Page ___ of ___

General Engineering Laboratories
2040 Savage Road
Charleston, SC 29414

Date (yr/mo/day) 92/09/24
Field Personnel Surasky, Weeks
Facility Name Charleston Harbor Site (CITY00391)
EPA ID #
Well ID # MW-8
___ Upgradient ___ Downgradient
Weather Conditions Raining / Clear / Windy / Partly Cloudy / Warm / Cool
Air Temperature 26.9 °C
Total Well Depth (TWD) = 30.99 1/100 ft
Depth to Groundwater (DGW) = 5.20 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 25.79 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 4.20 gal
3 Casing Volumes = 12.60 gal = Standard Evacuation Volume
Method of Well Evacuation GEL Teflon Bailer
Method of Sample Collection GEL Teflon Bailer
Total Volume of Water Removed 12.75 gal

Casing Diameter 2 inches
Casing Material PVC
Top Elevation 1/100 ft
Height of Riser 1/100 ft
Surface Elevation 1/100 ft
Screened Interval 1/100 ft
Bottom of Pump, if dedicated (depth/elevation) 1/100 ft
Steel Guard Pipe Around Casing YES ✓ NO ___
Locking Cap YES ✓ NO ___
Protective Abutment YES ✓ NO ___
Well Integrity Satisfactory YES ✓ NO ___
Well Yield LOW ___ MODERATE ✓ HIGH ___
Remarks
final evacuation completed @ 1143
final sample collected @ 1315
Work @ time of collection 4

FIELD ANALYSES

VOLUME PURGED (gallons)	4.25	8.50	12.75				
TIME (military)	1132	1137	1143				
pH (S.U.)	6.43	6.50	6.49				
Sp. Cond. (µmhos/cm)	10990	11440	11500				
Water Temp. (°C)	23.2	22.7	22.5				
TURBIDITY (subjective) *	4	4	4				
ODOR (subjective) **	2	2	2				

* (1) Clear (2) Slight (3) Moderate (4) High ** (1) None (2) Faint (3) Moderate (4) Strong

COMMENTS/OBSERVATIONS Sampled@ 1315

fldinfo 2/88

Field Data Information Sheet for Ground-Water Sampling

Page ___ of ___

General Engineering Laboratories
2040 Savage Road
Charleston, SC 29414

Date (yr/mo/day) 92/09/13 (4)
Field Personnel Surasky, Weeks, Burton
Facility Name Charleston Harbor Site (CITY00391)
EPA ID #
Well ID # MW-9
___ Upgradient ___ Downgradient
Weather Conditions Raining / Clear / Windy / Partly Cloudy / Warm / Cool
Air Temperature 26.2 °C
Total Well Depth (TWD) = 21.89 1/100 ft
Depth to Groundwater (DGW) = 6.29 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 15.60 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 2.54 gal
3 Casing Volumes = 7.62 gal = Standard Evacuation Volume
Method of Well Evacuation GEL Teflon Bailer
Method of Sample Collection GEL Teflon Bailer
Total Volume of Water Removed 8.25 gal

Casing Diameter 2 inches
Casing Material PVC
Top Elevation 1/100 ft
Height of Riser 1/100 ft
Surface Elevation 1/100 ft
Screened Interval 1/100 ft
Bottom of Pump, if dedicated (depth/elevation) 1/100 ft
Steel Guard Pipe Around Casing YES ✓ NO ___
Locking Cap YES ✓ NO ___
Protective Abutment YES ✓ NO ___
Well Integrity Satisfactory YES ✓ NO ___
Well Yield LOW ___ MODERATE ___ HIGH ✓
Remarks Small amounts of sheen prevalent
final volume evacuated @ 1205
final sample collected @ 1400
turb. @ time of collection 1-2

FIELD ANALYSES

VOLUME PURGED (gallons)	2.75	5.5	8.25				
TIME (military)	1155	1200	1205				
pH (S.U.)	7.00	6.99	7.03				
Sp. Cond. (µmhos/cm)	6980	6440	6290				
Water Temp. (°C)	26.0	26.0	26.1				
TURBIDITY (subjective) *	4	4	4				
ODOR (subjective) **	4	4	4				

* (1) Clear (2) Slight (3) Moderate (4) High ** (1) None (2) Faint (3) Moderate (4) Strong

COMMENTS/OBSERVATIONS Sampled @ 1400

fldinfo 2/88

Page ___ of ___

Field Data Information Sheet for Ground-Water Sampling

General Engineering Laboratories
2040 Savage Road
Charleston, SC 29414

Date (yr/mo/day) 92/09/13 (14)
Field Personnel Surasky, Weeksy, BUXTON
Facility Name Charleston Harbor Site (CITY00391)
EPA ID #
Well ID # MW-11
___ Upgradient ___ Downgradient
Weather Conditions (Raining) / Clear / Windy / Partly Cloudy / (Warm) / Cool
Air Temperature 26.5 °C
Total Well Depth (TWD) = 29.64 1/100 ft
Depth to Groundwater (DGW) = 5.09 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 24.55 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 4.00 gal
3 Casing Volumes = 12.00 gal = Standard Evacuation Volume
Method of Well Evacuation GEL Teflon Bailer
Method of Sample Collection GEL Teflon Bailer
Total Volume of Water Removed ___ gal

Casing Diameter 2 inches
Casing Material PVC
Top Elevation ___ 1/100 ft
Height of Riser ___ 1/100 ft
Surface Elevation ___ 1/100 ft
Screened Interval ___ 1/100 ft
Bottom of Pump, if dedicated (depth/elevation) ___ 1/100 ft
Steel Guard Pipe Around Casing YES (✓) NO ___
Locking Cap YES ___ NO ✓
Protective Abutment YES ___ NO ✓
Well Integrity Satisfactory YES ✓ NO ___
Well Yield LOW ___ MODERATE ___ HIGH ___
Remarks
final volume evacuated @ 1417
final sample collected @ 1530
turb @ time of collection. 1-2

FIELD ANALYSES

VOLUME PURGED (gallons)	4	8	12				
TIME (military)	1405	1410	1417				
pH (S.U.)	6.53	6.56	6.63				
Sp. Cond. (µmhos/cm)	9860	7000	8390				
Water Temp. (°C)	23	23.7	22.9				
TURBIDITY (subjective) *	4	3	3				
ODOR (subjective) **	3	3	3				

* (1) Clear (2) Slight (3) Moderate (4) High ** (1) None (2) Faint (3) Moderate (4) Strong

COMMENTS/OBSERVATIONS Sampled@ 1530 collected field blank @ 1430

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APPENDIX XII

SURFACE WATER AND SEDIMENT SAMPLING TECHNIQUES

Page ___ of ___

Field Data Information Sheet for Ground-Water Sampling

General Engineering Laboratories
2040 Savage Road
Charleston, SC 29414

Date (yr/mo/day) 92/09/(3).4
Field Personnel Surasky, Weeks
Facility Name Charleston Harbor Site (CITY00391)
EPA ID #
Well ID # MW-10
___ Upgradient ___ Downgradient
Weather Conditions Raining / Clear / Windy / Partly Cloudy / Warm / Cool
Air Temperature 28.7 °C
Total Well Depth (TWD) = 19.88 1/100 ft
Depth to Groundwater (DGW) = 5.99 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 13.89 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 2.26 gal
3 Casing Volumes = 6.78 gal = Standard Evacuation Volume
Method of Well Evacuation GEL Teflon Bailer
Method of Sample Collection GEL Teflon Bailer
Total Volume of Water Removed 7.50 gal

Casing Diameter 2 inches
Casing Material PVC
Top Elevation 1/100 ft
Height of Riser 1/100 ft
Surface Elevation 1/100 ft
Screened Interval 1/100 ft
Bottom of Pump, if dedicated (depth/elevation) 1/100 ft
Steel Guard Pipe Around Casing YES ✓ NO ___
Locking Cap YES ✓ NO ___
Protective Abutment YES ✓ NO ___
Well Integrity Satisfactory YES ✓ NO ___
Well Yield LOW ___ MODERATE ✓ HIGH ___
Remarks final volume evacuated @ 1338
final sample collected @ 1415 turb. @ time of collection 2+3

FIELD ANALYSES

VOLUME PURGED (gallons)	2.50	5.00	7.50				
TIME (military)	1331	1335	1338				
pH (S.U.)	6.52	6.42	6.37				
Sp. Cond. (µmhos/cm)	1898	2138	2340				
Water Temp. (°C)	24.1	22.9	23.1				
TURBIDITY (subjective) *	4	3	2				
ODOR (subjective) **	4	2	2				

* (1) Clear (2) Slight (3) Moderate (4) High ** (1) None (2) Faint (3) Moderate (4) Strong

COMMENTS/OBSERVATIONS Sampled@ 1415

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Page ___ of ___

Field Data Information Sheet for Ground-Water Sampling

General Engineering Laboratories
2040 Savage Road
Charleston, SC 29414

Date (yr/mo/day) 92/09/13 (4)
Field Personnel Surasky, Weeks, Buxton
Facility Name Charleston Harbor Site (CITY00391)
EPA ID #
Well ID # SW-1
___ Upgradient ___ Downgradient
Weather Conditions Raining / Clear / Windy / Partly Cloudy / Warm / Cool
Air Temperature °C
Total Well Depth (TWD) = N/A 1/100 ft
Depth to Groundwater (DGW) = 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = gal
3 Casing Volumes = gal = Standard Evacuation Volume
~~Method of Well Evacuation~~ ~~GFE Teflon Bailer~~ Subsurface Grab
Method of Sample Collection ~~GFE Teflon Bailer~~ S.S. core Tube
Total Volume of Water Removed N/A gal

Casing Diameter 2 inches
Casing Material PVC
Top Elevation 1/100 ft
Height of Riser 1/100 ft
Surface Elevation 1/100 ft
Screened Interval 1/100 ft
Bottom of Pump, if dedicated (depth/elevation) 1/100 ft
Steel Guard Pipe Around Casing YES ___ NO ___
Locking Cap YES ___ NO ___
Protective Abutment YES ___ NO ___
Well Integrity Satisfactory YES ___ NO ___
Well Yield LOW ___ MODERATE ___ HIGH ___
Remarks
SW-1 collected @ 0930
SD-1 collected @ 0935

FIELD ANALYSES

VOLUME PURGED (gallons)	NA						
TIME (military)	0935						
pH (S.U.)	7.46						
Sp. Cond. (µmhos/cm)	21430						
Water Temp. (°C)	23.1						
TURBIDITY (subjective) *	1						
ODOR (subjective) **	1						

* (1) Clear (2) Slight (3) Moderate (4) High ** (1) None (2) Faint (3) Moderate (4) Strong

COMMENTS/OBSERVATIONS Sampled@

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Field Data Information Sheet for Ground-Water Sampling

General Engineering Laboratories
2040 Savage Road
Charleston, SC 29414

Date (yr/mo/day) 92/09/13.4

Field Personnel Surasky, Weeks, BUXTON

Facility Name Charleston Harbor Site (CITY00391)

EPA ID #

Well ID # SW-2

___ Upgradient ___ Downgradient

Weather Conditions Raining / Clear / Windy / Partly Cloudy / Warm / Cool

Air Temperature 23.6 °C

Total Well Depth (TWD) = 1/100 ft

Depth to Groundwater (DGW) = 1/100 ft

Length of Water Column (LWC) = TWD - DGW = 1/100 ft

1 Casing Volume (OCV) = LWC x _____ = gal

3 Casing Volumes = gal = Standard Evacuation Volume

Method ~~of Well Evacuation~~ ~~GEL Teflon Bailer~~ Sub Surface Grab

Method of Sample Collection ~~GEL Teflon Bailer~~ S.S. CoreTube

Total Volume of Water Removed gal

Casing Diameter 2 inches

Casing Material PVC

Top Elevation 1/100 ft

Height of Riser 1/100 ft

Surface Elevation 1/100 ft

Screened Interval 1/100 ft

Bottom of Pump, if dedicated (depth/elevation) 1/100 ft

Steel Guard Pipe Around Casing YES ___ NO ___

Locking Cap YES ___ NO ___

Protective Abutment YES ___ NO ___

Well Integrity Satisfactory YES ___ NO ___

Well Yield LOW ___ MODERATE ___ HIGH ___

Remarks
SW-2 collected @ 1115
SD-2 collected @ 1125
heavy rain caused large amount of runoff during sample collection.

FIELD ANALYSES

VOLUME PURGED (gallons)	NA						
TIME (military)	1115						
pH (S.U.)	8.15						
Sp. Cond. (µmhos/cm)	1742						
Water Temp. (°C)	24.4						
TURBIDITY (subjective) *	2						
ODOR (subjective) **	2						

* (1) Clear (2) Slight (3) Moderate (4) High ** (1) None (2) Faint (3) Moderate (4) Strong

COMMENTS/OBSERVATIONS Sampled@

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APPENDIX XII
SURFACE WATER AND SEDIMENT SAMPLING TECHNIQUES

Sediment and surface water samples SD-1/SW-1, SD-2/SW-2, and SD-3/SW-3 were collected at the locations shown on Figure 2, and sediment sample SD-4 was collected at the location shown on Figure 1.

Samples were collected on September 4, 1992, on the outgoing tide just before low tide. The downstream samples were collected first to minimize potential sample bias related to sediment suspended during the sample collection procedures. At each location, the surface water sample was collected prior to the sediment sample to minimize potential impact to the water sample from suspended sediments. The samples were all collected from docks except for SD-2/SW-2 which was collected from shore.

The water samples were collected from a water column approximately 2 feet deep. The samples were collected using a Grab Sampler II. The Grab Sampler II is specially designed to collect surface water samples from locations which are difficult to access. The sampler is a glass bottle attached to a 12-foot pole. The bottle can be opened after lowering it into the water column. To collect the surface water samples, the bottle was lowered approximately 6 inches below the water surface and then opened to allow the bottle to slowly fill with water. The samples were poured directly from the Grab Sampler II into the sample containers. The sampler was decontaminated between each sample collection location using the techniques described in Appendix VIII.

The sediment samples were collected using a stainless steel core tube. The sediment samples were transferred directly from the core to the sample jars. The core sampler was decontaminated between each sample collection location. Field Data Information Sheets for the samples are included in this appendix.

Page ___ of ___

Field Data Information Sheet for Ground-Water Sampling

General Engineering Laboratories
2040 Savage Road
Charleston, SC 29414

Date (yr/mo/day) 92/09/13 (4)
Field Personnel Surasky, Weeks, Buxton
Facility Name Charleston Harbor Site (CITY00391)
EPA ID #
Well ID # SW-3
___ Upgradient ___ Downgradient
Weather Conditions Raining / Clear / Windy / Partly Cloudy / Warm / Cool
Air Temperature 23.8 °C
Total Well Depth (TWD) = 1/100 ft
Depth to Groundwater (DGW) = 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 1/100 ft
1 Casing Volume (OCV) = LWC x ___ = gal
3 Casing Volumes = gal = Standard Evacuation Volume
~~Method of Well Evacuation~~ ~~GFM Teflon Bailer~~ Subsurface Grab
Method of Sample Collection ~~GFM Teflon Bailer~~ S.S. Core Tube
Total Volume of Water Removed gal

Casing Diameter 2 inches
Casing Material PVC
Top Elevation 1/100 ft
Height of Riser 1/100 ft
Surface Elevation 1/100 ft
Screened Interval 1/100 ft
Bottom of Pump, if dedicated (depth/elevation) 1/100 ft
Steel Guard Pipe Around Casing YES ___ NO ___
Locking Cap YES ___ NO ___
Protective Abutment YES ___ NO ___
Well Integrity Satisfactory YES ___ NO ___
Well Yield LOW ___ MODERATE ___ HIGH ___
Remarks
SW-3 collected @ 1150
SD-3 collected @ 1200

FIELD ANALYSES

VOLUME PURGED (gallons)	NA						
TIME (military)	1155						
pH (S.U.)	7.49						
Sp. Cond. (µmhos/cm)	23100						
Water Temp. (°C)	27.1						
TURBIDITY (subjective) *	2						
ODOR (subjective) **	1						

* (1) Clear (2) Slight (3) Moderate (4) High ** (1) None (2) Faint (3) Moderate (4) Strong

COMMENTS/OBSERVATIONS Sampled@

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