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SITE CHARACTERIZATION REPORT NAVY PIER AREA U. S. COAST GUARD RESERVE
TRAINING AREA NWS YORKTOWN VA
9/6/1995
GEOTECHNICAL SPECIALTIES, INC.

SITE CHARACTERIZATION REPORT

Navy Pier Area
U. S. Coast Guard Reserve Training Center
Yorktown, Virginia

PC # 94-3734

Submitted to:

Ms. Errin Tisdale
Virginia Department of Environmental Quality
Tidewater Regional Office, Water Division
Pembroke Two - Suite 310
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Prepared for:

Ms. Lynn Daniels- Owner/Operator
U. S. Coast Guard - RTC
Yorktown, Virginia
(804) 898-2390

Prepared by:

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September 6, 1995

EXECUTIVE SUMMARY

- Drinking wells affected
 - Drinking wells potentially threatened
 - Surface water affected
 - Surface water potentially threatened
 - Free product on ground water
 - Dissolved phase present above water quality standards
 - Sump, basement, utility potentially threatened
 - Sump or basement affected
 - Utility affected
 - Residual phase present that may leach into ground water
 - Residual phase levels in stockpiled soils that merit abatement
 - Site recommended for Further Investigation
-

EXECUTIVE SUMMARY (continued)

The project site was initially targeted for investigation after the demolition of a pier-side structure revealed the release of periodic contamination of the beach area by heavy fuel products which had been trapped underground. Rusty water and fuel oil were periodically flowing from two pipelines which had fed into the pier-side structure. Tracing the route of these pipelines penetrating the bulkhead led to the discovery of an old Valve Pit approximately 25 - 30 ft south of the existing bulkhead. The valve pit is a below grade, concrete structure, abandoned in place. It was filled with construction debris and paved over with asphalt as part of the lower parking area construction. It is located adjacent to the now demolished Boiler House, first operated by the US Navy as a means to preheat NSFO.

Initially, prior to opening the pit, it was suspected it might have been a tank containing the petroleum products and rusty water noted on the beach. The actual source of the contamination was unknown. After excavation and surveys of the pit were conducted, the pit was identified as a Valve Pit formerly associated with the Boiler House operations. The pit contains many pipelines, large and small, penetrating the concrete walls. It was discovered that the petroleum product was seeping into the pit from the surrounding ground through cracks in the walls and floor as well as periodically escaping from the abandoned pipelines.

Further investigation of both the project site and available records revealed that at least two large (100 K+ Gal.) spill events had been recorded at the US Navy Fuel Depot located upgradient from the USCG site. A US Navy Spill Prevention Control and Countermeasures Plan dated 1978 indicated that a 100 K+ gallon NSFO spill had occurred in 1970 (actual date was early January 1971) due to US Navy operations. Based on interviews with USCG personnel, the release was suspected to have followed a route from the Naval Fuel Supply Depot concrete fuel storage tanks, through abandoned fuel line pipe-bed trenches and storm drain lines to the vicinity of the recently re-discovered Valve Pit located on what is currently USCG property.

During the preliminary assessment (Site Check) phase of the investigation during which the extent of contamination of heavy fuel oil products was being established, relatively high concentrations of gasoline, kerosene, and diesel contamination were noted on the beach area immediately beneath the Navy's "Stripper House" attached to the Navy Fuel Pier. The source of this contamination was unknown, however it is suspected that the "reservoirs" beneath the pumps, and past Navy fueling practices, are responsible for this contamination.

Additionally, while attempting to delineate the extent of the NSFO contamination in the parking area immediately surrounding the recently opened Valve Pit, elements of Aviation

EXECUTIVE SUMMARY (continued)

Gasoline (AvGas) were detected in several of the chemical analyses. Further research of the facility plans and records revealed the presence of two abandoned Navy AvGas supply lines in the immediate vicinity of the noted contamination.

The extent and scope of this investigation was modified several times en route to completion, as requested by Virginia DEQ, with the final scope to establish the sources of the noted contamination, preliminarily define limits of contamination, and provide recommendations for further action to either remediate or close the site.

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SIGNATURE/CERTIFICATION SHEET

Prepared by:

Name: Bruce R. Spiro

Signature:



Company: Geotechnical Specialties, Inc

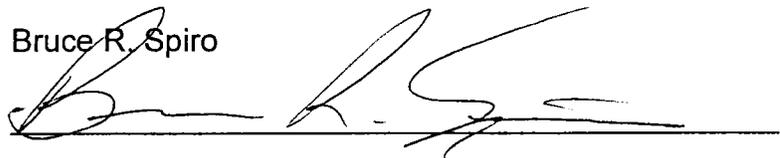
Address: 953 - B Norfolk Square
Norfolk, Virginia 23502

VA Professional Certification (recommended):

I certify that I have prepared or supervised preparation of the attached report, that it has been prepared in accordance with industry standards and practices, and that the information contained herein is truthful and accurate to the best of my knowledge.

Name: Bruce R. Spiro

Signature:



VA Professional Certification Type and Number:

Virginia Professional Engineer - Registration No.15791

Company: Geotechnical Specialties, Inc.

Address: 953 - B Norfolk Square
Norfolk, Virginia 23502

1.0 SITE ASSESSMENT

1.1 SITE LOCATION AND DESCRIPTION

Facility Name & Address: U.S. Coast Guard Reserve Training Center
Yorktown, Virginia

Contact: Ms. Lynn Daniels

Phone: (804) 898 - 2390

Facility Function: Coast Guard Personnel Training and Education

Current land use within 500 feet: West - Northwest : Colonial National Historical Park;
Remainder of project vicinity is within the confines of the Coast Guard property.

Projected land use within 500 feet (include specific dates, if known): None other than
Current.

Is the site in a flood plain?: North - Northeast area of site in vicinity of Navy
and Coast Guard Piers is in the Flood Plain - the remainder of the site is above flood plain
level.

1.2 HISTORICAL RELEASES

Accounts of numerous spill events, in particular an event comprising some 100,000 Gal. of Navy Special Fuel Oil (NSFO), are recorded as having occurred at the Navy Fuel Depot. This fuel facility is approximately 1/4 to 1/2 mile Southwest of the subject site and is upgradient, with surface elevation differences of some 20 ft from the Fuel Depot to the Pier area. These spill events, while not occurring within 500 ft of the site where product was detected in May 1994, directly impact it by allowing contamination to travel through conduit pathways to the site, or Pier area. Reports of the referenced spill events are copied in the Appendix of this SCR.

1.3 GEOLOGY AND HYDROGEOLOGY

The project site is within the Coastal Plains Geologic Province. The subsurface stratigraphy of the Coastal Plain in this region consists of typical Coastal Plains Alluvial and Fluvial deposits containing unconsolidated sediments of the Norfolk and Yorktown formations. Norfolk formation sediments consist of interbedded Silts, Clays and Sands, while Yorktown Formation deposits consist primarily of Fine Sands and Silts with noticeable quantities of Marine Shell Fragments. At the project site, surficial soils consist of typical Recent deposits of estuarine sediments with localized concentrations of disturbed soils and/or man-placed uncontrolled fill. In the immediate vicinity of the Parking Area adjacent to the Pier, debris resulting from demolition of previous buildings underlies the existing pavement structure. The parking area is constructed on the former site of a Navy Steam Plant. The building was demolished and existing storm and fuel lines abandoned in-place. The extent to which these debris materials exist is not fully defined at the present time.

Ground water depths varied across the site from a minimum of about 4 to 5 ft at the lower areas of the site near the pier area, to depths of approximately 16 ft in the vicinity of the upper parking area. Reference is made to the Test Boring, Hand Auger and Monitoring Well Logs included with this study for specific groundwater elevations. An approximate Groundwater Contour Map is included for reference as Appendix A, Figure 6.

1.4 RELEASE ASSESSMENT

The detected contamination at the site appears to derive from several events over the history of the usage of the site. The initial detection of weathered NSFO leaching onto the beach appears to be related to at least two large scale spill events recorded in the early 1970's. In particular, a spill event recorded in 1971 indicated that approximately 100,000 gallons of NSFO were released from the Navy Fuel Depot located upgradient from the project site. This release was recorded by the Navy as having occurred in 1970; however, USCG records identify the event as having occurred on Jan 10, 1971. Copies of interviews with USCG members present during the spill are included with this document as Appendix E.

Interviews with USCG personnel battling the spill indicate that the fuel moved from the Navy Fuel Depot tanks (constructed circa 1918), around the perimeter of the NSFO conduits and into a Valve Pit located on Navy property immediately adjacent to the USCG RTC Main Entrance (See "Upper Valve Pit" - Site Vicinity Map, Figure 2). This upper valve pit, which was open to the elements until early 1995, appeared to have contained several feet of oil at one time. This observation is consistent with the statements made by USCG personnel on site for the spill clean up in 1971. A pipe runway or bed, just above floor level in the upper pit, contains several pipes which lead to the lower valve pit adjacent to the old

Boiler House. Once in the pipe beds, the NSFO is suspected to have traveled downgradient until these lines intercepted or crossed a storm drain which, in turn led toward the lower valve pit (which now lies beneath the parking area by the Navy and Coast Guard piers). From this lower pit, two pipelines extended into the pierside structure that was demolished in 1994. The demolition of this structure initiated this latest release. The two pipes (one terra cotta and one cast iron) were found to leak rusty water and oil intermittently after the structure was removed.

Of the 100,000 gallons reported as released, approximately 60,000 gallons were reported as recovered at that time. The 1978 Navy SPCC Plan which lists this spill, states "virtually none of this reached surface water". This would indicate that approximately 40,000 gallons of NSFO remains in the ground and could be migrating downgradient via existing or abandoned utility lines or beds.

In addition to the NSFO discovered in the parking area and traced to the Navy Fuel Depot, analysis of samples obtained from the early stages of the Site Check and SCR investigation revealed contamination in limited areas within the lower parking area due to Aviation Fuel (AvGas). Further investigation of the site history revealed the presence of two abandoned Aviation Fuel lines formerly operated by the Navy. These lines were abandoned at some point in the past; however, it does not appear that they were fully flushed prior to being abandoned. As a consequence, remaining fuel has pooled to the bottom of the lines, downgradient in the parking lot area. Apparently, these pipelines have been damaged or corroded over time (possibly during demolition of the Boiler House), resulting in the noted release. Quantification of this release is not possible at this time without further evaluation of the pipeline routes and condition of the conduits. However, it appears that this contamination is isolated to the immediate area surrounding the two specific areas of pipeline.

Relatively high concentrations of gasoline and diesel on the beach area beneath the Navy 'Stripper House' was investigated under this site check and SCR. The exact source of this contamination is unknown, however it is suspected that the "reservoirs" beneath the pumps, and past Navy fueling practices, are responsible for this contamination. The Stripper House contains pumps which "strip" the fuel from the lines and send it back upgradient to the fuel farm. Beneath each pump is a flanged reservoir made of steel which extends, in some cases, into the sand and in other cases, the river. Previous operations involved four separate parallel pumps for JP (Jet Fuel), NSFO, MoGas (leaded gas) and MUR (Motor gas, unleaded regular). Inspection of the reservoirs by USCG personnel revealed deterioration in the steel, around the flanges and at the union of the reservoirs to the concrete flooring of the stripper house. The US Navy has agreed to remove the two pumps (inside the stripper house, atop the reservoirs) for the two unused products (NSFO and MoGas) and is currently discussing removing the reservoirs. The USCG has unofficially requested the US Navy pressure test these reservoirs to prove they do not leak; however, no agreement has been reached.

2.0 RISK ASSESSMENT

The Risk Assessment for this site has three separate components: the Stripper House, located at the foot of the Navy Fuel Pier; aviation gasoline (AVGAS) from leaking and deteriorated abandoned fuel lines; and contamination from the 1971 release of approximately 100,000 gallons of Navy Special Fuel Oil (NSFO). The Risk Assessment for each component will be addressed separately.

Risk Assessment - Stripper House

Products presumed to be from reservoirs under the stripper house and past practices were discovered during a screening for Navy Special Fuel Oil (NSFO) contamination. Hand auger samples taken along the beach beneath the fuel piers found free product and photo-ionization detector (PID) readings demonstrated the presence of organic vapors (**Appendix F, Site Check Report**). Subsequent soil samples identified gasoline and weathered diesel components (**Appendix B**). These past releases resulted in free product, vapor phase, residual soil contamination, and dissolved phase groundwater contamination immediately beneath the stripper house. The contamination is located within the tidal zone. Soil samples found TPH levels in excess of 3000 ppm. Risk to human health is minimal. The environment may be adversely affected since contamination is leaching into the York River.

Risk Assessment - Aviation Fuel Lines (Abandoned)

Contamination resulted from leaking/deteriorated aviation gasoline fuel lines abandoned in place after installation of the fuel piping for the current Navy fuel pier. Aviation fuel (AVGAS) contamination was discovered during an assessment of the site for NSFO contamination. The location of the aviation fuel lines parallel to the entrance road to the parking lot and around the perimeter of the former power plant were identified from old site drawings (**Appendix A, Figure 4**). Borings and monitoring wells to identify NSFO contamination indicate the presence of AVGAS components in samples immediately adjacent to the location of abandoned aviation fuel lines (**Appendix B, Tables 2B, 2C**). The release generated an unknown quantity of contaminant. Contamination in the vicinity of abandoned fuel lines has resulted in the presence of a vapor phase and residual phase with minimal dissolved phase contamination. No free product was identified. Risk to human health and the environment is minimal, the USCG Reserve Training Center uses city utilities for its potable water source and the area of contamination beneath the parking lot is limited.

Risk Assessment - Navy Special Fuel Oil

Following the demolition of a pierside concrete structure on the beach adjacent to the Stripper House, NSFO was discovered seeping upwards through the beach soils and later,

in water leaking from abandoned pipes protruding through the seawall. The pipes were traced to the lower Valve Pit where NSFO was identified both as free product and in groundwater leaching into the abandoned pit from cracks in the concrete floor and walls and around the pipes entering the pit. Contaminated groundwater was pumped out of the valve pit for disposal, and to enable work to be done in the pit. Two of the large pipes entering the pit from upgradient were cut open and drained of approximately 200 gallons of fuel oil, then grouted with concrete and blanked off.

Subsequent record searches identified a Navy Fuel Depot NSFO release on 10 January 1971 of approximately 100,000 gallons, which eventually made its way through pipe beds and storm drains toward the river near the USN and USCG piers. Contamination appears to have flowed along the outside of underground fuel lines, and intersected storm drains in the vicinity of what is now the upper parking lot at the USCG-RTC (**Appendix A**). Old site plans indicated this area had been a housing area, under which the now abandoned NSFO fuel lines, Steam lines and other utilities once ran. Storm drains from the housing area are believed to have connected to the existing storm drain system in the new, lower parking lot through terra-cotta drain lines. Approximately 60,000 gallons of NSFO were reportedly recovered by the Navy during this incident.

Contamination has resulted in the presence of free product as well as vapor, residual and dissolved phase contamination throughout the pipeline runs. A plume of residual NSFO appears to be using the outside of the abandoned piping as a conduit from the fuel depot to the York River. NSFO contamination along with free product was found at the top of the drop off adjacent to the upper parking lot. NSFO contamination was also found from the toe of the slope to the area around the pit. NSFO is pooling beneath the lower parking lot near the abandoned valve pit and behind the seawall area adjacent to the recently removed structure.

In early 1995, the US Navy sealed off the pipe penetrations within the upper Valve Pit at the Navy Fuel Depot, preventing further introduction of surface waters to the conduit pathways and thereby reducing the flow of water and oil from the Fuel Depot toward the beach area. However, a potentially serious threat to the River remains in regards to the stability of the seawall. As previously noted, NSFO collecting in the lower valve pit was leaching through and around abandoned lines, seeping through the soils beneath the existing seawall and contaminating the beach area. The maintenance of the seawall is critical, as the quantity of oil being held back by the wall is presumed to be significant, based on the free product in the lower valve pit and in the monitoring wells. Failure of the seawall, or further undermining of the soils, could result in a significant release of NSFO to the York River.

The presence of petroleum contamination at the site does not appear to impact human health, but environmental quality may be adversely affected by the intermittent release of petroleum contamination into the York River at the lower end of the parking lot adjacent to the fuel piers. The quantity and frequency of release is determined by variable hydrologic conditions at the site and the continued integrity of the seawall.

3.0 REMEDIATION ASSESSMENT / CONCLUSIONS

For the three contaminant conditions (Stripper House, AvGas Lines, and NSFO) the direct impact on human receptors appears to be minimal. However, continued migration and leaching of the NSFO and stripper house contaminants into the York River has the potential to affect shellfish beds and other marine life. It should be noted that the USCG is confident that these contaminants are the result of past US Navy practices and/or spills and that the next steps (Corrective Action Plan and implementation of corrective actions) should be the responsibility of US Navy subject to scrutiny and approval by USGC staff.

Remediation Assessment - Stripper House

At this time, the potential on-going nature of this release precludes a complete evaluation of potential remedial alternatives. As previously stated, the USGC has become aware of the issue, has made the US Navy aware of the issue and has begun negotiations with the US Navy to determine the source of release from US Navy supplies. While it is suspected that leaking flanges from reservoirs at the "Stripper House", in conjunction with poor housekeeping of fuel supplies, has led to the present condition, termination of the release cannot be verified until the lines are pressure tested and integrity ascertained. Once this task is completed, it may be found that TPH concentrations have been reduced to levels appropriate for further remediation by natural processes only; otherwise, considering the concentrated area of contamination and proximity to the River, remediation by excavation and replacement is recommended as the most effective alternative. The contaminated soils could be either removed from the site and treated at an existing off-site facility, or treated on-site with portable units and returned to point of origin.

Remediation Assessment - AvGas Lines

Due to the apparent limited extent of the contamination released from the AvGas lines, distance from receptors and limited current and projected site utilization (parking lot), closure of this 'site' is recommended. Drawings should be marked to show the location of contamination. If buildings are placed there in the future, clean-up should be addressed, as needed.

Remediation Assessment - NSFO

Complete cleanup of the NSFO lines will be directly hampered by the buildings which sit over the Abandoned Lines (Figure 4). The lateral extent and minimal risk presented by the NSFO contamination along the fuel lines seem to negate the consideration of less conventional remediation technologies on a cost benefit basis alone. However, some degree of more conventional remediation should be considered, with a priority being to

eliminate the escape of NSFO contamination to adjacent receptors. Several alternatives are considered herein to meet this criteria.

Excavation and Replacement:

It would be feasible to excavate contaminated soils within the NSFO conduit pathways, remediate these soils utilizing portable burn units, and return the excavated materials to the point of origin. This alternative would have the advantage of removing the greatest proportion of contaminated materials. However, it is also expected that this would be singularly the most disruptive of several alternatives. Excavations would need to extend to depths of 16 to 18 ft in places in order to reach pooled contamination. In addition, several existing buildings occupy area above the abandoned lines, and would require careful protection or alternative remediation measures. For this reason, this is considered least favorable of the alternatives discussed.

Recovery Well Extraction:

Since the principal component of the contamination appears to lie along an extended pathway following existing utility beds, a series of recovery/extraction wells could be used to extract pooled contamination along the entire length of the utility beds as well as within the more distributed area in the lower parking lot. Advantages to this methodology would be less disturbance to existing operations, ability to work around the existing site structures and probable reduced cost relative to excavation. Disadvantages to this alternative would include a less complete removal of contamination, greater duration of remediation time and post collection disposal of contaminated groundwater, product, etc.

Passive Recovery Gallery:

As of the present date, migration of the NSFO contamination through existing pipelines from the Valve Pit to the bulkhead has been effectively terminated. It could therefore be considered a primary objective of the remediation program to prevent further migration of the contaminants from within the upper portion of the Abandoned lines and Pipe beds to the lower parking area. The potential for this migration has been greatly reduced through the sealing off of the Valve Pit area at the Navy Fuel Depot. Further reductions may be accomplished by installing a passive recovery system consisting of a cut-off trench placed so as to intercept the migratory pathways of the old utility lines and pipe beds, and allow the higher elevation contamination to continue its migration via gravity flow to the recovery system. The location of such a system would be at the toe of the slope from the upper parking area to the lower parking area - situated so as to take maximum advantage of elevation head differences. The cutoff trench would contain a graded collection conduit which would channel any recovered product to a resident oil-water separator for further treatment. This would not be a pro-active recovery system and would allow a majority of

the remaining upper area contamination to remain in place until gravity flow directed the contamination to the collection. However, due to the low risk and exposure levels, this may be considered an acceptable alternative.

Further development of any of these remediation alternatives will depend upon the results of further study being conducted at this time by the Navy as a part of their SCR for the NSFO plume. It is believed that the NSFO remaining from a 1970's era spill event, has migrated along existing and abandoned utility lines to its present position. We do not have a clear picture at this time of the potential additional lateral migration which the contaminant plume may have followed along other known and unknown, existing or abandoned, utility lines or beds intercepting the contaminant concentrations between the site of the Navy Fuel Depot and the lower parking area. Drawings of old utility lines are being compared with current drawings in hopes of finding the storm drains through which product is said to have flowed into the York River, however, the drawings are not complete.

SITE CHARACTERIZATION REPORT

**Navy Pier Area
U. S. Coast Guard Reserve Training Center
Yorktown, Virginia**

PC # 94-3734

Submitted to:

**Ms. Errin Tisdale
Virginia Department of Environmental Quality
Tidewater Regional Office, Water Division
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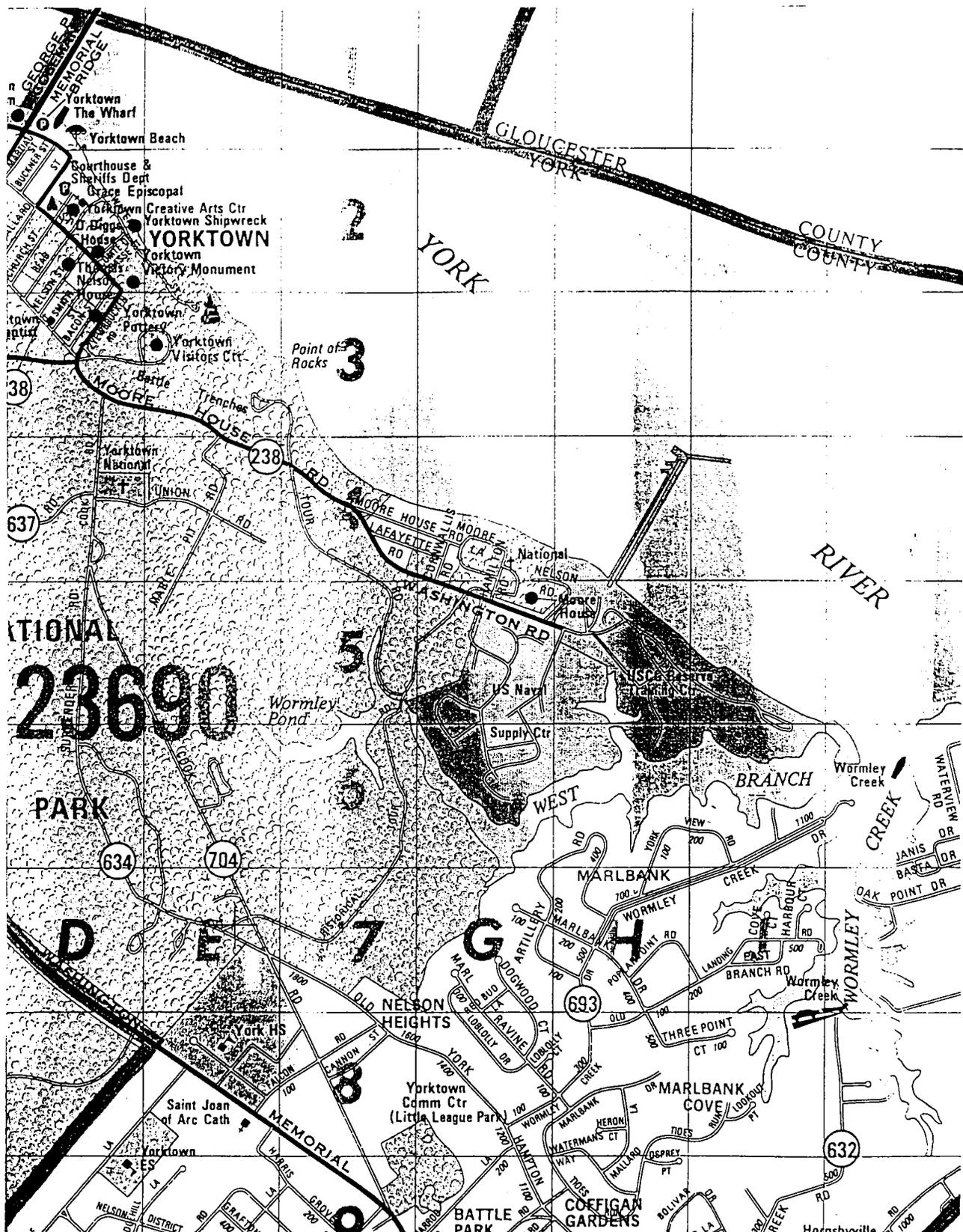
Prepared by:

**Bruce R. Spiro
Geotechnical Specialties, Inc.
953 - B Norfolk Square
Norfolk, Virginia 23502
(804) 461-0826**

September 6, 1995

APPENDIX A

Figures



SITE CHARACTERIZATION STUDY
 NAVY PIER AREA
 USCC - RTC; YORKTOWN, VIRGINIA

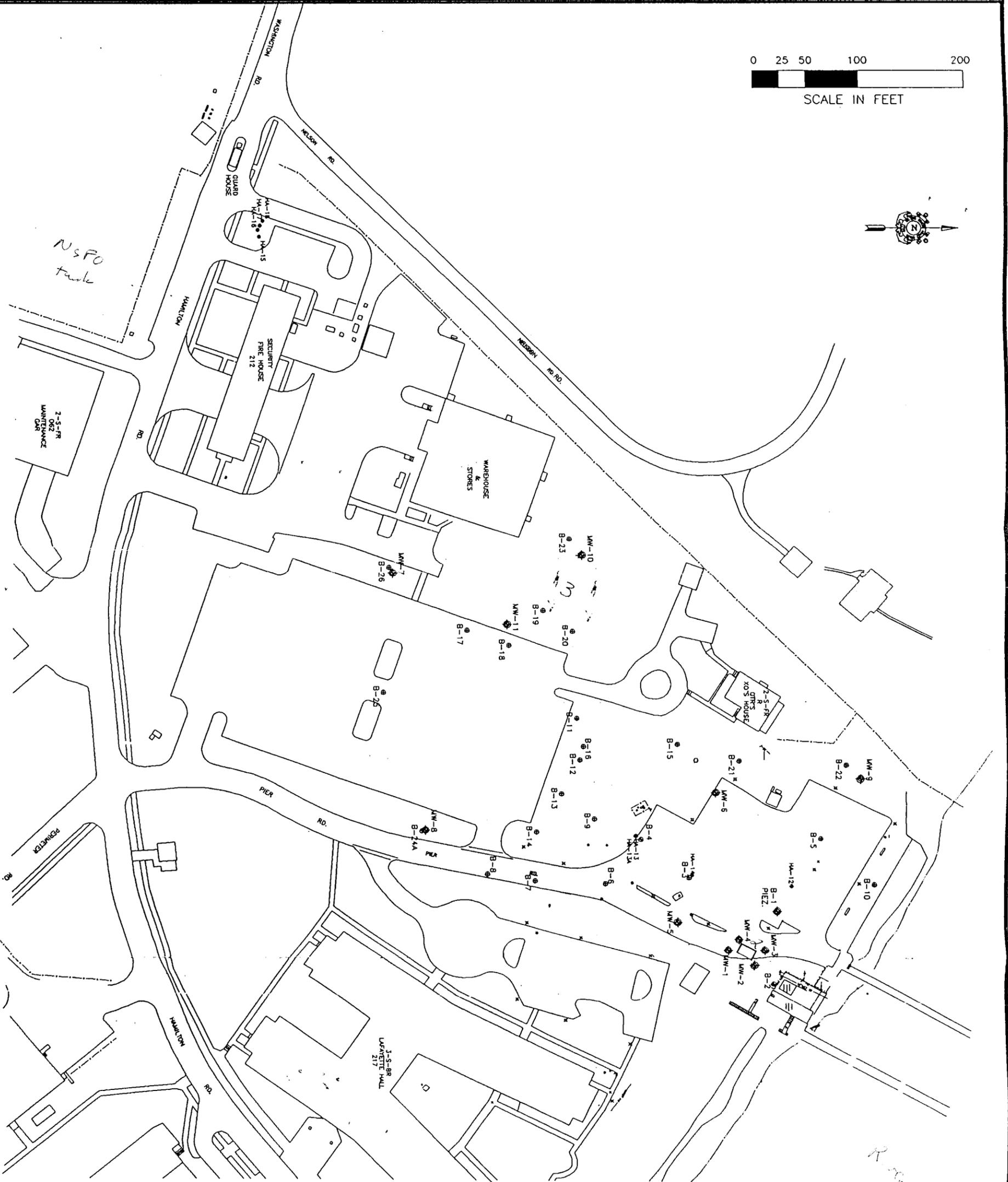
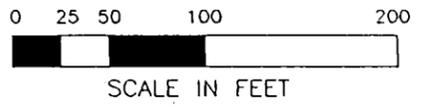
SITE LOCATION MAP

DESIGNED BRS 3/20/95
 DATE
 DRAWN BRS 3/20/95
 DATE
 CHECKED BRS 4/9/95
 DATE
 APPROVED BRS 4/20/95
 DATE

FIGURE - 1



SCALE: AS SHOWN
 SHEET 1 OF 1
 PRINT NO.: 84-3-127



SITE CHARACTERIZATION STUDY
 NAVY PIER AREA
 USCG - RTC; YORKTOWN, VIRGINIA

TEST BORING LOCATION PLAN

DESIGNED	BRS	3/20/95
	DAW	
DRAWN	BRS	4/19/95
	DAW	
CHECKED	BRS	4/20/95
	DAW	
APPROVED	BRS	8/09/95
	DAW	

FIGURE - 3

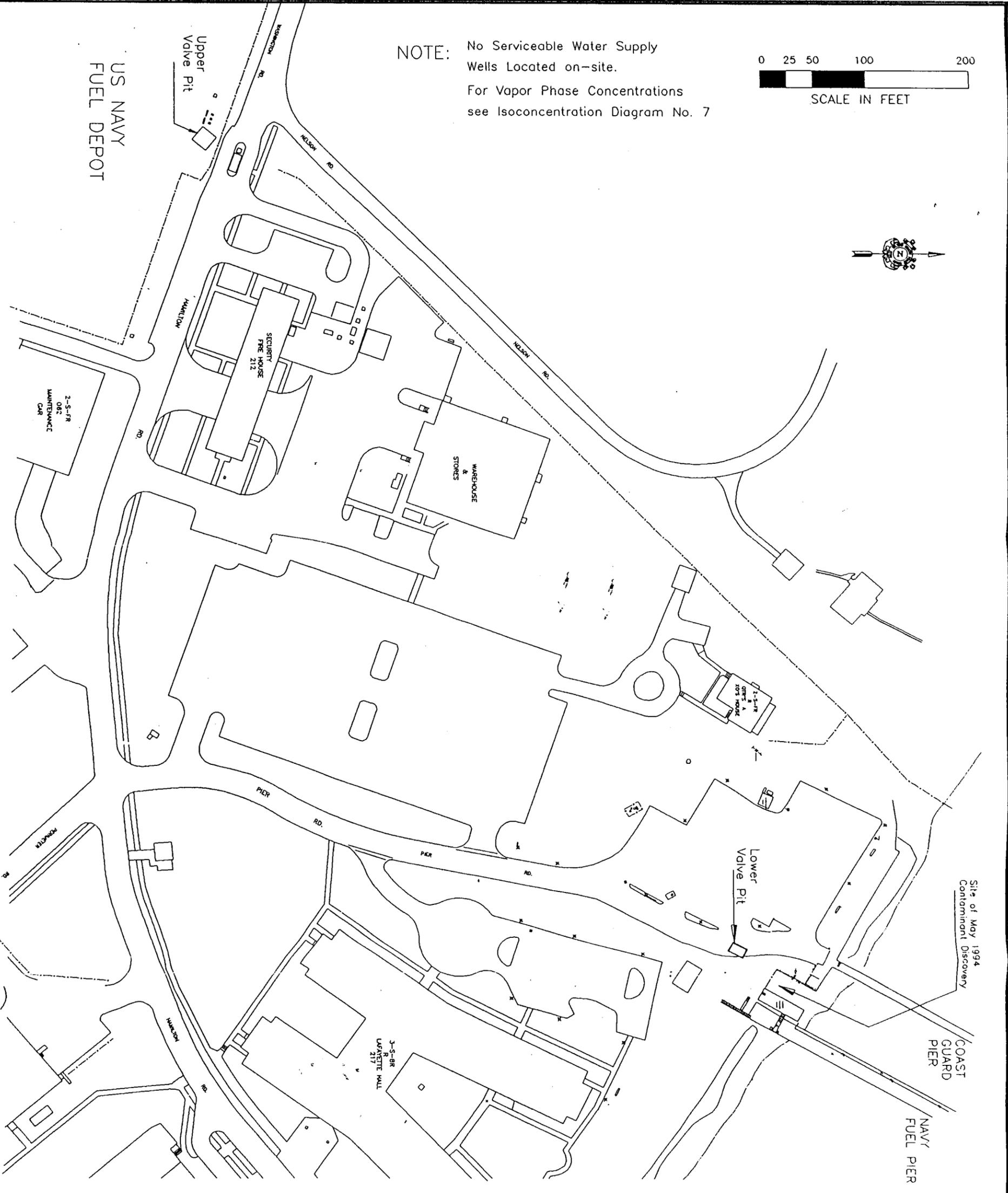
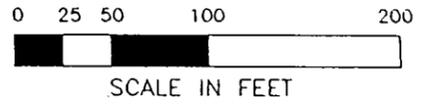
GEOTECHNICAL SPECIALTIES, INC.

 808 B Northham Square
 Norfolk, Virginia 23502
 Telephone (804) 661-0000
 Facsimile (804) 661-1420

PROJ. NO.: 84-5-137
 SHEET 1 OF 1
 SCALE: AS SHOWN

US NAVY
FUEL DEPOT

NOTE: No Serviceable Water Supply
Wells Located on-site.
For Vapor Phase Concentrations
see Isoconcentration Diagram No. 7



SITE CHARACTERIZATION STUDY
NAVY PIER AREA
USCG - RTC; YORKTOWN, VIRGINIA

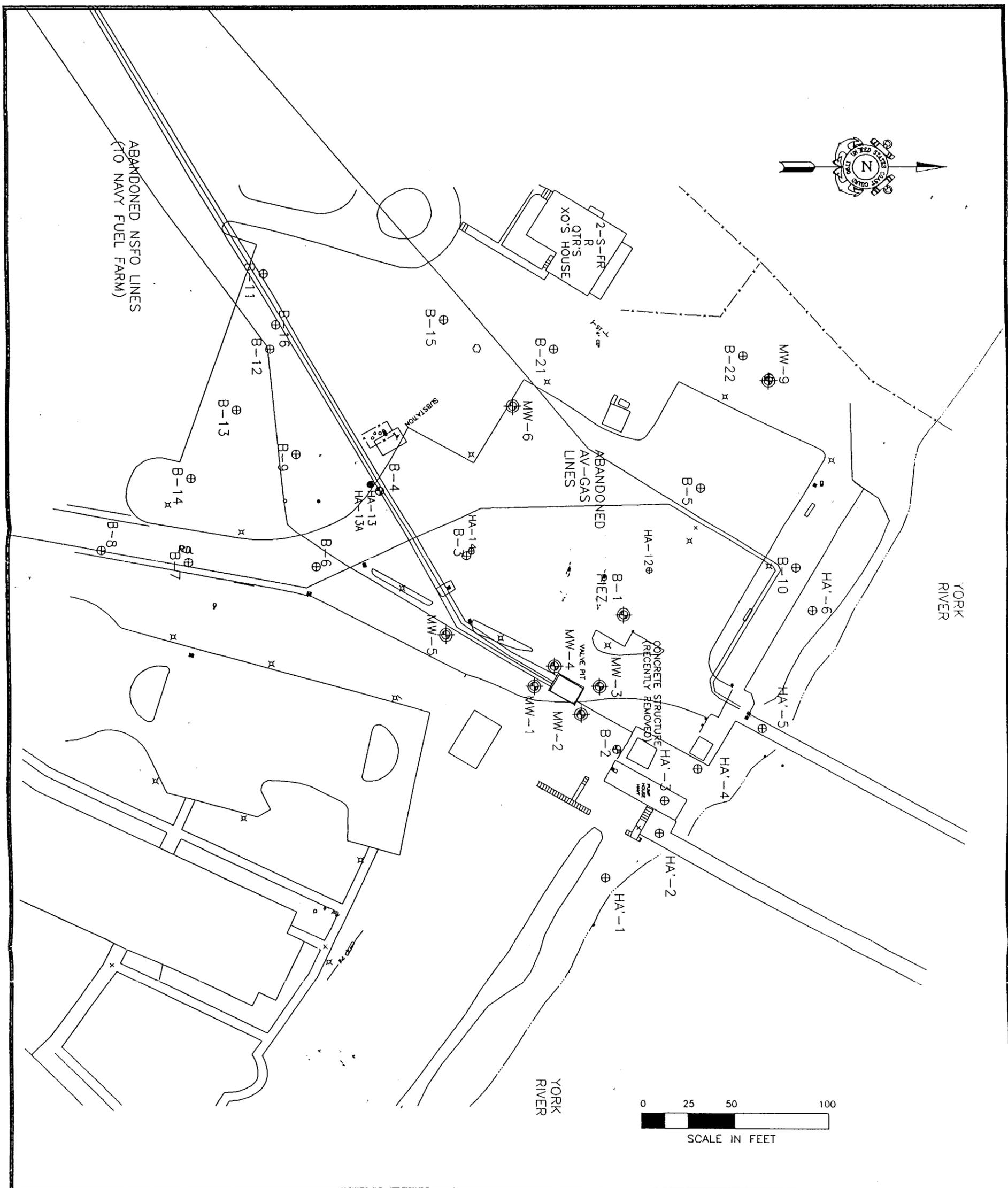
SITE VICINITY MAP

DESIGNED	BRS	3/20/95
		DATE
DRAWN	BRS	4/19/95
		DATE
CHECKED	BRS	4/20/95
		DATE
APPROVED	BRS	8/09/95
		DATE

FIGURE - 2



PROJ. NO. 94-3-137
SHEET 1 OF 1
SCALE: AS SHOWN



SITE CHARACTERIZATION STUDY
 NAVY PIER AREA
 USCG - RTC; YORKTOWN, VIRGINIA

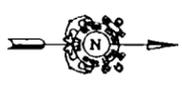
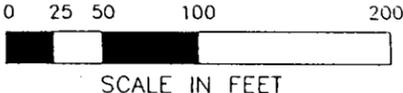
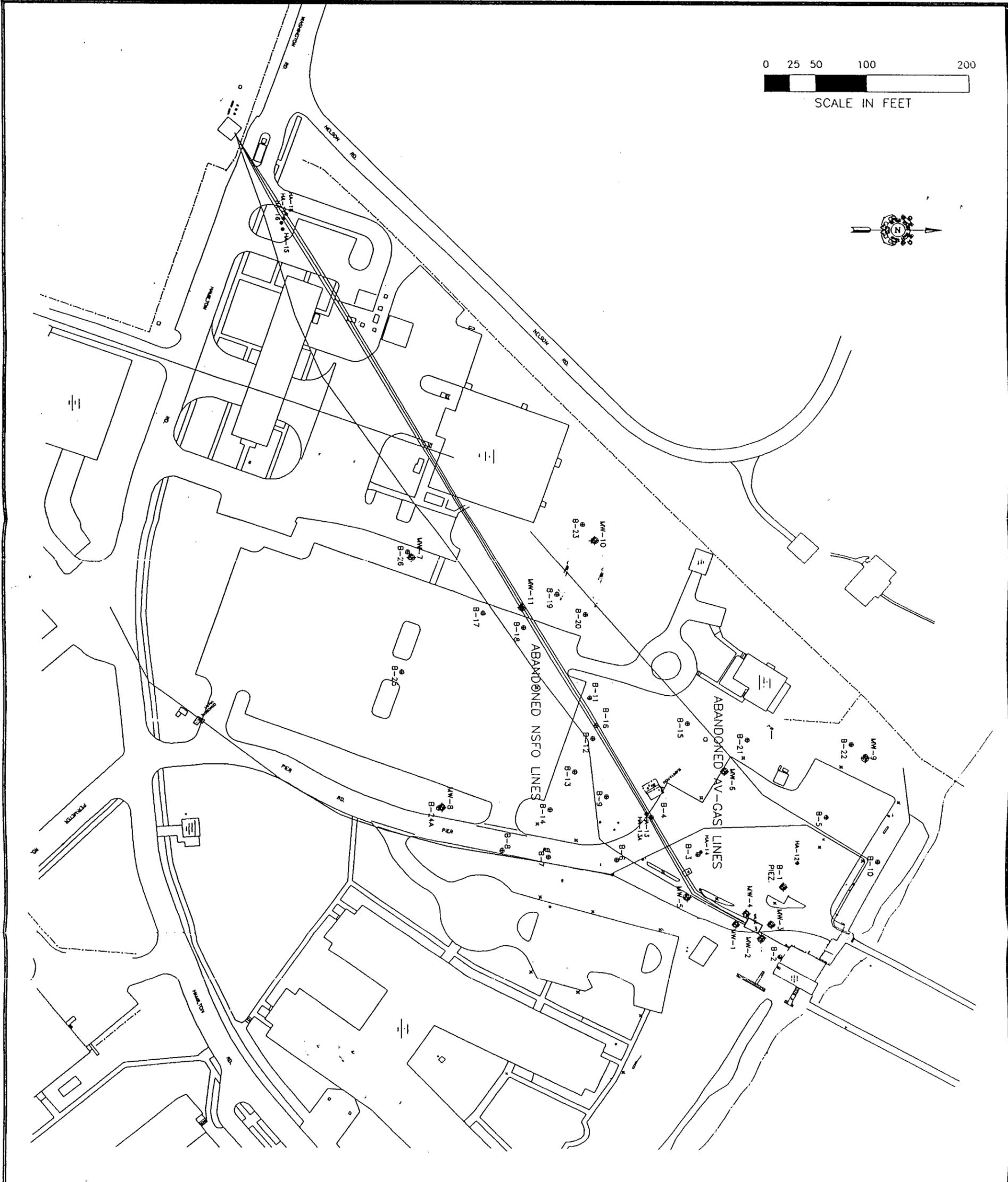
TEST BORING LOCATION PLAN
 DETAIL OF LOWER PARKING AREA
 AND BEACH / STRIPPER HOUSE

DESIGNED	BRS	3/20/95
DRAWN	BRS	4/19/95
CHECKED	BRS	4/20/95
APPROVED	BRS	8/09/95

FIGURE - 3A

GSI
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NOAA NGS B-4-3-127
 SHEET 1 OF 1
 SCALE: AS SHOWN



SITE CHARACTERIZATION STUDY
 NAVY PIER AREA
 USCG - RTC; YORKTOWN, VIRGINIA

ABANDONED UTILITY LOCATIONS

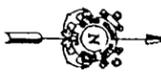
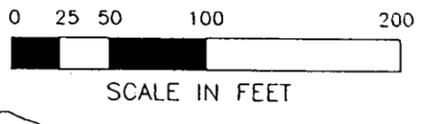
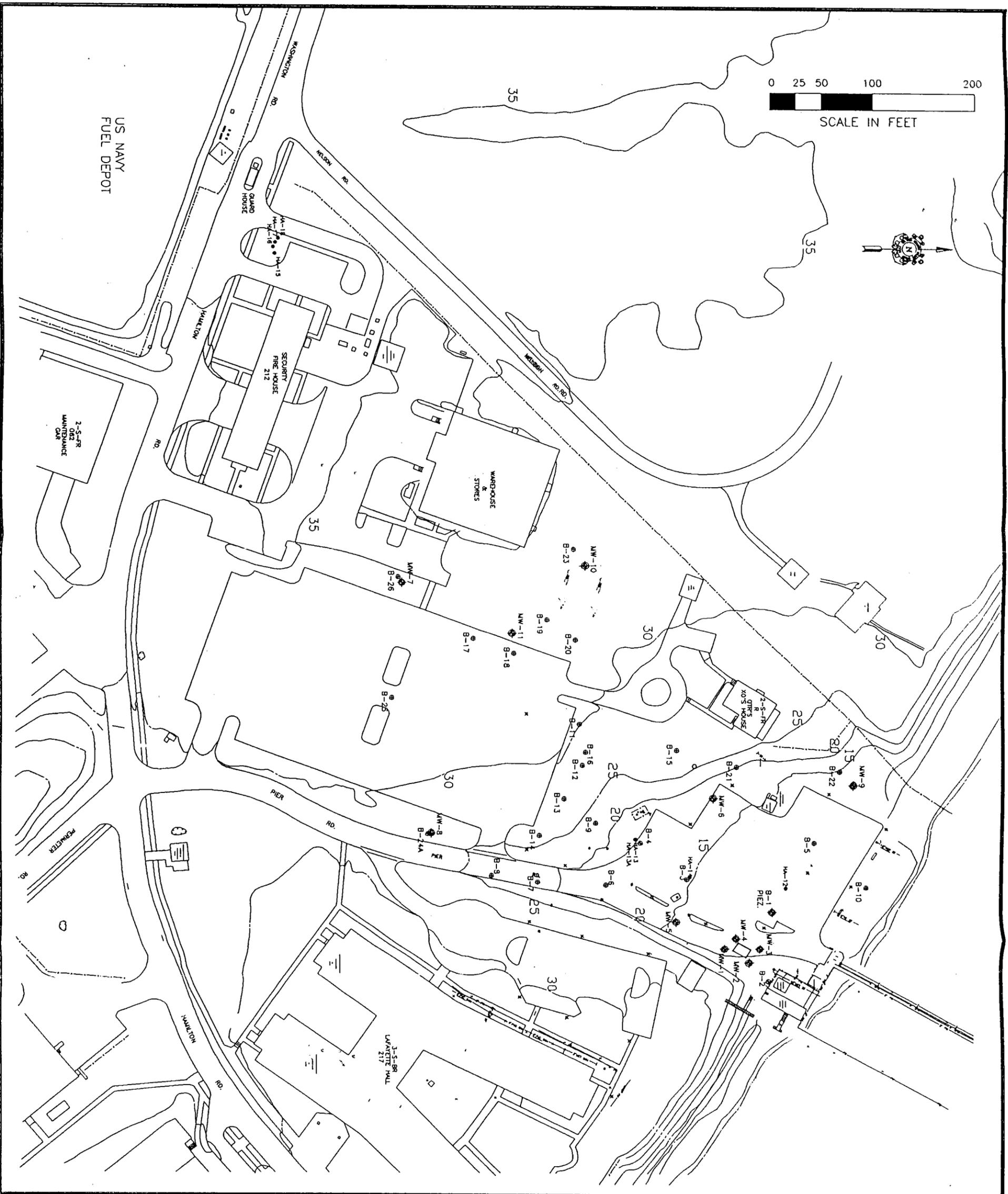
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		DATE
DRAWN	BRS	4/19/95
		DATE
CHECKED	BRS	4/20/95
		DATE
APPROVED	BRS	8/09/95
		DATE

FIGURE - 4

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PROJ. NO.: SA-5-137
 SHEET 1 OF 1
 SCALE: AS SHOWN



SITE CHARACTERIZATION STUDY
 NAVY PIER AREA
 USCG - RTC; YORKTOWN, VIRGINIA

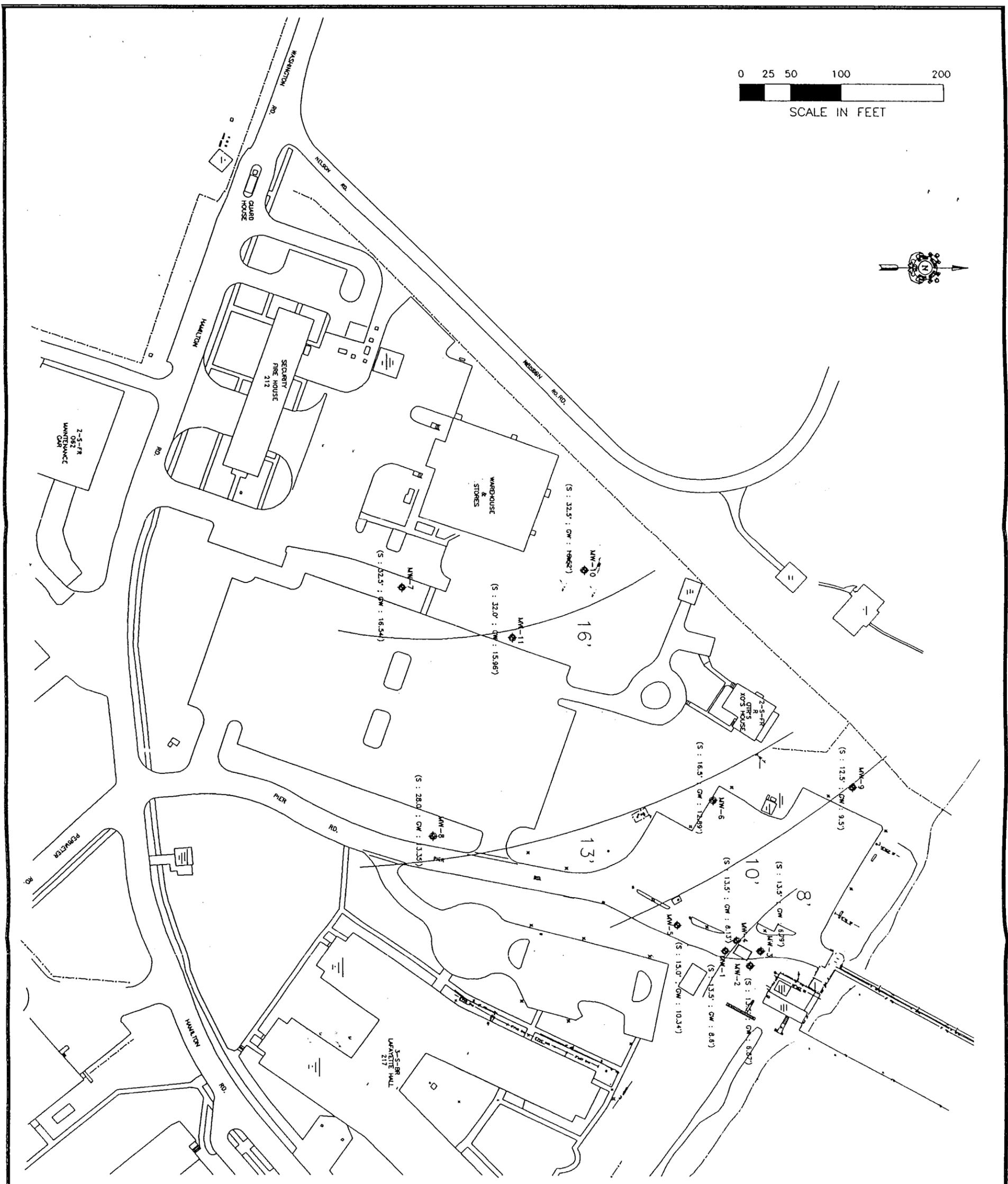
GROUND SURFACE CONTOURS

DESIGNED BRS 3/20/95
 DATE
 DRAWN BRS 4/19/95
 DATE
 CHECKED BRS 4/20/95
 DATE
 APPROVED BRS 8/8/95
 DATE

FIGURE - 5

808 E. Norfolk Square
 Norfolk, Virginia 23504
 Telephone (804) 641-9826
 Fax (804) 641-1438

PROJ. NO. 94-5-137
 SHEET 1 OF 1
 SCALE: AS SHOWN



SITE CHARACTERIZATION STUDY
 NAVY PIER AREA
 USCG - RTC; YORKTOWN, VIRGINIA

GROUND WATER CONTOURS

DESIGNED	BRS	3/20/95
		DATE
DRAWN	BRS	4/19/95
		DATE
CHECKED	BRS	4/20/95
		DATE
APPROVED	BRS	8/09/95
		DATE

FIGURE - 6

GEOTECHNICAL SPECIALISTS, INC.

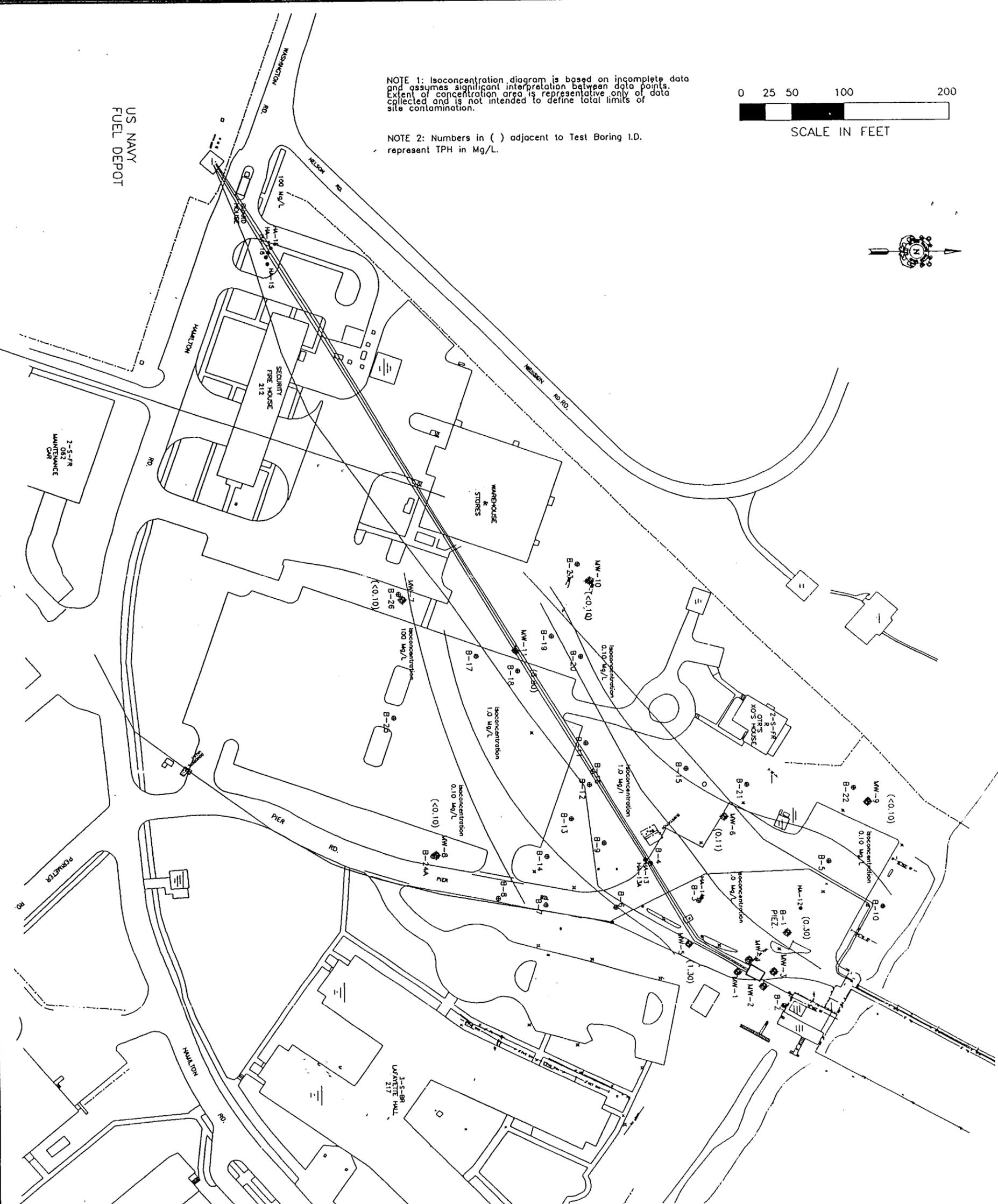
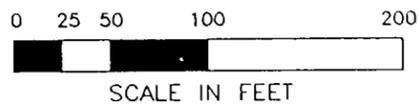
 808 B. HARTZELL SQUARE
 FORT BELLEVILLE, VIRGINIA 22060
 TELEPHONE (804) 681-4000
 FACSIMILE (804) 681-1400

PROJ. NO.: 94-5-137
 SHEET 1 OF 1
 SCALE: AS SHOWN

US NAVY
FUEL DEPOT

NOTE 1: Isoconcentration diagram is based on incomplete data and assumes significant interpretation between data points. Extent of concentration area is representative only of data collected and is not intended to define total limits of site contamination.

NOTE 2: Numbers in () adjacent to Test Boring I.D. represent TPH in Mg/L.



SITE CHARACTERIZATION STUDY
NAVY PIER AREA
USCG - RTC; YORKTOWN, VIRGINIA

ISOCONCENTRATION DIAGRAM
DISSOLVED PHASE

DESIGNED	BRS	3/20/95
	DATE	
DRAWN	BRS	4/19/95
	DATE	
CHECKED	BRS	4/20/95
	DATE	
APPROVED	BRS	8/09/95
	DATE	

FIGURE - 9



PROJ. NO.: 94-5-137
SHEET 1 OF 1
SCALE: AS SHOWN

MONITORING WELL GROUNDWATER ELEVATION DATA			
WELL NUMBER	SURFACE ELEVATION	DEPTH TO WATER	GW ELEVATION
MW-01	13.5	4.9	8.6
MW-02	13.5	6.63	6.87
MW-03	13.5	6.71	6.79
MW-04	13.5	5.37	8.13
MW-05	15	4.66	10.34
MW-06	16.5	3.61	12.89
MW-07	32.5	15.96	16.54
MW-08	28	14.65	13.35
MW-09	12.5	3	9.5
MW-10	32.5	15.88	16.62
MW-11	32	16.04	15.96

SITE CHARACTERIZATION STUDY
NAVY PIER AREA
USCG-RTC; YORKTOWN, VA.
GSI PROJECT NO.: 94-5-137

APPENDIX B

Tables

TABLE 1 . Headspace Vapor Readings - PID		
Boring/MW	Depth (feet)	Reading (ppm)
MW-1	5	5
MW-2	5	3
MW-3	--	ND
MW-4	--	ND
MW-5	8	33.9
MW-6	--	ND
MW-7	12	10.8
MW-8	10	10.1
MW-9	6	1.7
MW-10	--	ND
MW-11	20	64.0

TABLE 2A. Soil Sampling Analytical Results - Stripper House				
Location	Depth (feet)	BTEX (mg/kg)	TPH (mg/kg)	Lead (mg/kg)
HA-1	1.5' - 2'	<0.060	<22	N/A
HA-2	1.5' - 2'	<0.066	300	<17
HA-3	2' - 2.5'	12.200	3,200	<14
HA-4	1.5' - 2'	<0.060	130	N/A
HA-5	1.5' - 2'	<0.060	<18	N/A
HA-6	1.5' - 2'	<0.100	<18	N/A

Notes: BDL - Below Detection Limit
mg/l - Milligrams Per Liter; EPA Method 8020 & California Method, Standard, Diesel Fuel

TABLE 2B. Soil Sampling Analytical Results - Hand Auger Samples				
Location	Depth (feet)	BTEX (mg/kg)	TPH (mg/kg)	Lead (mg/kg)
HA-12-1	5'		1,800	N/A
HA-12-2	5'	<0.242		N/A
HA-12-3	6.5'		770	N/A
HA-12-4	6.5'	<0.135		N/A
HA13-5	2.5'		1,700	N/A
HA13-6	2.5'	<0.068		N/A
HA14-7	3'		70	N/A
HA14-8	3'	<0.060		N/A
HA-18	6' - 7'	<0.047	1,300	<0.50

Notes: BDL - Below Detection Limit
mg/l - Milligrams Per Liter; EPA Method 8020 & California Method, Standard, Diesel Fuel

TABLE 2C. Soil Sampling Analytical Results - Test Boring Samples Navy Pier Area, AVGAS Lines, NFSO Lines				
Location	Depth (feet)	BTEX (mg/kg)	TPH (mg/kg)	Lead (mg/kg)
B8	6'	<0.060	<18	N/A
B9	10'	<0.060	<17	N/A
B10	10'	<0.060	<17	N/A
B11	10'	<0.060	<16	N/A
B11	16'	<0.060	<15	N/A
B12	10'	<0.060	<23	N/A
B13	16'	<0.060	<16	N/A
B14	16'	<0.060	200	<18
B-7-A	6' - 8'	0.296 to 0.306	390	<0.50
B16	4' - 6'	<0.060	<20	N/A
B16	14' - 16'	<0.060	<16	N/A
B17	20' - 22'	<0.060	63	N/A
B18	16' - 18'	<0.077	380	N/A
B21A	6' - 8'	<0.060	<19	<7.8
B-20	18' - 20'	<0.060	<14	N/A
B-24A	16' - 18'	<0.060	<23	N/A
B-26	16' - 18'	<0.060	<16	N/A
MW-9	6' - 8'	<0.060	23	
MW-10	18' - 20'	<0.060		
MW-11	6' - 8'	0.110 to 0.140	340	
MW-11	18' - 20'	<0.060	1200	N/A
B25	16' - 18'	<0.060	19	N/A

Notes: BDL - Below Detection Limit
mg/l - Milligrams Per Liter, EPA Method 8020 & California Method, Standard,
Diesel Fuel

TABLE 3. Water Sampling Analytical Results-				
Location	Date Sampled	BTEX (mg/l)	TPH (mg/l)	Lead (mg/l)
B-1	11/11/94	<0.060	0.30*	N/A
MW-5	11/11/94	<0.064	1.3**	N/A
MW-6	11/11/94	<0.060	0.11*	N/A
MW-7	3/10/95	<0.060	<0.10**	<0.25
MW-8	3/10/95	<0.060	<0.10**	<0.25
MW-9	3/10/95	<0.060	<0.10**	<0.25
MW-10	3/10/95	<0.060	<0.10**	<0.25
MW-11	3/10/95	<0.060	8.8**	<0.25

Notes: BDL - Below Detection Limit
mg/l - Milligrams Per Liter; EPA Method 8020 & 239.2

* California Method, Standard: Gasoline

**California Method, Standard: Diesel Fuel

Note: While the EPA sets a maximum limit of 0.015 mg/l for lead in drinking water, groundwater at this site is not used for human consumption.

TABLE 4: Monitoring Well Completion Data

Monitoring Well ID	Date Installed	Completion Feature	Depth (ft)
MW-01	08/30/94	Flush Cover	0.0
		Bentonite Seal	0.0 - 2.0
		Sch. 40 PVC Slotted / Sand Pack	2.0 - 16.0
MW-02	08/30/94	Flush Cover	0.0
		Bentonite Seal	0.0 - 2.0
		Sch 40 PVC Slotted / Sand Pack	2.0 - 16.0
MW-03	08/30/94	Flush Cover	0.0
		Bentonite Seal	0.0 - 2.0
		Sch 40 PVC Slotted / Sand Pack	2.0 - 16.0
MW-04	08/30/94	Flush Cover	0.0
		Bentonite Seal	0.0 - 2.0
		Sch 40 PVC Slotted / Sand Pack	2.0 - 16.0
MW-05	10/19/94	Flush Cover	0.0
		Bentonite - Cement Seal	0.0 - 1.0
		Sch 40 PVC Solid / Natural Pack	1.0 - 2.0
		Bentonite Seal	2.0 - 3.0
		Sch 40 PVC Solid / Sand Pack	3.0 - 5.0
		Sch 40 PVC Slotted / Sand Pack	5.0 - 20.0
MW-06	10/20/94	Flush Cover	0.0
		Bentonite - Cement Seal	0.0 - 2.0
		Sch 40 PVC Solid / Sand Pack	2.0 - 4.0
		Sch 40 PVC Slotted / Sand Pack	4.0 - 14.0
MW-07	02/23/95	Flush Cover	0.0
		Bentonite - Cement Seal	0.0 - 1.0
		Sch 40 PVC Solid / Natural Pack	1.0 - 4.0
		Bentonite Seal	4.0 - 6.0
		Sch 40 PVC Solid / Sand Pack	6.0 - 8.0
		Sch 40 PVC Slotted / Sand Pack	8.0 - 18.0

TABLE 4: Monitoring Well Completion Data			
Monitoring Well ID	Date Installed	Completion Feature	Depth (ft)
MW-08	02/23/95	Flush Cover	0.0
		Bentonite - Cement Seal	0.0 - 1.0
		Sch 40 PVC Solid / Natural Pack	1.0 - 2.0
		Bentonite Seal	2.0 - 4.0
		Sch 40 PVC Solid / Sand Pack	4.0 - 6.0
		Sch 40 PVC Slotted / Sand Pack	6.0 - 16.0
MW-09	2/24/95	Flush Cover	0.0
		Bentonite - Cement Seal	0.0 - 2.0
		Sch 40 PVC Slotted / Sand Pack	2.0 - 10.0
MW-10	2/24/95	Flush Cover	0.0
		Bentonite - Cement Seal	0.0 - 1.0
		Sch 40 PVC Solid / Natural Pack	1.0 - 6.0
		Bentonite Seal	6.0 - 8.0
		Sch 40 PVC Solid / Sand Pack	8.0 - 10.0
		Sch 40 PVC Slotted / Sand Pack	10.0 - 20.0
MW-11	02/24/95	Flush Cover	0.0
		Bentonite - Cement Seal	0.0 - 1.0
		Sch 40 PVC Solid / Natural Pack	1.0 - 6.0
		Bentonite Seal	6.0 - 8.0
		Sch 40 PVC Solid / Sand Pack	8.0 - 10.0
		Sch 40 PVC Slotted / Sand Pack	10.0 - 20.0

APPENDIX C

Boring Logs and Monitor Well Diagrams



SOIL BORING LOG : B-01
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Drilling Company : Fishburne Drilling, Inc.		
Project Name : Site Characterization - Navy Pier Area			Foreman : Fishburne		
Project Location : USCG RTC Yorktown, Virginia			Boring Method : HSA		
North :		East :		Inspector : Walter	
Total Depth	20.0'	Elev. :	Referenced Datum : NGS - MSL	Completion Date : October 19, 1994	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2	S-1	-/- -/-		SS	Asphalt and Subgrade Material	2.0			ND	
4	S-2	9/8 5/8		SS	Tan Silty SAND with trace Clay				1.3	
6	S-3	3/4 5/4		SS		6.0			1.4	
8	S-4	2/2 2/2		SS	Blue-Green Silty Fine Sand	8.0			30.1	
10	S-5	1/1 1/2		SS	Tan Fine Silty Sand with Clay	10.0			3.1	
12	S-6	1/2 2/1		SS	Tan Fine Sand with trace Silt and marine shell fragments				3.1	
14	S-7	4/5 6/9		SS					3.3	
16	S-8	2/4 4/5		SS		16.0			4.1	
18	S-9	4/6 5/8		SS	Gray and Blue-Green, Silty Fine Sand				3.9	
20	S-10	4/6 7/10		SS		20.0			4.0	
					Boring Terminated at 20.0 ft					



SOIL BORING LOG : B-02
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.	Drilling Company : Fishburne Drilling, Inc.
Project Name : Site Characterization - Navy Pier Area	Foreman : Fishburne
Project Location : USCG RTC Yorktown, Virginia	Boring Method : HSA
North :	Inspector : Walter
East :	Completion Date : October 19, 1994
Total Depth 20.0' Elev. :	Referenced Datum : NGS - MSL

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2	S-1	-/- -/-		SS	Asphalt and Subgrade Material	2.0				
4	S-2	5/6 5/7		SS	Tan Silty SAND with trace Clay	4.0			ND	
	S-3	6/5 4/4		SS	Fine to Coarse Gravel with little Silty Sand	6.0			ND	
	S-4	4/7 7/2		SS	Tan Silty SAND with trace Clay	8.0			ND	
10	S-5	1/2 2/3		SS	Blue-Green Silty Fine Sand	10.0			ND	
12	S-6	2/2 2/2		SS	Tan and Blue-Gray, Fine Sand with trace Silt and marine shell fragments				359.0	
14	S-7	4/5 6/7		SS					171.0	
16	S-8	3/3 6/8		SS					49.8	
18	S-9	3/4 5/7		SS					21.2	
20	S-10	4/5 6/7		SS					3.5	
					Boring Terminated at 20.0 ft	20.0			3.3	



SOIL BORING LOG : B-03
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.	
Project Name : Site Characterization - Navy Pier Area		Foreman : Fishburne	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		East :	
Total Depth 10.0'		Referenced Datum : NGS - MSL	
Elev. :		Completion Date : October 20, 1994	
Inspector : Walter			

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2	S-1	4/5 7/8		SS	Gravel, Brown Fine Sand	2.0			13.6	
4	S-2	6/4 9/4		SS	Tan Silty Fine SAND with trace Clay	4.0			6.1	
6	S-3	4/3 3/3		SS	Blue-Green Silty Fine SAND				3.2	
8	S-4	2/2 3/2		SS					2.8	
10	S-5	4/2 2/3		SS		10.0			2.8	
					Boring Terminated at 10.0 ft				1.8	



Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.	
Project Name : Site Characterization - Navy Pier Area		Foreman : Fishburne	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		Inspector : Walter	
Total Depth 10.0' Elev. :		Completion Date : October 20, 1994	
East :		Referenced Datum : NGS - MSL	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2	S-1	5/4 3/3		SS	Brown and Black, Silty Fine Sand with trace Gravel				0.7	
	S-2	3/2 3/3		SS						
4	S-3	5/4 3/4		SS					19.1	
6	S-4	3/3 3/4		SS	Gray Fine Silty Sand	6.0			61.9	
	S-5	2/2 1/2		SS					11.5	
10					Boring Terminated at 10.0 ft	10.0			4.1	



Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.
Project Name : Site Characterization - Navy Pier Area		Foreman : Fishburne
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA
North :		Inspector : Walter
Total Depth 10.0' Elev. :		Completion Date : October 20, 1994
Referenced Datum : NGS - MSL		

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2	S-1	7/5 3/3		SS	Gray and Greenish-Gray, Silty Fine SAND trace Gravel				1.0	
	S-2	5/4 3/3		SS					6.0	
4	S-3	4/3 2/3		SS				29.3		
10	S-4	3/3 3/3		SS		8.0			8.9	
	S-5	3/2 2/2		SS	Greenish-Gray Silty Fine Sand and Marine Shell Fragments	10.0			4.0	
					Boring Terminated at 10.0 ft					



SOIL BORING LOG : B-06

(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.	
Project Name : Site Characterization - Navy Pier Area		Foreman : Young	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		Inspector : Walter	
Total Depth 10.0'		Referenced Datum : NGS - MSL	
Elev. :		Completion Date : February 20, 1995	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
	S-1	0/0 3/3		SS	Asphalt - 2" Concrete - 10"	1.0				
2					Tan, Silty fine SAND				ND	
	S-2	3/2 3/2		SS		4.0				
4					Gray-Green, Silty fine SAND with MARINE Shell Fragments				ND	
	S-3	3/3 3/3		SS						
6									21.2	
	S-4	3/3 3/3		SS						
8									85.0	
	S-5	3/1 3/3		SS		10.0				
10					Boring Terminated at 10.0 ft				23.8	



SOIL BORING LOG : B-07
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.	
Project Name : Site Characterization - Navy Pier Area		Foreman : Young	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		East :	
Inspector : Walter		Completion Date : February 20, 1995	
Total Depth : 20.0'	Elev. :	Referenced Datum : NGS - MSL	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
	S-1	0/15 7/2		SS	Asphalt - 5" Gravel - 12"	1.5				
2	S-2	3/2 4/3		SS	Tan, Silty fine SAND				ND	
4	S-3	3/2 3/3		SS					ND	
6	S-4	4/6 7/4		SS	Gray - Green, Silty fine SAND with trace marine shell fragments	6.0		▽	ND	
	S-5	3/3 3/3		SS					32.0	
10	S-6	2/1 2/2		SS					63.2	
12	S-7	1/1 2/1		SS					1.6	
14	S-8	1/2 2/2		SS					1.6	
16	S-9	1/1 1/1		SS					2.0	
18	S-10	4/4 5/6		SS					1.0	
20					Boring Terminated at 20.0 ft	20.0			0.8	



SOIL BORING LOG : B-08
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.	
Project Name : Site Characterization - Navy Pier Area		Foreman : Young	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		East :	
Total Depth 14.0'		Referenced Datum : NGS - MSL	
Elev. :		Completion Date : February 20, 1995	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
	S-1	-/- -/-		SS	Asphalt - 4" Gravel - 14 "	1.5				
2	S-2	2/3 1/4		SS	Dark Brown, Silty fine SAND				ND	
4	S-3	2/2 2/2		SS		6.0			3.5	
6	S-4	2/1 1/2		SS					1.8	
	S-5	6/3 4/4		SS	Tan, Silty fine SAND				1.8	
10	S-6	3/2 2/2		SS					0.7	
12	S-7	2/3 6/3		SS					0.7	
14						14.0				

Boring Terminated at 14.0 ft



SOIL BORING LOG : B-09
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.	
Project Name : Site Characterization - Navy Pier Area		Foreman : Young	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		Inspector : Walter	
Total Depth 14.0' Elev. :		Referenced Datum : NGS - MSL	
		Completion Date : February 20, 1995	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2	S-1	3/3 3/3		SS	Dark Brown, Silty fine SAND	2.0			ND	
4	S-2	3/3 3/6		SS	Tan, Silty fine SAND				1.9	
6	S-3	3/3 2/4		SS					2.2	
8	S-4	2/2 3/2		SS		8.0			2.7	
10	S-5	1/1 1/1		SS	Lt. Brown, fine Sandy, Silty CLAY	10.0			3.3	
12	S-6	1/1 1/3		SS	Tan, Silty fine SAND				3.4	
14	S-7	1/2 1/2		SS		14.0			2.3	
					Boring Terminated at 14.0 ft					



SOIL BORING LOG : B-10
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Drilling Company : Fishburne Drilling, Inc.		
Project Name : Site Characterization - Navy Pier Area			Foreman : Young		
Project Location : USCG RTC Yorktown, Virginia			Boring Method : HSA		
North :			Inspector : Walter		
Total Depth 10.0'		Elev. :	Referenced Datum : NGS - MSL		Completion Date : February 20, 1995

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2	S-1	3/4 3/3		SS	Brown, Silty fine SAND w/ trace Clay				ND	
	S-2	3/3 2/2		SS						
4	S-3	2/2 2/2		SS	Tan and Gray, Silty fine SAND	6.0			21.0	
6	S-4	1/1 1/1		SS						
10	S-5	3/2 3/3		SS	Gray-Green, Silty fine SAND with trace marine shell fragments	8.0			4.8	
					Boring Terminated at 10.0 ft				3.5	



SOIL BORING LOG : B-11
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.
Project Name : Site Characterization - Navy Pier Area		Foreman : Young
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA
North :		Inspector : Walter
East :		Completion Date : February 21, 1995
Total Depth : 18.0'	Elev. :	Referenced Datum : NGS - MSL

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2	S-1	2/2 2/3		SS	Brown to Tan, Silty fine SAND				ND	
4	S-2	2/3 2/3		SS					3.0	
6	S-3	2/4 3/3		SS					4.4	
8	S-4	3/3 3/5		SS		8.0			4.8	
10	S-5	3/3 5/4		SS	Reddish Brown, fine to medium Sandy CLAY	10.0			3.2	
12	S-6	4/3 2/4		SS	Tan, Silty fine SAND	12.0			12.3	
14	S-7	3/3 3/3		SS	Tan, fine Sandy CLAY	14.0			18.4	
16	S-8	2/3 4/4		SS	Tan, Silty fine SAND with trace marine shell fragments				9.6	
18	S-9	4/3 3/2		SS		18.0			3.0	
					Boring Terminated at 18.0 ft					



SOIL BORING LOG : B-12
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Drilling Company : Fishburne Drilling, Inc.		
Project Name : Site Characterization - Navy Pier Area			Foreman : Young		
Project Location : USCG RTC Yorktown, Virginia			Boring Method : HSA		
North :			Inspector : Walter		
Total Depth 10.0'		Elev. :	Referenced Datum : NGS - MSL		Completion Date : February 21, 1995

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2 4 6 8 10	S-1	1/3 2/2		SS	Tan to Brown, Silty fine SAND	6.0			ND	
	S-2	2/2 1/1		SS						
	S-3	2/1 3/2		SS						
	S-4	2/3 3/3		SS	Lt. Brown, fine Sandy CLAY					
	S-5	4/3 4/4		SS						
						10.0			2.1	Boring Terminated at 10.0 ft



SOIL BORING LOG : B-13
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.
Project Name : Site Characterization - Navy Pier Area		Foreman : Young
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA
North :		Inspector : Walter
East :		Completion Date : February 21, 1995
Total Depth : 18.0'	Elev. :	Referenced Datum : NGS - MSL

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
	S-1	2/4 3/4		SS	Topsoil - 6"	0.5				
2					Brown, Silty fine SAND	2.0				
	S-2	3/4 3/4		SS	Tan fine Sandy CLAY	4.0			ND	
4									2.4	
	S-3	2/4 3/2		SS	Tan Silty fine SAND				2.0	
6									1.5	
	S-4	2/2 2/2		SS		10.0			2.0	
10									2.0	
	S-5	4/4 5/3		SS		12.0			2.8	
12									3.6	
	S-6	2/3 3/2		SS	Lt. Brown, fine Sandy CLAY				3.0	
14									2.9	
	S-7	3/3 3/3		SS	Reddish Brown to Lt. Brown, Silty fine SAND with trace Clay					
16										
	S-8	2/2 3/3		SS		18.0				
18					Boring Terminated at 18.0 ft					
	S-9	2/2 2/2		SS						



SOIL BORING LOG : B-14
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Drilling Company : Fishburne Drilling, Inc.		
Project Name : Site Characterization - Navy Pier Area			Foreman : Young		
Project Location : USCG RTC Yorktown, Virginia			Boring Method : HSA		
North :		East :		Inspector : Walter	
Total Depth : 20.0'	Elev. :		Referenced Datum : NGS - MSL		Completion Date : February 21, 1995

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
	S-1	4/4 3/3		SS	Topsoil - 4"	0.4				
2					Lt. Brown, Silty fine SAND				ND	
	S-2	4/7 4/5		SS						
4									7.1	
	S-3	3/4 3/3		SS						
6						6.0			10.0	
	S-4	3/2 3/3		SS	Gray, Silty fine SAND with trace marine shell fragments					
8									62.0	
	S-5	4/4 4/4		SS						
10						10.0			20.0	
	S-6	3/2 4/5		SS	Gray to Gray-Green, Silty fine SAND with trace clay					
12									52.0	
	S-7	3/2 3/3		SS						
14									85.0	
	S-8	1/2 2/1		SS						
16									62.0	
	S-9	2/2 2/2		SS						
18									13.4	
	S-10	4/5 6/4		SS						
20						20.0				
					Boring Terminated at 20.0 ft				10.3	



SOIL BORING LOG : B-15
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.	
Project Name : Site Characterization - Navy Pier Area		Foreman : Young	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		Inspector : Walter	
Total Depth 16.0' Elev. :		Referenced Datum : NGS - MSL	
		Completion Date : February 22, 1995	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2	S-1	3/3 3/3		SS	Lt. Brown - Tan, Silty fine SAND				ND	
4	S-2	4/3 3/2		SS					ND	
6	S-3	7/4 3/5		SS					ND	
8	S-4	4/6 3/3		SS					ND	
10	S-5	3/3 5/5		SS		Trace Shell Fragments 8 - 10 ft			ND	
12	S-6	5/3 4/4		SS					ND	
14	S-7	2/1 1/2		SS					ND	
16	S-8	1/1 2/2		SS					ND	
					Boring Terminated at 16.0 ft	16.0			ND	



Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Drilling Company : Fishburne Drilling, Inc.		
Project Name : Site Characterization - Navy Pier Area			Foreman : Young		
Project Location : USCG RTC Yorktown, Virginia			Boring Method : HSA		
North :		East :		Inspector : Walter	
Total Depth : 16.0'	Elev. :		Referenced Datum : NGS - MSL		Completion Date : February 22, 1995

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2	S-1	1/3 2/2		SS	Tan Silty fine SAND					
4	S-2	1/1 2/2		SS		4.0			ND	
6	S-3	2/1 4/4		SS	Reddish Brown, fine Sandy CLAY	6.0			5.7	
8	S-4	6/3 4/4		SS	Tan, Silty fine SAND				7.8	
10	S-5	2/2 2/4		SS		10.0			3.2	
12	S-6	5/6 5/6		SS	Lt. Brown, fine Sandy CLAY	12.0			5.3	
14	S-7	2/1 2/1		SS	Tan, Silty fine SAND				6.0	
16	S-8	1/1 1/1		SS		16.0			3.0	
					Boring Terminated at 16.0 ft				3.0	



Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.
Project Name : Site Characterization - Navy Pier Area		Foreman : Young
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA
North :		Inspector : Walter
Total Depth 22.0' Elev. :		Completion Date : February 22, 1995
Referenced Datum : NGS - MSL		

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
	S-1	-/6 6/5		SS	Asphalt - 3" Gravel - 4" Dark Brown, fine Sandy CLAY	0.5				
2	S-2	2/4 7/6		SS					ND	
4	S-3	10/4 4/5		SS	Tan, Silty fine SAND				2.0	
6	S-4	2/2 2/2		SS					2.4	
	S-5	4/4 6/3		SS	Trace Marine Shell Fragments 8 - 10 ft				2.7	
10	S-6	1/2 4/3		SS					2.5	
12	S-7	5/6 4/4		SS	Gray and Green-Gray, Silty fine SAND with trace marine shell fragments	12.0			1.4	
14	S-8	2/3 3/3		SS					86.0	
16	S-9	2/3 4/3		SS					69.0	
18	S-10	7/3 6/4		SS					37.6	
20	S-11	3/3 3/5		SS					37.4	
					Boring Terminated at 22.0 ft	22.0			10.2	



SOIL BORING LOG : **B-18**
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.
Project Name : Site Characterization - Navy Pier Area		Foreman : Young
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA
North :		Inspector : Walter
East :		Completion Date : February 22, 1995
Total Depth : 22.0'	Elev. :	Referenced Datum : NGS - MSL

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
	S-1	-/6 4/6		SS	Asphalt - 3" Gravel - 4"	0.5				
2	S-2	3/6 4/3		SS					ND	
4	S-3	2/2 1/2		SS	Tan, Silty fine SAND	6.0			4.0	
6	S-4	2/2 2/2		SS	Gray, fine SAND				3.7	
	S-5	1/1 2/3		SS		10.0			9.2	
10	S-6	4/5 6/5		SS					22.0	
12	S-7	2/3 5/3		SS	Gray and Green-Gray, Silty fine SAND with trace marine shell fragments				23.0	
14	S-8	1/2 3/3		SS					106.0	
16	S-9	2/2 2/3		SS					54.0	
18	S-10	4/4 4/4		SS					11.5	
20	S-11	2/3 2/3		SS		22.0			6.6	
					Boring Terminated at 22.0 ft				6.3	



SOIL BORING LOG : B-19
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.					Drilling Company : Fishburne Drilling, Inc.						
Project Name : Site Characterization - Navy Pier Area					Foreman : Young						
Project Location : USCG RTC Yorktown, Virginia					Boring Method : HSA						
North :					East :						
Total Depth 20.0'					Elev. :						
Referenced Datum : NGS - MSL					Completion Date : February 22, 1995						
Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS	
2	S-1	2/6 5/3		SS	Tan, fine Sandy CLAY						
4	S-2	3/5 5/5		SS		4.0			ND		
6	S-3	3/3 5/4		SS	Tan, Silty fine SAND				8.1		
8	S-4	3/1 2/2		SS					2.6		
10	S-5	4/5 5/4		SS	Trace marine shell fragments 8 - 10 ft				6.2		
12	S-6	7/5 6/4		SS					5.3		
14	S-7	3/3 4/3		SS					4.0		
16	S-8	3/2 2/2		SS					4.0		
18	S-9	1/3 2/2		SS					5.7		
20	S-10	2/1 1/2		SS		20.0			4.7		
					Boring Terminated at 20.0 ft					4.6	



Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.	
Project Name : Site Characterization - Navy Pier Area		Foreman : Young	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		Inspector : Walter	
Total Depth 20.0'		Completion Date : February 23, 1995	
Elev. :		Referenced Datum : NGS - MSL	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2	S-1	2/8 4/3		SS	Tan, Silty fine SAND				ND	
4	S-2	2/2 2/1		SS					4.0	
6	S-3	2/1 3/2		SS					7.0	
	S-4	1/1 2/3		SS		8.0			5.0	
10	S-5	2/3 2/2		SS	Tan, fine Sandy CLAY				4.5	
12	S-6	3/2 3/4		SS					6.5	
14	S-7	2/2 2/2		SS		14.0			6.2	
16	S-8	2/2 2/2		SS	Tan, Silty fine SAND				7.0	
18	S-9	3/2 2/4		SS					7.0	
20	S-10	2/3 1/2		SS		20.0			6.5	
					Boring Terminated at 20.0 ft					



SOIL BORING LOG : B-21A
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.
Project Name : Site Characterization - Navy Pier Area		Foreman : Young
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA
North :		Inspector : Walter
East :		Completion Date : February 22, 1995
Total Depth : 10.0'	Elev. :	Referenced Datum : NGS - MSL

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2 4 6 8 10	S-1	2/1 2/2		SS	Brown to Tan, Silty fine SAND					
	S-2	2/1 1/1		SS					ND	
	S-3	1/1 0/1		SS					1.5	
	S-4	1/0 0/1		SS					1.4	
	S-5	1/2 1/1		SS					2.0	
10					Boring Terminated at 10.0 ft	10.0			2.4	



SOIL BORING LOG : B-22
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.	
Project Name : Site Characterization - Navy Pier Area		Foreman : Young	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		Inspector : Walter	
East :		Completion Date : February 23, 1995	
Total Depth : 10.0'	Elev. :	Referenced Datum : NGS - MSL	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2	S-1	3/4 4/5		SS	Brown to Tan, Silty fine SAND				ND	
4	S-2	4/6 5/5		SS					ND	
6	S-3	4/3 3/3		SS					2.3	
8	S-4	3/3 3/3		SS						
10	S-5	1/1 1/1		SS			10.0			
					Boring Terminated at 10.0 ft					



SOIL BORING LOG : B-23
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.	
Project Name : Site Characterization - Navy Pier Area		Foreman : Young	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		Inspector : Walter	
Total Depth 18.0'		Completion Date : February 23, 1995	
Elev. :		Referenced Datum : NGS - MSL	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2	S-1	3/7 4/3		SS	Brown, Tan and Reddish Brown, Silty fine SAND				ND	
	S-2	4/6 4/3		SS						
4	S-3	4/3 3/3		SS					4.1	
6	S-4	3/1 2/2		SS					2.1	
						8.0			3.8	
10	S-5	4/6 4/3		SS	Tan, Silty fine SAND with trace marine shell fragments				6.1	
	S-6	4/4 4/4		SS					2.5	
12	S-7	4/5 3/3		SS					5.4	
14	S-8	2/4 2/2		SS					6.8	
16	S-9	2/2 2/2		SS					18.0	
18					Boring Terminated at 18.0 ft				5.5	



SOIL BORING LOG : B-24A
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.	
Project Name : Site Characterization - Navy Pier Area		Foreman : Young	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		Inspector : Walter	
East :		Completion Date : February 23, 1995	
Total Depth : 16.0'	Elev. :	Referenced Datum : NGS - MSL	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2	S-1	3/4 3/3		SS	Tan, Silty fine SAND	2.0			ND	
4	S-2	3/2 3/4		SS	Tan, fine Sandy CLAY	4.0			5.6	
6	S-3	4/5 4/6		SS	Tan, Silty fine SAND				3.0	
8	S-4	2/2 2/2		SS					3.7	
10	S-5	2/3 5/6		SS		10.0			10.1	
12	S-6	5/5 5/5		SS	Tan, fine Sandy CLAY with trace marine shell fragemnts	12.0			6.7	
14	S-7	3/3 3/2		SS	Tan, Silty fine SAND				3.2	
16	S-8	2/2 2/2		SS		16.0			6.0	
					Boring Terminated at 16.0 ft					



Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.	
Project Name : Site Characterization - Navy Pier Area		Foreman : Young	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		Inspector : Walter	
Total Depth 18.0' Elev. :		Referenced Datum : NGS - MSL	
		Completion Date : February 24, 1995	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
	S-1	-/23 18/16		SS	Asphalt - 3" Gravel - 3" Tan, Silty fine SAND	0.5				
2	S-2	9/5 11/8		SS					ND	
4	S-3	9/5 6/8		SS					6.4	
6	S-4	3/4 6/6		SS					5.3	
8	S-5	3/3 3/3		SS					4.8	
10	S-6	4/5 3/3		SS	Tan, fine Sandy CLAY	10.0			3.6	
12	S-7	2/3 3/4		SS	Tan, Silty fine SAND	12.0			5.5	
14	S-8	3/3 1/1		SS					6.7	
16	S-9	1/1 1/2		SS					7.2	
18					Boring Terminated at 18.0 ft	18.0			7.8	



SOIL BORING LOG : B-26
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.	
Project Name : Site Characterization - Navy Pier Area		Foreman : Young	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		Inspector : Walter	
Total Depth 18.0'		Referenced Datum : NGS - MSL	
Elev. :		Completion Date : February 23, 1995	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Depth	WELL LOG	W L	Field PID	REMARKS
2	S-1	5/4 3/3		SS	Brown and Tan, Silty fine SAND				ND	
	S-2	3/4 2/2		SS						
4	S-3	2/2 2/2		SS					6.0	
6	S-4	2/1 2/2		SS					7.0	
						8.0				
	S-5	1/1 2/2		SS	Tan, fine Sandy CLAY				3.1	
10	S-6	3/5 3/2		SS	Tan, Silty fine SAND w/ trace Clay				7.3	
12	S-7	5/8 4/3		SS					10.8	
14	S-8	3/3 2/2		SS	Trace marine shell fragments 12 - 14 ft				7.0	
16	S-9	2/2 2/2		SS					7.2	
18						18.0				
					Boring Terminated at 18.0 ft				6.8	



Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Boring Contractor : TC Group
Project Name : Site Characterization - Navy Pier Area			Foreman :
Project Location : USCG RTC Yorktown, Virginia			Boring Method : Hand Auger
Boring Location : See Location Sketch			Inspector : R. Vogel
Total Depth : 7.0'	Elev. : .	Referenced Datum : NGS - MSL	Completion Date : May 24, 1994

Depth Scale	DESCRIPTION OF MATERIALS	Stratum Depth	Sample Number	REMARKS
			S-1	Crush-or-Run
			S-2	Yellow-brown clayey sand
			S-3	Yellow-gray sticky
2.5			S-4	Gray sticky sand with oil, strong petroleum odor below 48"
			S-5	Fine, gray silty sand with oil, thick tarlike sludge at 84"
5.0		7.0		

Boring Terminated at 7 Feet

WATER LEVEL OBSERVATIONS	
During Drilling:	ft
On Completion:	ft



Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Boring Contractor : TC Group
Project Name : Site Characterization - Navy Pier Area		Foreman :
Project Location : USCG RTC Yorktown, Virginia		Boring Method : Hand Auger
Boring Location : See Location Sketch		Inspector : R. Vogel
Total Depth : 7.0'	Elev. : .	Referenced Datum : NGS - MSL
		Completion Date : May 24, 1994

Depth Scale	DESCRIPTION OF MATERIALS	Stratum Depth	Sample Number	REMARKS
			S-1	Crush-or-Run
			S-2	
2.5				Yellow-brown sandy clay loam
			S-3	
			S-4	
5.0				Yellow-brown sand
				Yellow-brown sandy clay
		7.0	S-5	Gray silty sand w/oil sludge at 84", strong petroleum smell

Boring Terminated at 7 Feet

WATER LEVEL OBSERVATIONS	
During Drilling:	ft
On Completion:	ft



Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Boring Contractor : TC Group
Project Name : Site Characterization - Navy Pier Area			Foreman :
Project Location : USCG RTC Yorktown, Virginia			Boring Method : Hand Auger
Boring Location : See Location Sketch			Inspector : R. Vogel
Total Depth : 2.0'	Elev. : .	Referenced Datum : NGS - MSL	Completion Date : May 24, 1994

Depth Scale	DESCRIPTION OF MATERIALS	Stratum Depth	Sample Number	REMARKS
		+	S-1	Auger refusal at 24" on subsurface debris from the demolition of the former power station on the site.
		+		
		+		
		+		
		+		
		2.0		
	Auger Refusal Terminated Boring at 2 Feet			

WATER LEVEL OBSERVATIONS	
During Drilling:	ft
On Completion:	ft



Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Boring Contractor : TC Group		
Project Name : Site Characterization - Navy Pier Area			Foreman :		
Project Location : USCG RTC Yorktown, Virginia			Boring Method : Hand Auger		
Boring Location : See Location Sketch			Inspector : R. Vogel		
Total Depth : 2.0'	Elev. : .	Referenced Datum : NGS - MSL	Completion Date : May 24, 1994		

Depth Scale	DESCRIPTION OF MATERIALS	Stratum Depth	Sample Number	REMARKS
		+	S-1	Auger refusal at 24" on subsurface debris from the demolition of the former power station on the site.
		+		
		+		
		+		
		+	2.0	
	Auger Refusal Terminated Boring at 2 Feet			

WATER LEVEL OBSERVATIONS	
During Drilling:	ft
On Completion:	ft



Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Boring Contractor : TC Group
Project Name : Site Characterization - Navy Pier Area			Foreman :
Project Location : USCG RTC Yorktown, Virginia			Boring Method : Hand Auger
Boring Location : See Location Sketch			Inspector : R. Vogel
Total Depth : 7.0'	Elev. : .	Referenced Datum : NGS - MSL	Completion Date : May 24, 1994

Depth Scale	DESCRIPTION OF MATERIALS	Stratum Depth	Sample Number	REMARKS
2.5		+	S-1	Asphalt/Crush-or-Run
		+	S-2	Yellow-brown sandy clay loam
		+	S-3	Yellow-brown sticky sand
		+		
		+		
5.0		+	S-4	Yellow-brown sandy clay
		+	S-5	Gray silty wet sand
	Boring Terminated at 7 Feet		7.0	

WATER LEVEL OBSERVATIONS	
During Drilling:	ft
On Completion:	ft



Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Boring Contractor : TC Group
Project Name : Site Characterization - Navy Pier Area			Foreman :
Project Location : USCG RTC Yorktown, Virginia			Boring Method : Hand Auger
Boring Location : See Location Sketch			Inspector : R. Vogel
Total Depth : 7.0'	Elev. : .	Referenced Datum : NGS - MSL	Completion Date : May 24, 1994

Depth Scale	DESCRIPTION OF MATERIALS	Stratum Depth	Sample Number	REMARKS
			S-1	Concrete
			S-2	Red-brown sandy clay loam
2.5			S-3	
5.0				
		7.0		
	Boring Terminated at 7 Feet		S-4	Standing water, no petroleum odor

WATER LEVEL OBSERVATIONS	
During Drilling:	7.0 ft
On Completion:	ft



Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Boring Contractor : TC Group		
Project Name : Site Characterization - Navy Pier Area			Foreman :		
Project Location : USCG RTC Yorktown, Virginia			Boring Method : Hand Auger		
Boring Location : See Location Sketch			Inspector : R. Vogel		
Total Depth	Elev. :	Referenced Datum :	Completion Date :		
10.0'	.	NGS - MSL	May 24, 1994		

Depth Scale	DESCRIPTION OF MATERIALS	Stratum Depth	Sample Number	REMARKS
			S-1	Brown silty loam
			S-2	
			S-3	
2.5				Yellow beach sand
				Yellow-brown sandy clay
5.0				
				Fragipan layer
7.5				
10.0	Boring Terminated at 10 Feet	10.0	S-4	

WATER LEVEL OBSERVATIONS	
During Drilling:	ft
On Completion:	ft



LOG OF BORING : HA-12
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Boring Contractor : GSI
Project Name : Site Characterization - Navy Pier Area		Foreman : Spiro
Project Location : USCG RTC Yorktown, Virginia		Boring Method : Hand Auger
North :	East :	Inspector : Spiro
Total Depth 6.5'	Elev. :	Referenced Datum : NGS - MSL
		Completion Date : October 21, 1994

Depth Scale	DESCRIPTION OF MATERIALS	Stratum Depth	Sample Number	REMARKS
	2.5" Asphalt 7" Gravel	0.9		
2.5	Reddish Brown Fine Sand Trace of Silt	3.0		
	Reddish Brown Fine Sand with Trace of Marine Shells	4.5		
5.0	Gray Silty Fine Sand with Trace of Marine Shell	6.5		
	Hand Auger Terminated at 6.5 ft			

WATER LEVEL OBSERVATIONS	
During Drilling:	ft
On Completion:	ft



LOG OF BORING : HA-13
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Boring Contractor : GSI	
Project Name : Site Characterization - Navy Pier Area		Foreman : Spiro	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : Hand Auger	
North :		Inspector : Spiro	
Total Depth : 2.5'	Elev. :	Referenced Datum : NGS - MSL	Completion Date : October 21, 1994

Depth Scale	DESCRIPTION OF MATERIALS	Stratum Depth	Sample Number	REMARKS
	Top Soil	0.2		
	Reddish Silty Fine Sand with Brown Clay Lumps	2.0		
	Brown Silty Sand with Wood Fragments Refusal on debris .M=SM Hand Auger Terminated at 2.5 ft	2.5		

WATER LEVEL OBSERVATIONS	
During Drilling:	ft
On Completion:	ft



LOG OF BORING : HA-13A
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Boring Contractor : GSI
Project Name : Site Characterization - Navy Pier Area			Foreman : Spiro
Project Location : USCG RTC Yorktown, Virginia			Boring Method : Hand Auger
North :		East :	Inspector : Spiro
Total Depth : 2.5'	Elev. :	Referenced Datum : NGS - MSL	Completion Date : October 21, 1994

Depth Scale	DESCRIPTION OF MATERIALS	Stratum Depth	Sample Number	REMARKS
	Top Soil	0.2		
	Reddish Silty Fine Sand with Brown Clay Lumps	2.0		
	Brown Silty Sand with Wood Fragments	2.5		
2.5	Hand Auger Terminated at 2.5 ft			

WATER LEVEL OBSERVATIONS	
During Drilling:	ft
On Completion:	ft



LOG OF BORING : HA-14
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Boring Contractor : GSI	
Project Name : Site Characterization - Navy Pier Area		Foreman : Spiro	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		Inspector : Spiro	
East :		Completion Date : October 21, 1994	
Total Depth : 5.0'	Elev. :	Referenced Datum : NGS - MSL	

Depth Scale	DESCRIPTION OF MATERIALS	Stratum Depth	Sample Number	REMARKS
	Asphalt - 2"			
	Concrete, Rubble and Debris	2.0		
2.5	Brown Fine Sand, trace Silt and Clay	5.0		
5.0	Hand Auger Terminated at 5.0 ft			

WATER LEVEL OBSERVATIONS	
During Drilling:	ft
On Completion:	ft



LOG OF BORING : HA-15
(1 OF 1)

Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Boring Contractor : GSI	
Project Name : Site Characterization - Navy Pier Area		Foreman : Spiro	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		Inspector : Spiro	
East :		Completion Date : February 22, 1995	
Total Depth : 5.5'	Elev. :	Referenced Datum : NGS - MSL	

Depth Scale	DESCRIPTION OF MATERIALS	Stratum Depth	Sample Number	REMARKS
2.5	Reddish Brown, Silty fine SAND with Asphalt and Gravel Debris	4.0		
	Lt Brown, Sandy CLAY	4.8		
5.0	Lt. Brown, Clayey F-M SAND	5.5		
	Refusal on Debris			
	Hand Auger Terminated at 5.5 ft			

WATER LEVEL OBSERVATIONS	
During Drilling:	ft
On Completion:	ft



Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Boring Contractor : GSI	
Project Name : Site Characterization - Navy Pier Area		Foreman : Spiro	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		Inspector : Spiro	
Total Depth 3.0'		Referenced Datum : NGS - MSL	
Elev. :		Completion Date : February 22, 1995	

Depth Scale	DESCRIPTION OF MATERIALS	Stratum Depth	Sample Number	REMARKS
	Brown Clayey SILT	1.0		
	Reddish Brown, fine to medium SAND with Clay lumps and Gravel			
2.5	Refusal on Debris	3.0		
	Hand Auger Terminated at 3.0 ft			

WATER LEVEL OBSERVATIONS	
During Drilling:	ft
On Completion:	ft



Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Boring Contractor : GSI
Project Name : Site Characterization - Navy Pier Area			Foreman : Spiro
Project Location : USCG RTC Yorktown, Virginia			Boring Method : HSA
North :		East :	Inspector : Spiro
Total Depth : 2.5'	Elev. :	Referenced Datum : NGS - MSL	Completion Date : February 22, 1995

Depth Scale	DESCRIPTION OF MATERIALS	Stratum Depth	Sample Number	REMARKS
	Brown Clayey SILT	1.0		
	Reddish Brown, fine to medium SAND with Clay lumps and Gravel			
2.5	Refusal on Debris	2.5		
	Hand Auger Terminated at 3.0 ft			

WATER LEVEL OBSERVATIONS	
During Drilling:	ft
On Completion:	ft



Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Boring Contractor : GSI		
Project Name : Site Characterization - Navy Pier Area			Foreman : Spiro		
Project Location : USCG RTC Yorktown, Virginia			Boring Method : HSA		
North :		East :		Inspector : Spiro	
Total Depth	11.0'	Elev. :	Referenced Datum : NGS - MSL		Completion Date : February 22, 1995

Depth Scale	DESCRIPTION OF MATERIALS	Stratum Depth	Sample Number	REMARKS
	Brown Clayey SILT	1.0		
2.5	Reddish Brown, fine to medium SAND with Clay lumps and Gravel	3.0		
	Lt. Brown, fine to medium SAND (Clean Sand Fill)			
5.0	Black, Clayey, Oily sample	7.0		
	Brown, Clayey fine to medium SAND	7.5		
7.5	Lt. Orange to Brown, Clayey fine to medium SAND	9.5		
	Lt. Brown, fine to medium Sandy CLAY	10.5		
10.0	Green - Brown, fine Sandy CLAY with trace to little marine shell fragments Refusal on shell fragments at 11 ft Hand Auger Terminated at 11.0 ft	11.0		

WATER LEVEL OBSERVATIONS	
During Drilling:	ft
On Completion:	ft



Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Rock Ray Drilling	
Project Name : Site Characterization - Navy Pier Area		Foreman : Rock-Ray	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North : 3610370.0000		East : 12070440.0000	
Total Depth 16.0'		Referenced Datum : NGS - MSL	
Elev. : 12.2		Completion Date : August 30, 1994	
		Inspector : R. Vogel	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Elev.	WELL LOG	W L	Field PID	REMARKS
2	S-1	5/2 2/3	5	SS						N.D. Oil Sheen on Surface Prior to Boring
4	S-2	3/2 2/3	5	SS						4-5 Oil Sheen, Diesel Odor, Standing Water @ 6'
6										
8										
10	S-3	3/2 3/6	9	SS	Running Sands				2-3	
12						-0.3				
14	S-4	9/7 8/9	17	SS	Running Sands with Shells					N.D.
16					Boring Terminated at 16.0 Feet	-3.8				



Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Rock Ray Drilling
Project Name : Site Characterization - Navy Pier Area		Foreman : Rock-Ray
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA
North : 3610395.0000	East : 12070453.0000	Inspector : R. Vogel
Total Depth 16.0'	Elev. : 22.0	Referenced Datum : NGS - MSL
		Completion Date : August 30, 1994

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Elev.	WELL LOG	W L	Field PID	REMARKS
2	S-1	6/5 4/4	8	SS		19.0			N.D.	
4	S-2	3/2 2/3	5	SS		16.0			2-3	Oil Pockets in Sand
8										
10	S-3	3/4 5/9	14	SS		11.0			1-2	Oil Sheen, Diesel Odor, Oil Droplets Visible in Sand aft Standing
14	S-4	5/4 6/9	15	SS					N.D.	
16	Boring Terminated at 16 Feet.									



Project Number : 94-5-137

Client : T.C. Consultants, Inc.				Drilling Company : Rock Ray Drilling			
Project Name : Site Characterization - Navy Pier Area				Foreman : Rock-Ray			
Project Location : USCG RTC Yorktown, Virginia				Boring Method : HSA			
North :				East :			
Total Depth 16.0'				Referenced Datum : NGS - MSL			
Elev. :				Completion Date : August 30, 1994			
Inspector : R. Vogel							

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Elev.	WELL LOG	W L	Field PID	REMARKS
2	S-1	6/4 4/4	8	SS					N.D.	Sand
4	S-2	2/2/ 1/3	4	SS					N.D.	Silty Sand
8										
10	S-3	3/3 4/8	12	SS					N.D.	Running Sands (fine beach sands with shells)
14	S-4	5/4 6/9	15	SS					N.D.	
16	Boring Terminated at 16 Feet									



Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Rock Ray Drilling	
Project Name : Site Characterization - Navy Pier Area		Foreman : Rock-Ray	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North : 3610381.0000	East : 12870429.0000	Inspector : R. Vogel	
Total Depth 16.0'	Elev. : 12.3	Referenced Datum : NGS - MSL	Completion Date : August 30, 1994

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Elev.	WELL LOG	W L	Field PID	REMARKS
2	S-1	3/3 3/6	9	SS					N.D.	
4	S-2	5/4 4/4	8	SS					N.D.	
6										
8										
10	S-3	3/4 3/5	8	SS					N.D.	
12										
14	S-4	4/3 5/8	13	SS					N.D.	
16						-3.7				

Boring Terminated at 16 Feet.



Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Drilling Company : Fishburne Drilling, Inc.		
Project Name : Site Characterization - Navy Pier Area			Foreman : Fishburne		
Project Location : USCG RTC Yorktown, Virginia			Boring Method : HSA		
North :		East :		Inspector : Walter	
Total Depth	20.0'	Elev. :	Referenced Datum : NGS - MSL	Completion Date : October 19, 1994	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Elev.	WELL LOG	W L	Field PID	REMARKS
	S-1	-/- -/-		SS	Asphalt - Concrete					
2	S-2	4/4 5/4		SS	Tan Silty fine SAND with trace Clay				-	
4	S-3	2/1 1/1		SS					1.8	
6	S-4	1/1 1/1		SS	Blue-Green Silty Fine Sand				2.7	
	S-5	1/1 1/1		SS					33.9	
10	S-6	2/1 2/2		SS					6.4	
12	S-7	2/4 4/3		SS					2.0	
14	S-8	3/4 4/4		SS					6.0	
16	S-9	4/5 5/6		SS				0.7		
18	S-10	5/6 7/8		SS				0.6		
20					Boring Terminated at 20.0 ft				0.4	



Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Drilling Company : Fishburne Drilling, Inc.		
Project Name : Site Characterization - Navy Pier Area			Foreman : Fishburne		
Project Location : USCG RTC Yorktown, Virginia			Boring Method : HSA		
North :		East :		Inspector : Walter	
Total Depth	14.0'	Elev. :	Referenced Datum :	Completion Date : October 20, 1994	
			NGS - MSL		

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Elev.	WELL LOG	W L	Field PID	REMARKS
	S-1	3/3 2/2		SS	Asphalt - 3"					
2					Tan-Green Fine Sandy Silt					
	S-2	4/3 3/3		SS					ND	
4					Tan Fine Silty Sand with Clay					
	S-3	2/1 1/1		SS					ND	
6										
	S-4	2/7 7/2		SS					ND	
	S-5	2/1 1/1		SS					ND	
10										
	S-6	2/2 1/1		SS					ND	
12										
	S-7	3/3 6/5		SS					ND	
14					Boring Terminated at 14.0 ft				ND	



Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.	
Project Name : Site Characterization - Navy Pier Area		Foreman : Young	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		East :	
Inspector : Walter		Completion Date : February 23, 1995	
Total Depth : 18.0'	Elev. :	Referenced Datum : NGS - MSL	

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Elev.	WELL LOG	W L	Field PID	REMARKS
2	S-1	5/4 3/3		SS	Brown and Tan, Silty fine SAND					
4	S-2	3/4 2/2		SS					ND	
6	S-3	2/2 2/2		SS					6.0	
8	S-4	2/1 2/2		SS					7.0	
10	S-5	1/1 2/2		SS	Tan, fine Sandy CLAY				3.1	
12	S-6	3/5 3/2		SS	Tan, Silty fine SAND w/ trace Clay				7.3	
14	S-7	5/8 4/3		SS	Trace marine shell fragments 12 - 14 ft				10.8	
16	S-8	3/3 2/2		SS					7.0	
18	S-9	2/2 2/2		SS					7.2	
					Boring Terminated at 18.0 ft				6.8	



Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Drilling Company : Fishburne Drilling, Inc.		
Project Name : Site Characterization - Navy Pier Area			Foreman : Young		
Project Location : USCG RTC Yorktown, Virginia			Boring Method : HSA		
North :		East :		Inspector : Walter	
Total Depth	16.0'	Elev. :	Referenced Datum :	Completion Date : February 23, 1995	
			NGS - MSL		

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Elev.	WELL LOG	W L	Field PID	REMARKS
2	S-1	3/4 3/3		SS	Tan, Silty fine SAND					
4	S-2	3/2 3/4		SS	Tan, fine Sandy CLAY				ND	
6	S-3	4/5 4/6		SS	Tan, Silty fine SAND				5.6	
8	S-4	2/2 2/2		SS					3.0	
10	S-5	2/3 5/6		SS					3.7	
12	S-6	5/5 5/5		SS	Tan, fine Sandy CLAY with trace marine shell fragemnts				10.1	
14	S-7	3/3 3/2		SS	Tan, Silty fine SAND				6.7	
16	S-8	2/2 2/2		SS					3.2	
					Boring Terminated at 16.0 ft				6.0	



Project Number : 94-5-137

Client : T.C. Consultants, Inc.			Drilling Company : Fishburne Drilling, Inc.		
Project Name : Site Characterization - Navy Pier Area			Foreman : Young		
Project Location : USCG RTC Yorktown, Virginia			Boring Method : HSA		
North :		East :		Inspector : Walter	
Total Depth : 10.0'	Elev. :		Referenced Datum : NGS - MSL		Completion Date : February 24, 1995

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Elev.	WELL LOG	W L	Field PID	REMARKS
2	S-1	2/3 3/3		SS	Brown to Tan, Silty fine SAND w/ trace Clay					
	S-2	2/2 2/2		SS					ND	
4	S-3	2/2 2/2		SS					1.1	
6	S-4	1/1 3/2		SS					1.7	
	S-5	2/3 3/4		SS					1.4	
10					Boring Terminated at 10.0 ft				1.0	



Project Number : 94-5-137

Client : T.C. Consultants, Inc.		Drilling Company : Fishburne Drilling, Inc.	
Project Name : Site Characterization - Navy Pier Area		Foreman : Young	
Project Location : USCG RTC Yorktown, Virginia		Boring Method : HSA	
North :		East :	
Total Depth 20.0'		Referenced Datum : NGS - MSL	
Elev. :		Completion Date : February 24, 1995	
Inspector : Walter			

Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Elev.	WELL LOG	W L	Field PID	REMARKS
2	S-1	4/7 6/5		SS	Tan, Silty fine SAND					
4	S-2	3/4 4/4		SS						
6	S-3	2/2 2/2		SS						
8	S-4	4/3 4/4		SS						
10	S-5	2/4 2/2		SS	Tan, Silty fine SAND with trace marine shell fragments					
12	S-6	3/3 3/3		SS						
14	S-7	3/5 4/5		SS						
16	S-8	6/4 5/5		SS						
18	S-9	4/4 4/4		SS						
20	S-10	3/3 3/4		SS						
					Boring Terminated at 20.0 ft					



Project Number : 94-5-137

Client : T.C. Consultants, Inc.					Drilling Company : Fishburne Drilling, Inc.					
Project Name : Site Characterization - Navy Pier Area					Foreman : Young					
Project Location : USCG RTC Yorktown, Virginia					Boring Method : HSA					
North :			East :		Inspector : Walter					
Total Depth 20.0'		Elev. :			Referenced Datum : NGS - MSL		Completion Date : February 24, 1995			
Depth Scale	Sample ID	Blow Count	N Value	Type	DESCRIPTION OF MATERIALS	Stratum Elev.	WELL LOG	W L	Field PID	REMARKS
2	S-1	2/5 7/5		SS	Tan, fine Sandy CLAY					
4	S-2	2/4 3/3		SS	Tan, Silty fine SAND with trace Clay				ND	
4	S-3	2/3 4/3		SS					4.8	
6	S-4	2/2 2/2		SS					3.9	
6	S-5	3/2 2/3		SS					3.0	
10	S-6	2/1 1/1		SS	Gray, Silty fine SAND				31.0	
12	S-7	2/2 2/2		SS	Oil Contamination Noted 8 - 18 ft				52.0	
14	S-8	2/1 1/1		SS					37.7	
16	S-9	1/1 1/1		SS					31.5	
18	S-10	2/2 2/2		SS					28.0	
20					Boring Terminated at 20.0 ft				64.0	

FIELD CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

NON COHESIVE SOILS (Silt, Sand, Gravel and Combinations)

Density

Very Loose	- 5 blows/ft or less
Loose	- 6 to 10 blows/ft
Medium Dense	- 11 to 30 blows/ft
Dense	- 31 to 50 blows/ft
Very Dense	- 51 blows/ft or more

Particle Size Identification

Boulders	- 8 inch diameter or more
Cobbles	- 3 to 8 inch diameter
Gravel	- Coarse - 1 to 3 inch Medium - 1/2 to 1 inch Fine - 1/4 to 1/2 inch
Sand	- Coarse - 2.00 mm to 1/4 inch (diam. of pencil lead) Medium - 0.42 to 2.00 mm (diam. of broom straw) Fine - 0.074 to 0.42 mm (diam. of human hair)
Silt	- 0.002 to 0.074 mm (Cannot see particles)

Relative Proportions

Descriptive Term	Percent
Trace	1 - 10
Little	11 - 20
Some	21 - 35
And	36 - 50

COHESIVE SOILS (Clay, Silt and Combinations)

Consistency

Very Soft	- 3 blows/ft or less
Soft	- 4 to 5 blows/ft
Medium Stiff	- 6 to 10 blows/ft
Stiff	- 11 to 15 blows/ft
Very Stiff	- 16 to 30 blows/ft
Hard	- 31 blows/ft or more

Plasticity

Degree of Plasticity	Plasticity Index
None to Slight	0 - 4
Slight	5 - 7
Medium	8 - 22
High to Very High	over 22

Classification on Logs are made by visual inspection of samples.

Standard Penetration Test - Driving a 2.0" O.D., 1-3/8" I.D. sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30.0 inches. It is customary to drive the spoon 6.0 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the test are recorded for each 6.0 inches of penetration on the drill log (Example - 6/8/9). The Standard Penetration Test result can be obtained by adding the last two figures (i.e. 8+9 = 17 blows/ft). (ASTM D - 1586-67)

Strata Changes - In the column "Description of Materials" on the drill log, the horizontal lines represent strata changes. A solid line (____) represents an actually observed change, a dashed line (_____) represents an estimated change.

Ground Water - Observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, may cause changes in the water levels indicated on the logs.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS	
			GRAPH	LETTER		
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES	
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES	
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
		CLEAN SANDS (LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES	
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES	
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES	
		SILTS AND CLAYS LIQUID LIMIT LESS THAN 50	SILTS AND CLAYS		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			SILTS AND CLAYS		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
SILTS AND CLAYS			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY		
SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50	SILTS AND CLAYS		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS		
	SILTS AND CLAYS		CH	INORGANIC CLAYS OF HIGH PLASTICITY		
	SILTS AND CLAYS		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS		
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS



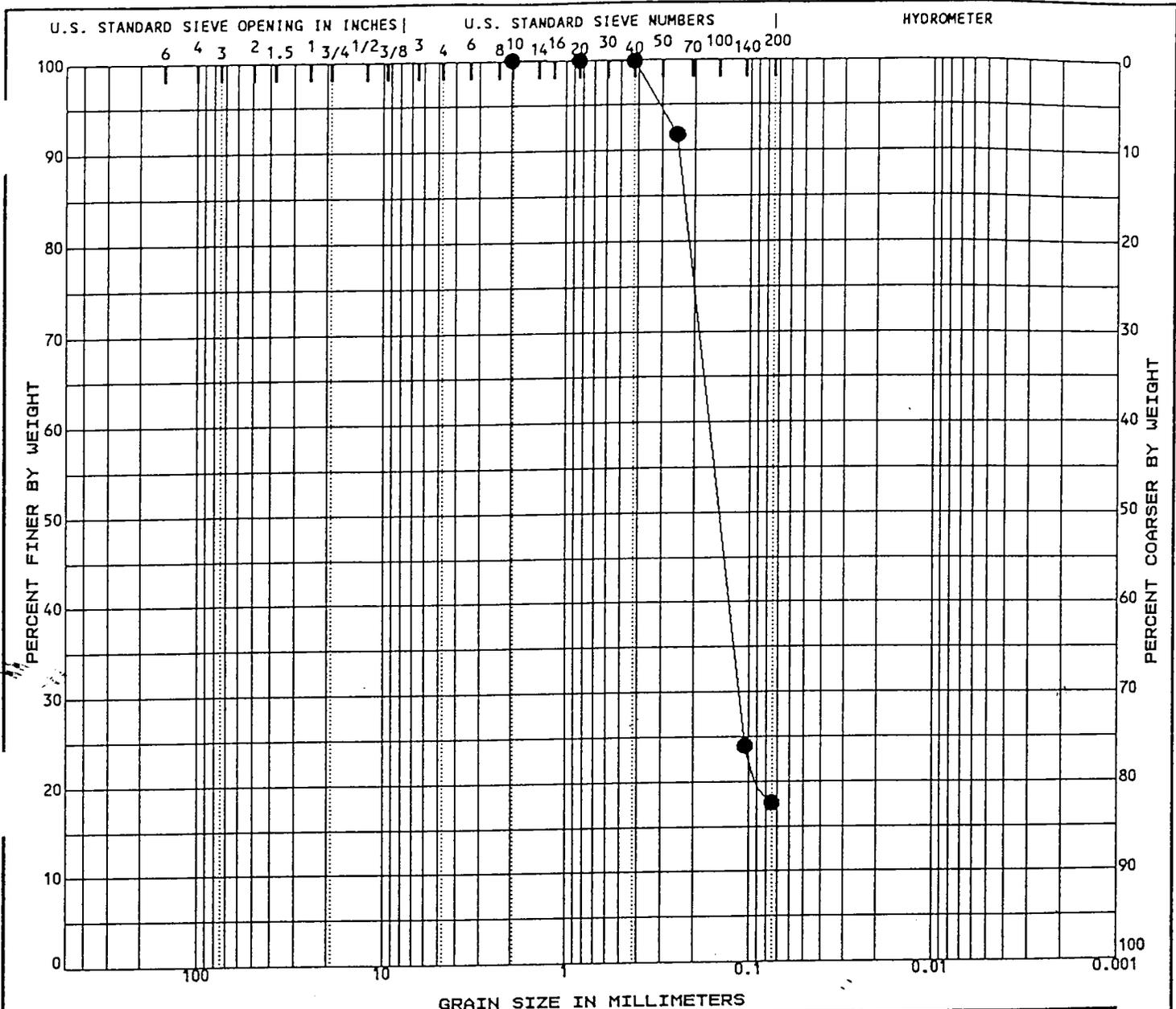
SUMMARY OF LABORATORY TEST DATA

CLIENT NAME: TC Consultants
 GSI PROJECT NO.: 94-5-137

PROJECT NAME: USCG Navy Pier Area
 PROJECT LOCATION: Yorktown, Virginia

DATE: 11/18/94

BORING NUMBER	SAMPLE NUMBER	SAMPLE DEPTH inches	NATURAL MOISTURE CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX %	PASSING NO. 200 SIEVE %	GRAIN SIZE FIGURE	DRY DENSITY psf	UNCONFINED COMPRESSIVE STRENGTH tsf	STRAIN at FAILURE %	pH ANALYSIS	UNIFIED SOIL CLASS. (USCS)	MAXIMUM DRY DENSITY pcf	OPTIMUM MOISTURE CONTENT %	CBR VALUE (SOAKED)	SWELL %
B-1S3	B-1S3	8	34										SM				
B-1S4	B-1S4	10	36										SM				
B-2S3	B-2S3	6	22										SM				
B-2S4	B-2S4	8	28										SM				
B-2S4	B-2S4	9	18										SM				
B-2S5	B-2S5	10	26										SM				
B-3S3	B-3S3	4	30										SM				
B-3S3	B-3S3	6	28										SM				
B-3S5	B-3S5	8	37										SM				
B-4S4	B-4S4	8	29										SM				
B-4S5	B-4S5	10	31										SM				
B-5S4	B-5S4	6.5	20										SM				
B-5S4	B-5S4	7	29										SM				
B-6S5	B-6S5	8	36										SM				
B-6S6	B-6S6	10	35										SM				
B-6S7	B-6S7	12	32										SM				

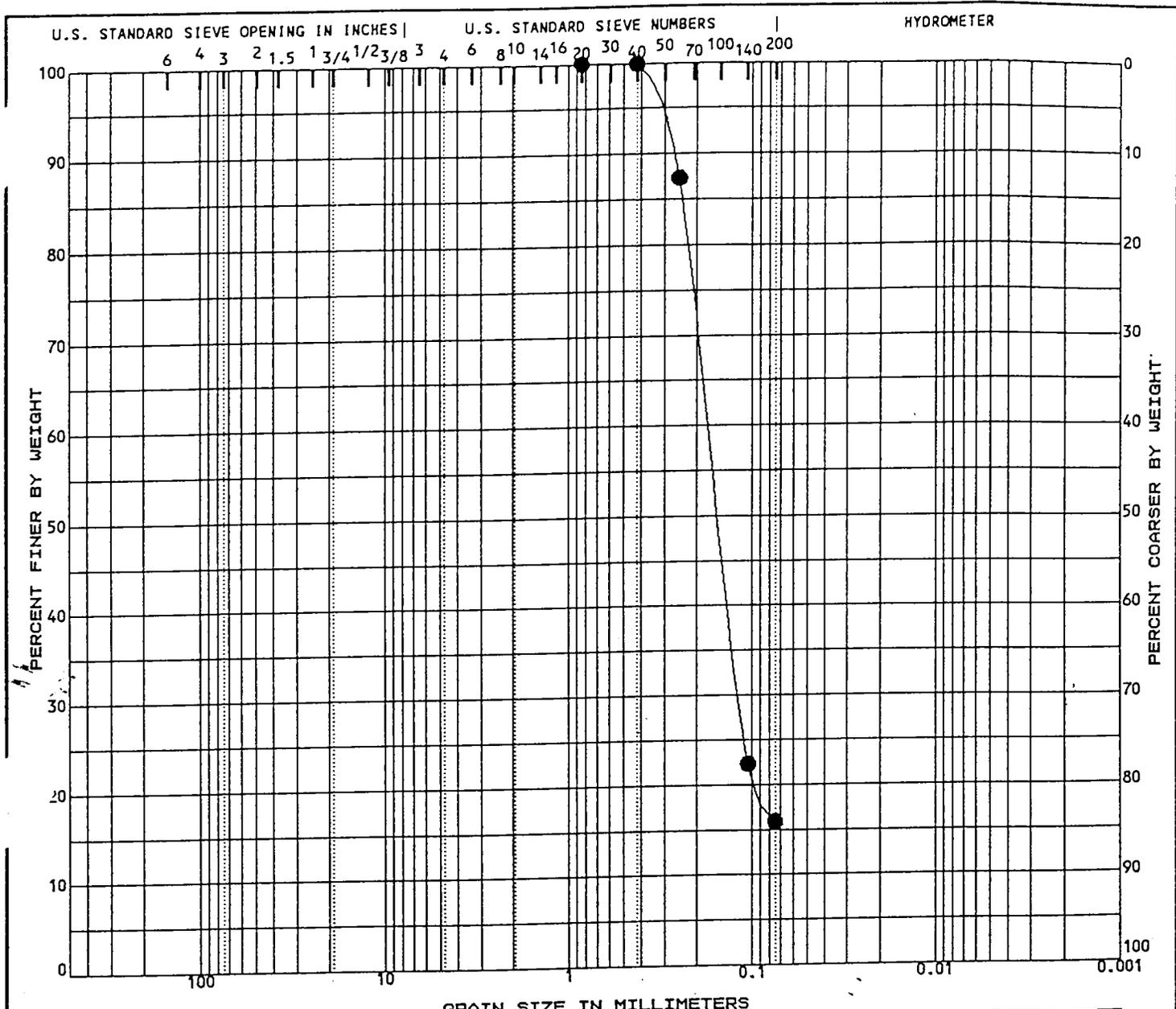


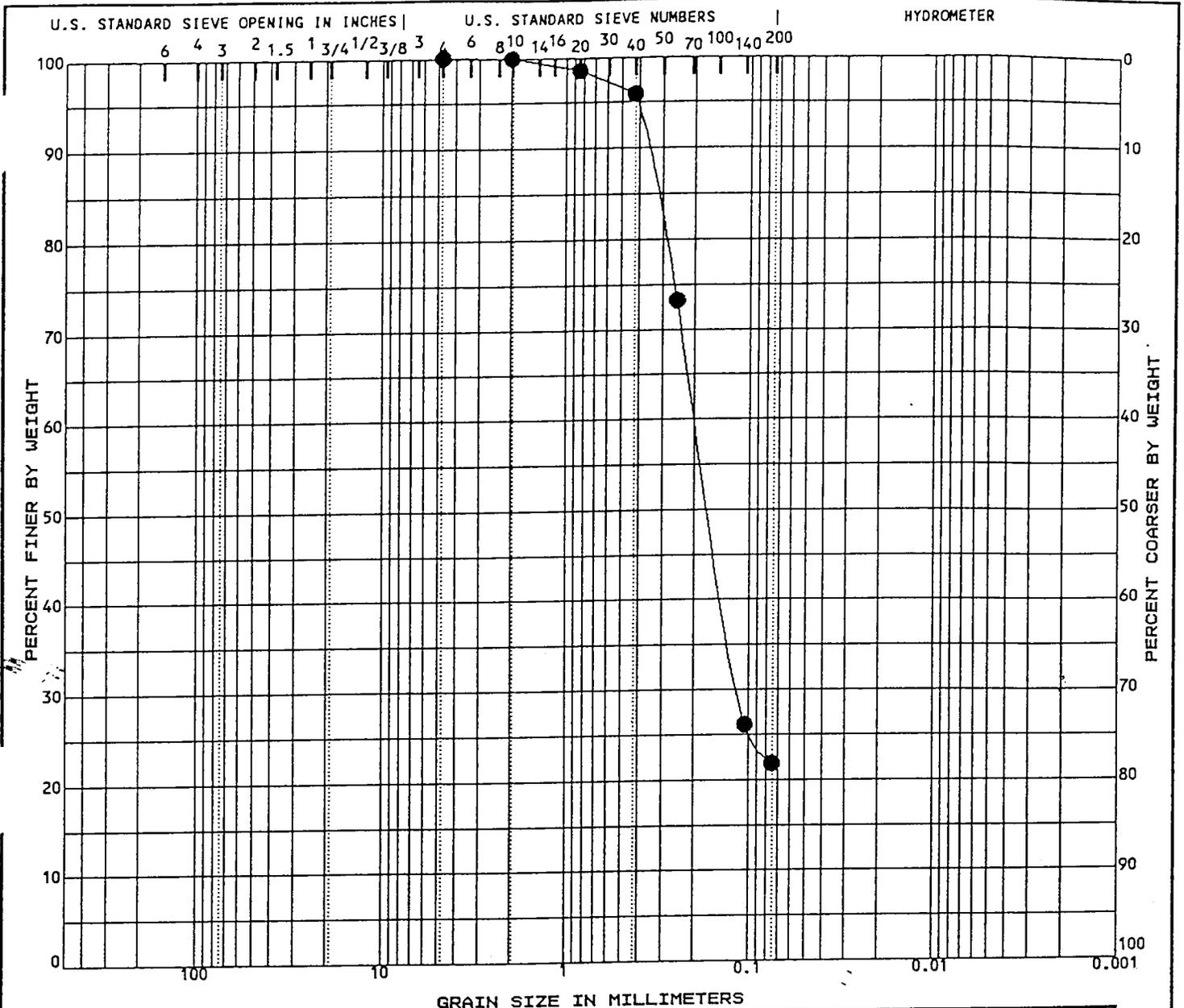
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

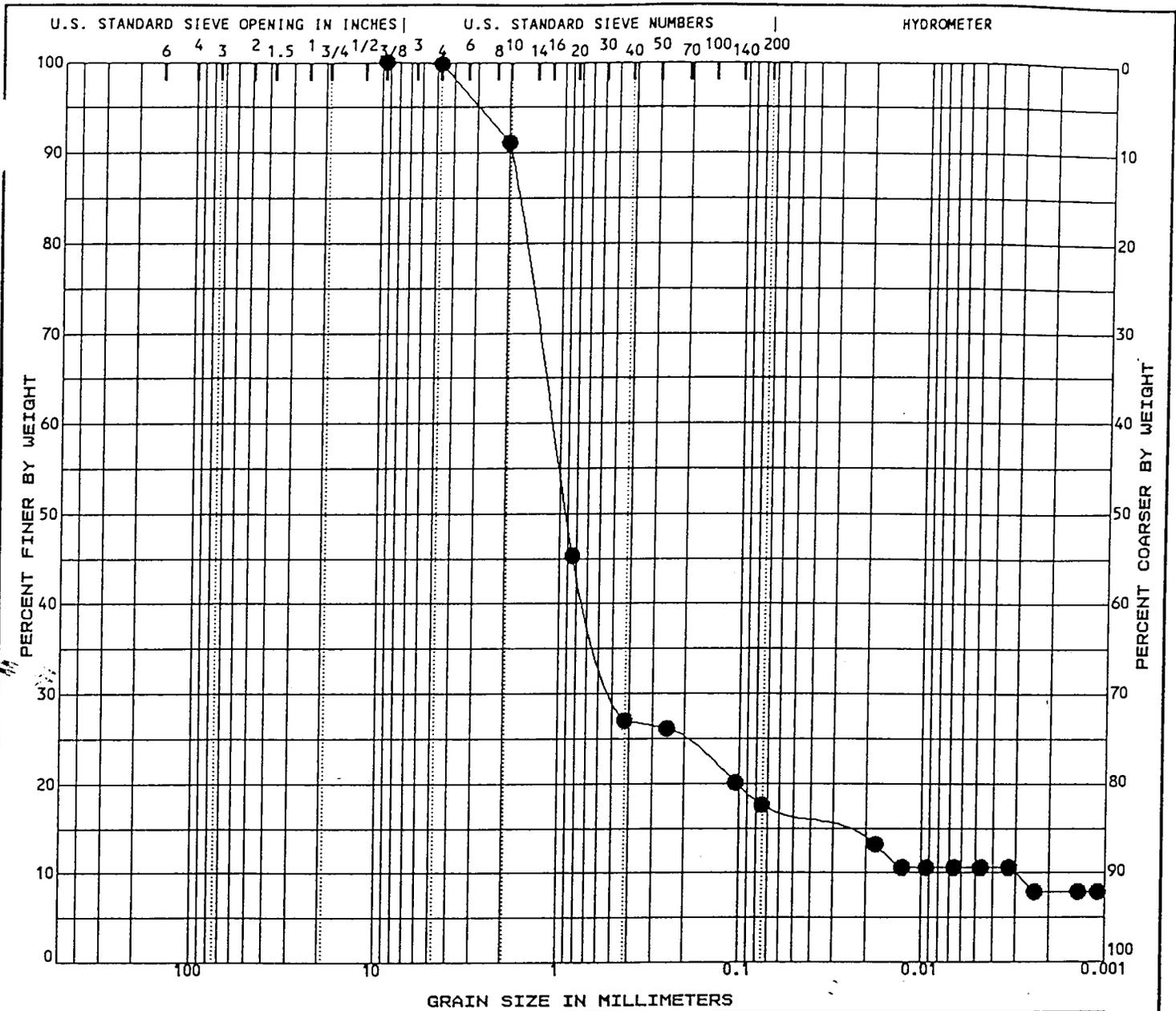
Specimen Identification	Classification	WC%	LL	PL	PI	C _c	C _u
● B-1S3 8.0	Tan, lt. gray, fine, Silty SAND w/trace of clay	34					

Specimen Identification	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Gravel	%Sand	%Silt	%Clay
● B-1S3 8.0	2.00	0.17	0.113		0.0	82.4	17.6	

GSI	Project: USCNAVY PIER AREA	GSI Project No.:	FIGURE 1
	Location: YORKTOWN, VIRGINIA		
	Date: November 1994	GRADATION CURVES	





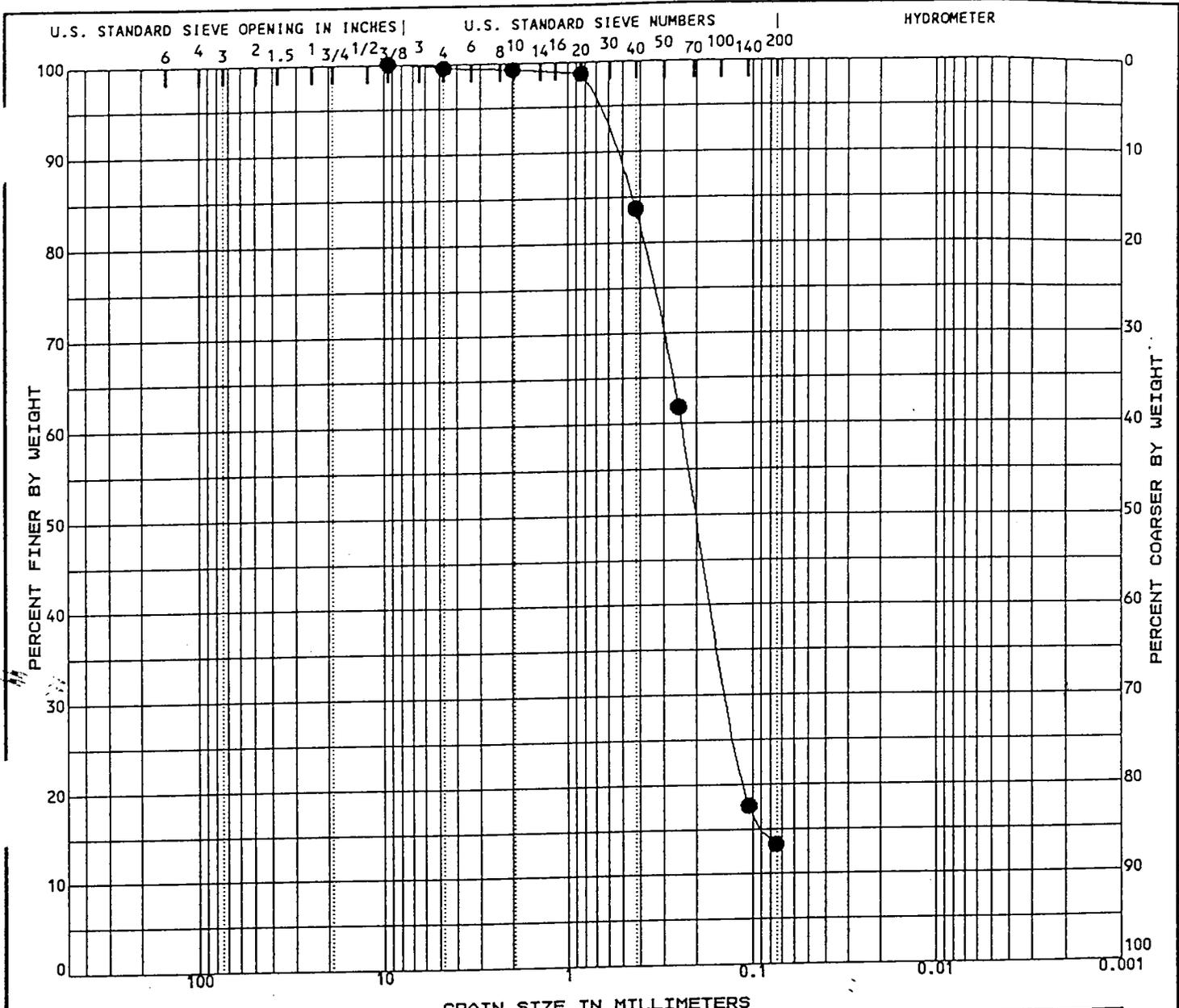


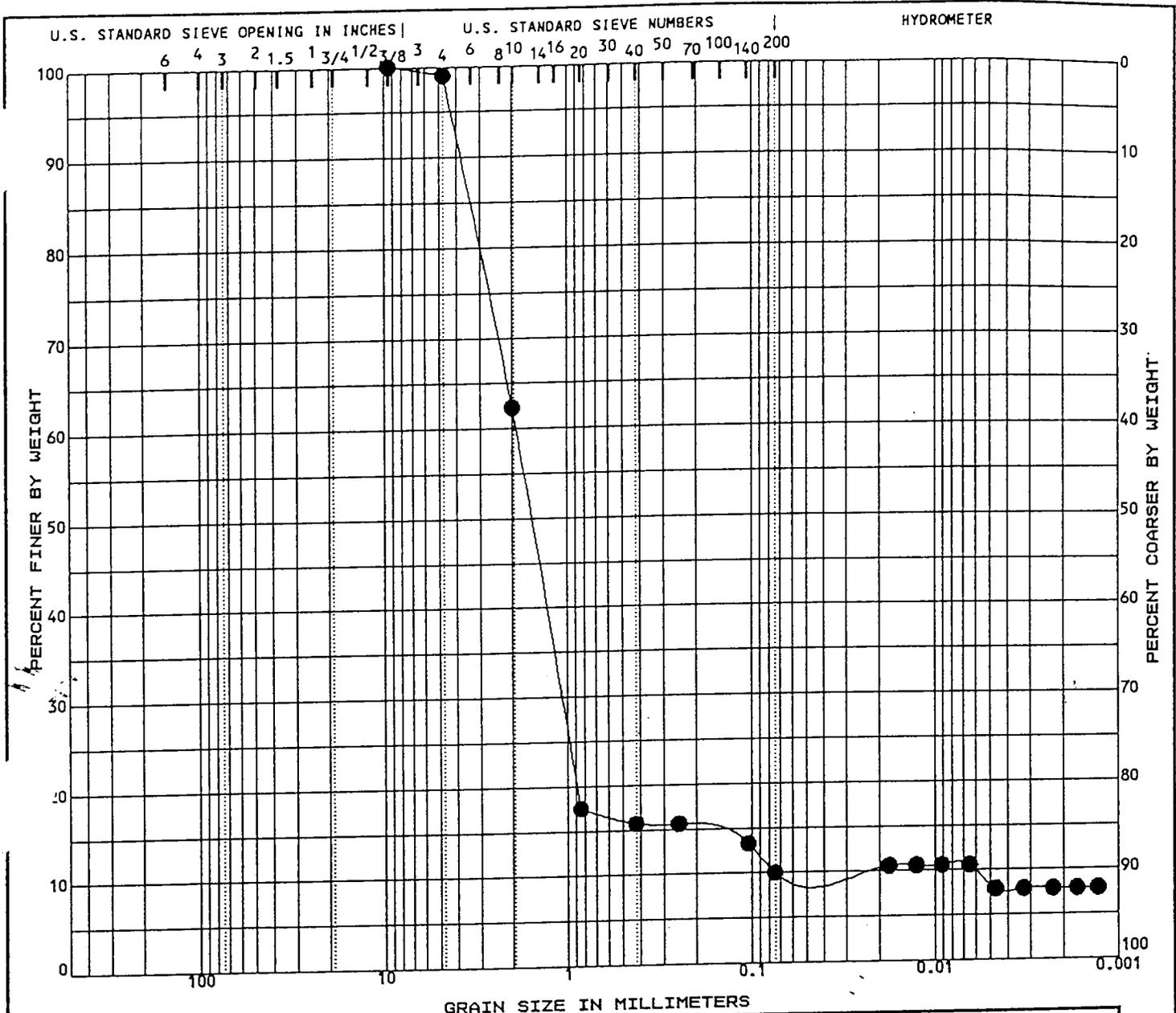
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	WC%	LL	PL	PI	Cc	Cu
● B-2S4 8.0	Lt gray, tan, fine, Silty SAND w/trace clay & gravel w/shell	26					

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-2S4 8.0	9.50	1.12	0.476	0.0031	0.2	82.2	7.0	10.6

GSI	Project: USCNAVY PIER AREA	FIGURE 4
	Location: YORKTOWN, VIRGINIA	GSI Project No.:
	Date: November 1994	GRADATION CURVES



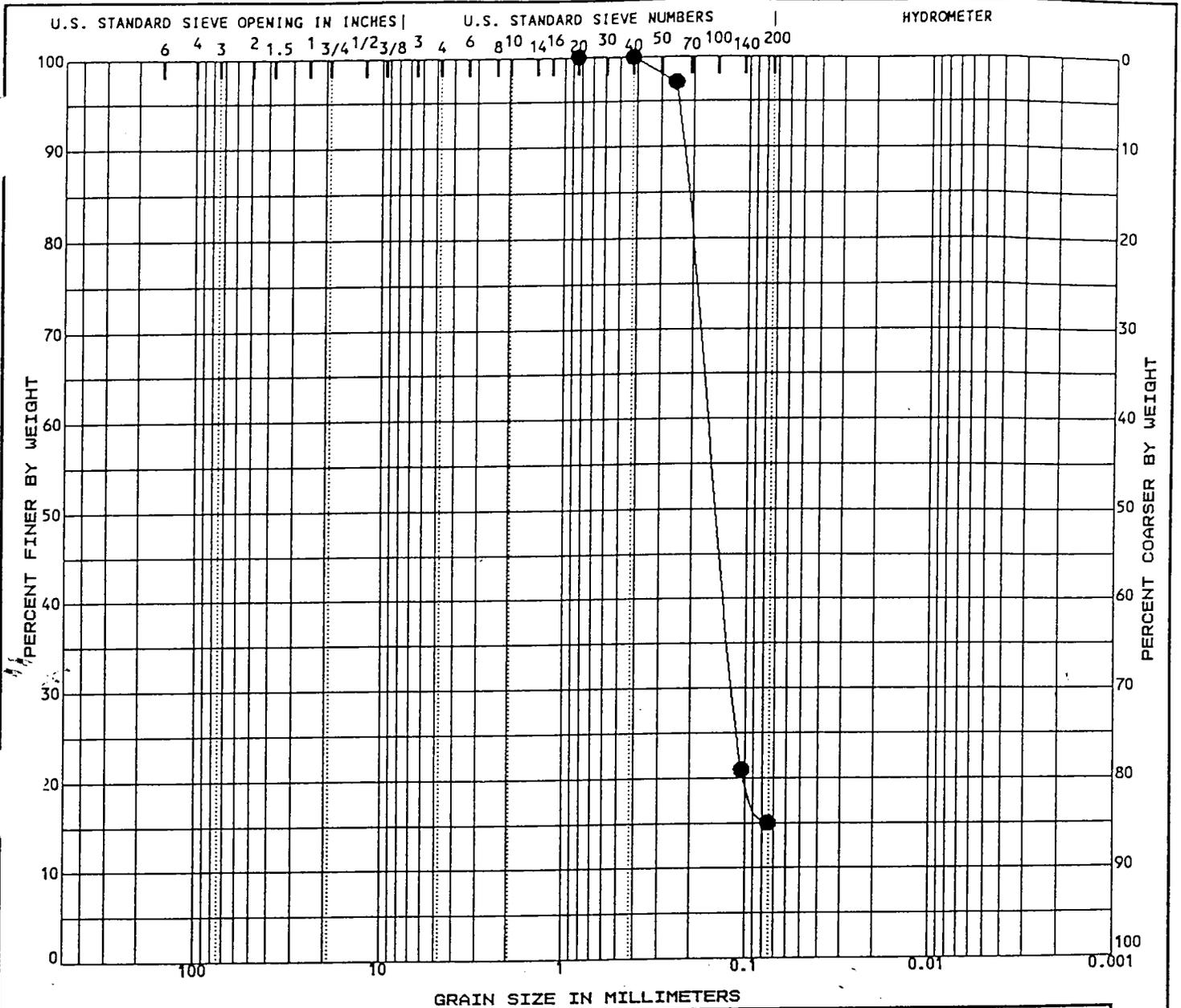


COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	WC%	LL	PL	PI	Cc	Cu
● B-3S3 6.0	Tan, fine, Silty SAND w/trace of clay & little gravel	28				8.11	25.5

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3S3 6.0	9.50	1.91	1.079	0.0060	1.0	89.0	1.6	8.4

GSI	Project: USCG NAVY PIER AREA	FIGURE 6
	Location: YORKTOWN, VIRGINIA	GSI Project No.:
	Date: November 1994	GRADATION CURVES

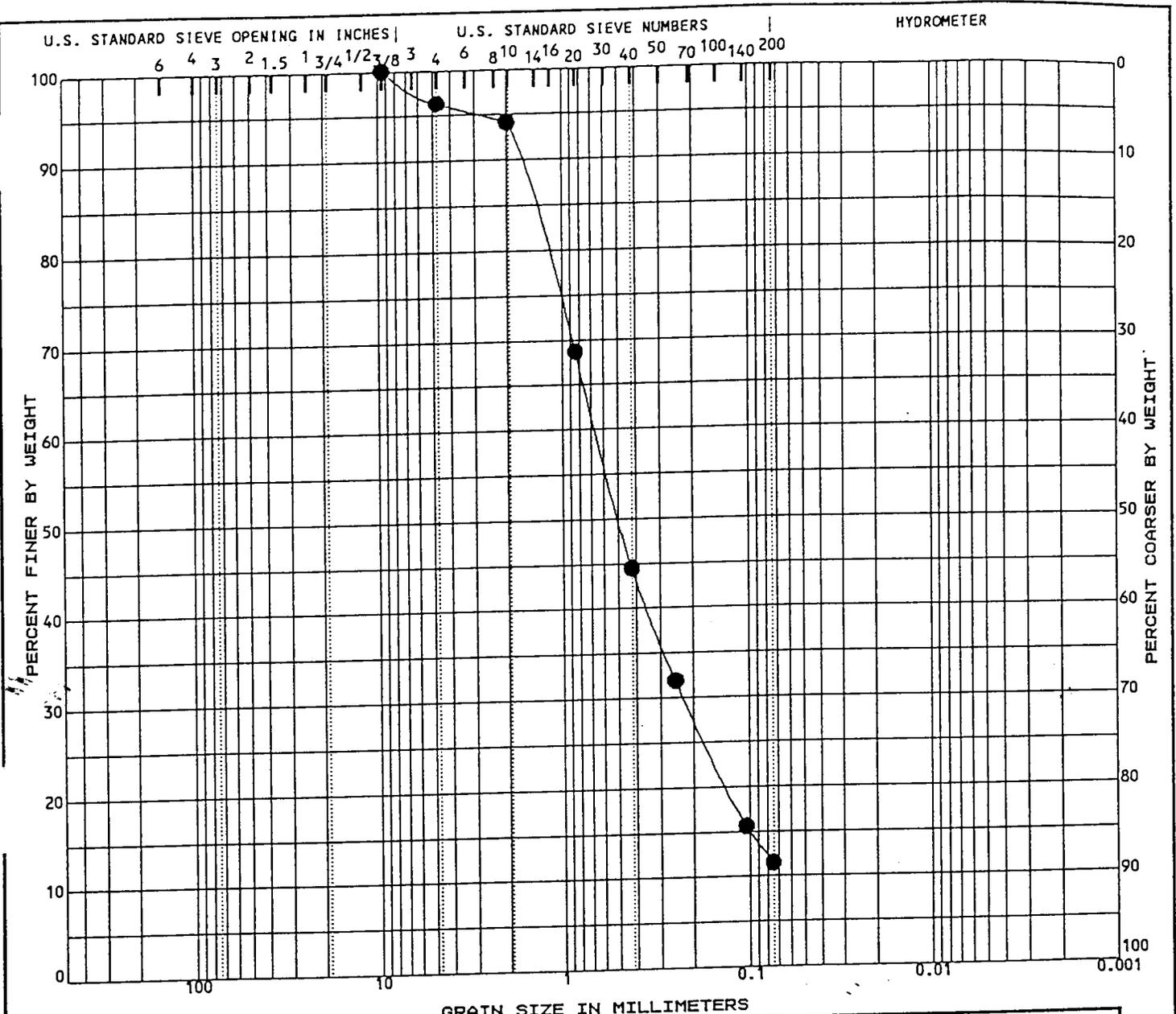


COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	WC%	LL	PL	PI	Cc	Cu
● B-3S5 8.0	Tan, fine, Silty SAND w/trace of clay	37					

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3S5 8.0	0.85	0.16	0.117		0.0	85.0	15.0	

GSI	Project: USCNAVY PIER AREA	FIGURE 7
	Location: YORKTOWN, VIRGINIA	GSI Project No.:
	Date: November 1994	GRADATION CURVES



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	WC%	LL	PL	PI	Cc	Cu
● B-4S4 8.0	Gray, fine, Silty SAND w/trace clay & ltl gravel & wood frag	29				1.10	9.5

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-4S4 8.0	9.50	0.66	0.226		3.7	84.8	11.5	

FIGURE 8



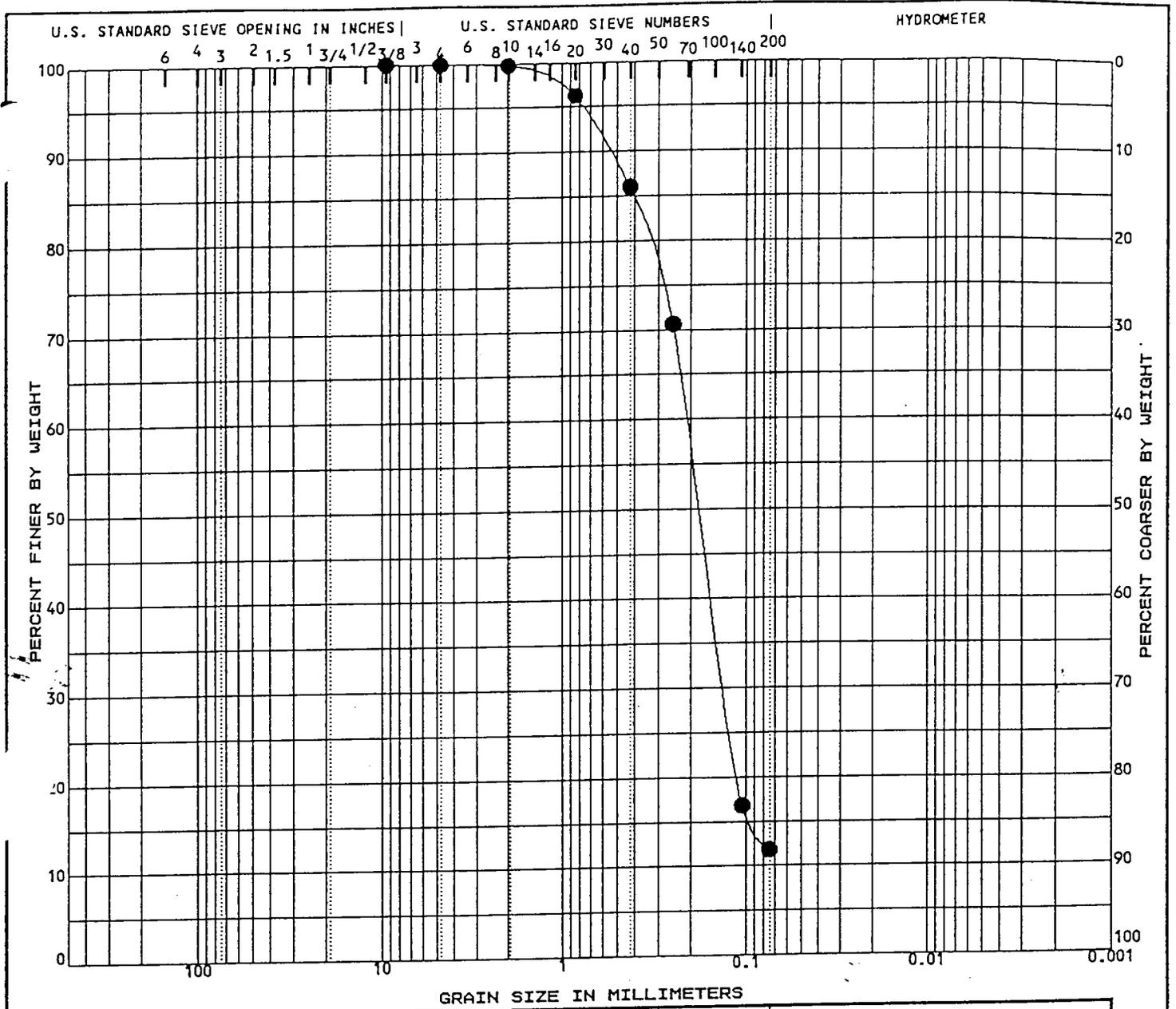
Project: USCG NAVY PIER AREA

Location: YORKTOWN, VIRGINIA

Date: November 1994

GSI Project No.:

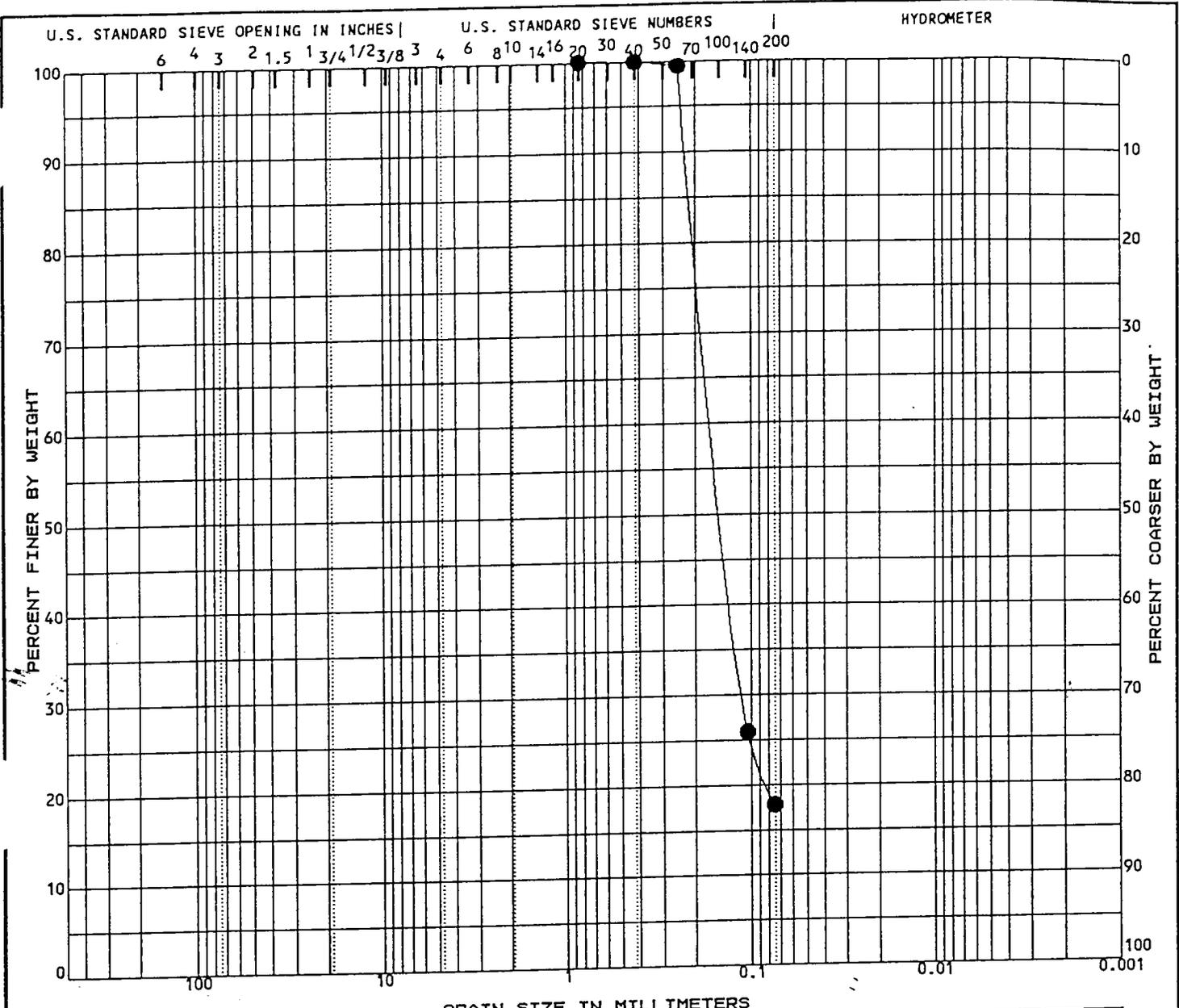
GRADATION CURVES



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	WC%	LL	PL	PI	Cc	Cu
● B-4S5 10.0	Gray, fine, Silty SAND w/trace clay & lt gravel & wood frag	31				1.14	3.0

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-4S5 10.0	9.50	0.21	0.130		0.1	88.1	11.8	



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

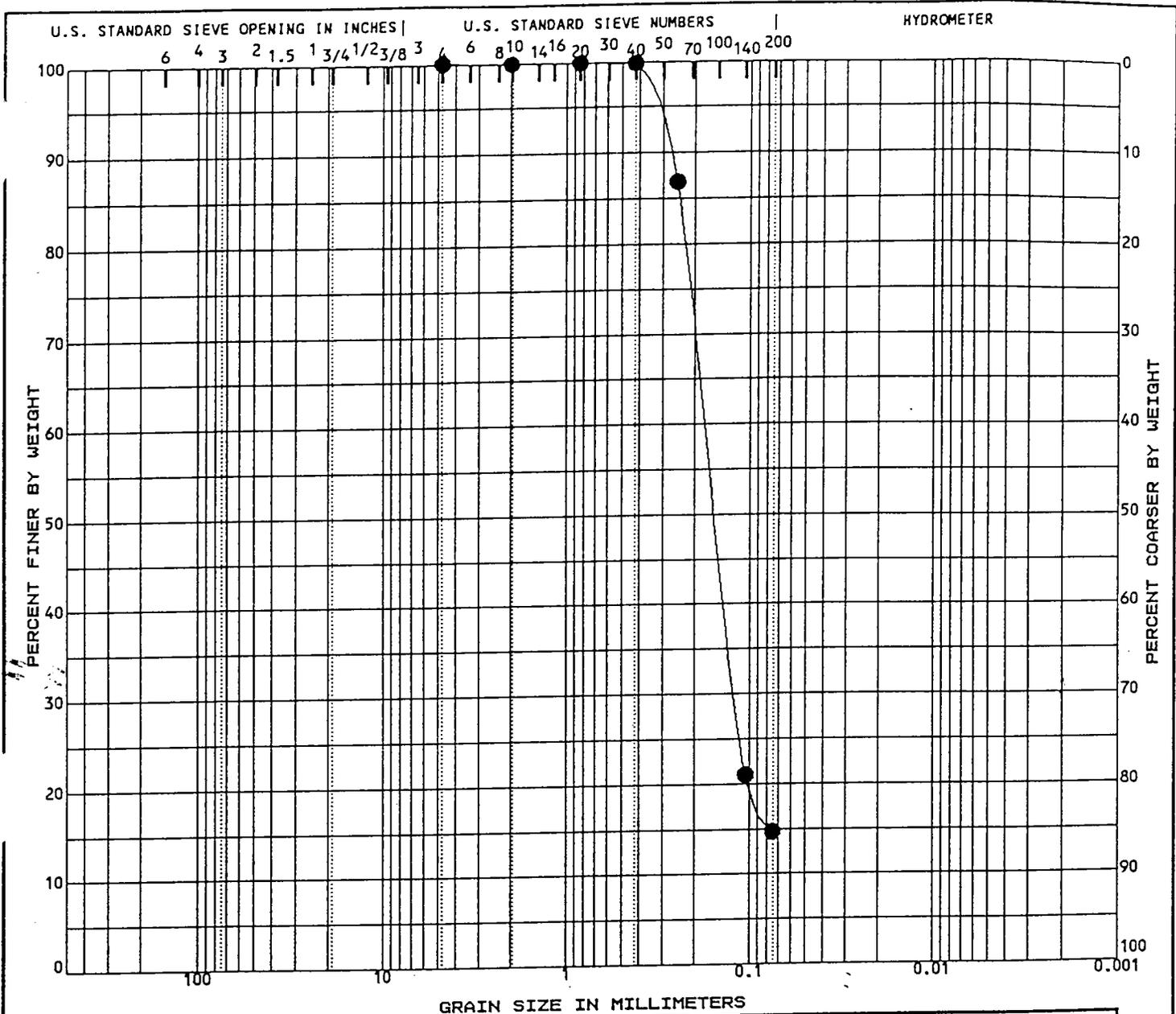
Specimen Identification	Classification				WC%	LL	PL	PI	Cc	Cu
● B-5S4 7.0	Tan, fine, Silty SAND w/trace of clay				29					

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-5S4 7.0	0.85	0.16	0.110		0.0	82.2	17.8	



Project: USCG NAVY PIER AREA
 Location: YORKTOWN, VIRGINIA
 Date: November 1994

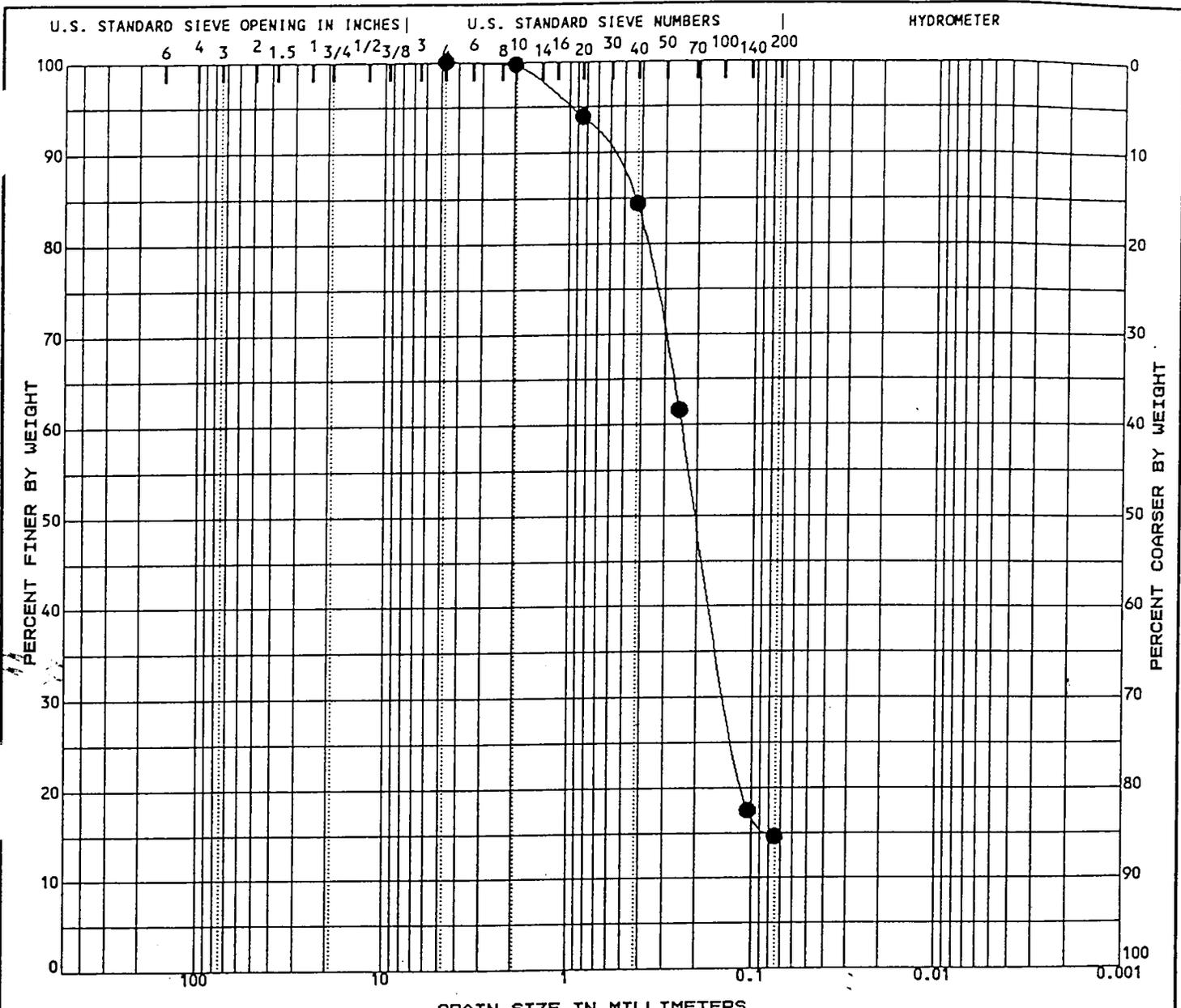
FIGURE 10
 GSI Project No.:
GRADATION CURVES



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					WC%	LL	PL	PI	Cc	Cu
● B-6S6 10.0	Tan, fine, Silty SAND w/trace of clay & shell pieces					35					

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-6S6 10.0	4.75	0.18	0.118		0.0	85.3	14.7	



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification				WC%	LL	PL	PI	Cc	Cu
●	B-6S7 12.0	Tan, fine, Silty SAND w/trace of clay & shell pieces				32					
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	B-6S7 12.0	4.75	0.24	0.134		0.0	85.4	14.6			



Project: USCG NAVY PIER AREA

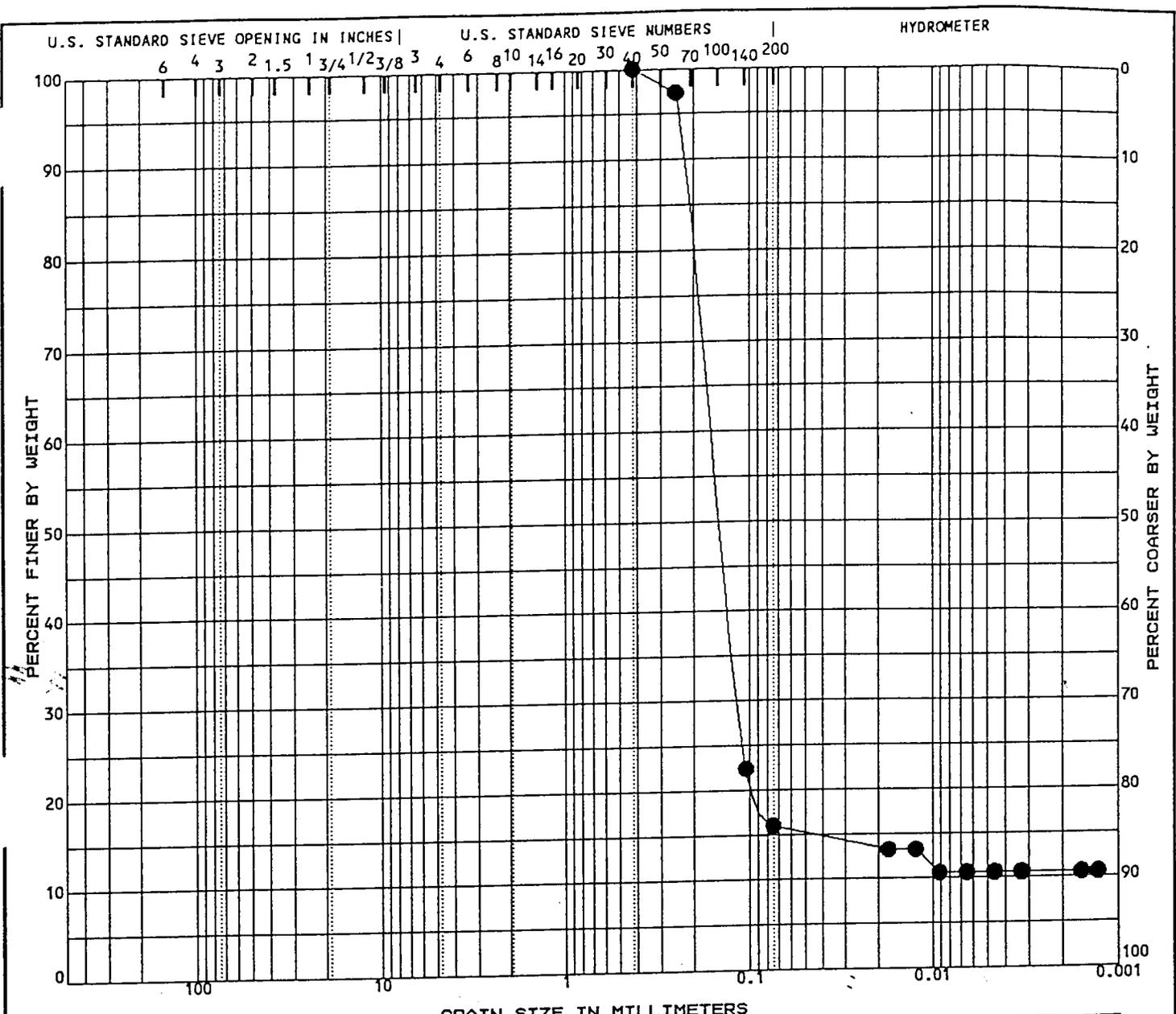
FIGURE 13

Location: YORKTOWN, VIRGINIA

GSI Project No.:

Date: November 1994

GRADATION CURVES



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

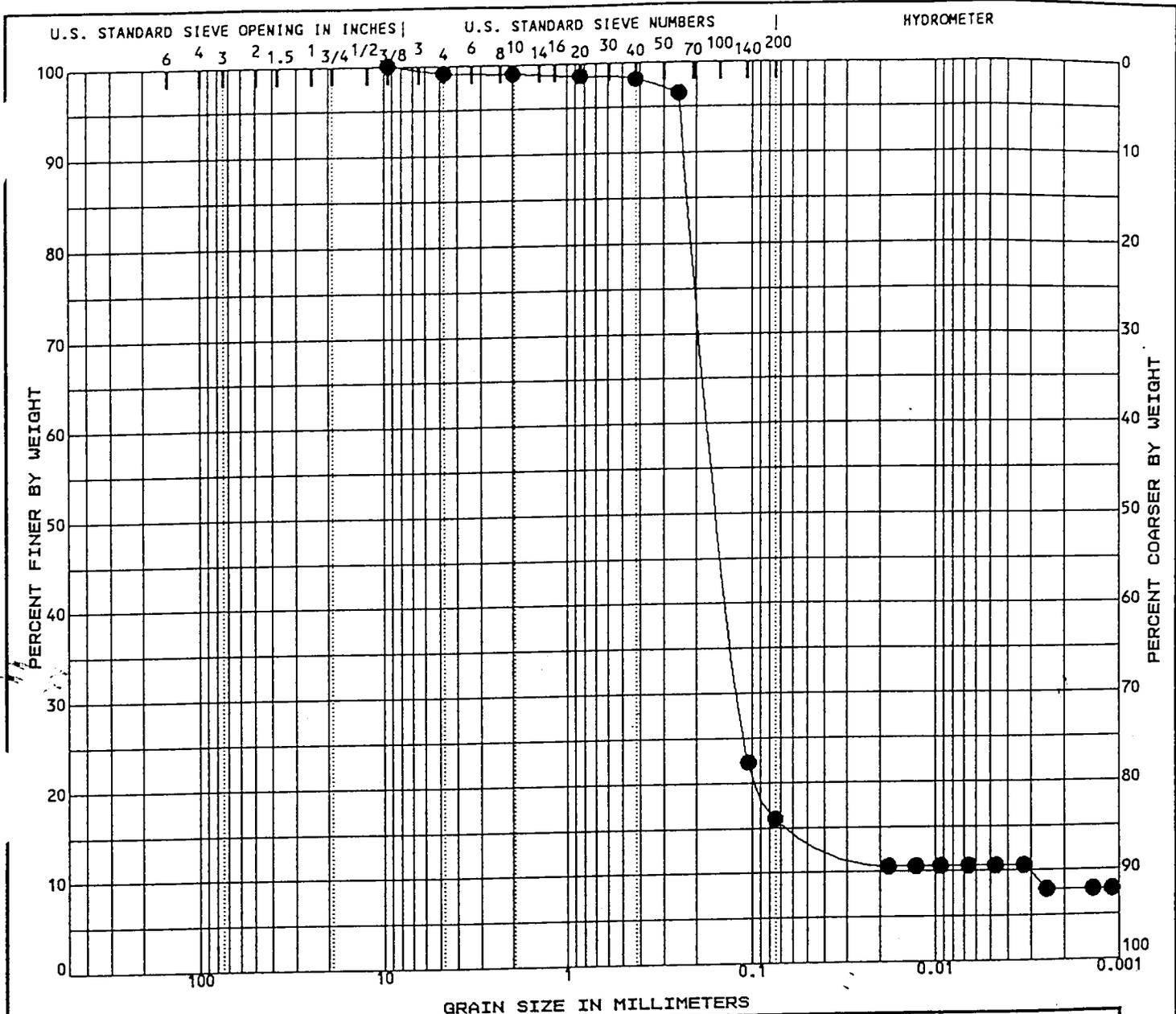
Specimen Identification	Classification	WC%	LL	PL	PI	Cc	Cu
● MWB-5S4 8.0	Tan, fine Silty SAND w/trace of clay	33					

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● MWB-5S4 8.0	0.43	0.16	0.115		0.0	84.0	5.4	10.6



Project: USCG NAVY PIER AREA
 Location: YORKTOWN, VIRGINIA
 Date: November 1994

FIGURE 15
 GSI Project No.:
GRADATION CURVES



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification				WC%	LL	PL	PI	Cc	Cu
● MWB-5S5 10.0	Tan, fine, Silty SAND w/trace of clay & little gravel				37					
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● MWB-5S5 10.0	9.50	0.16	0.115	0.0031	0.9	83.1	5.4	10.6		



Project: USCG NAVY PIER AREA

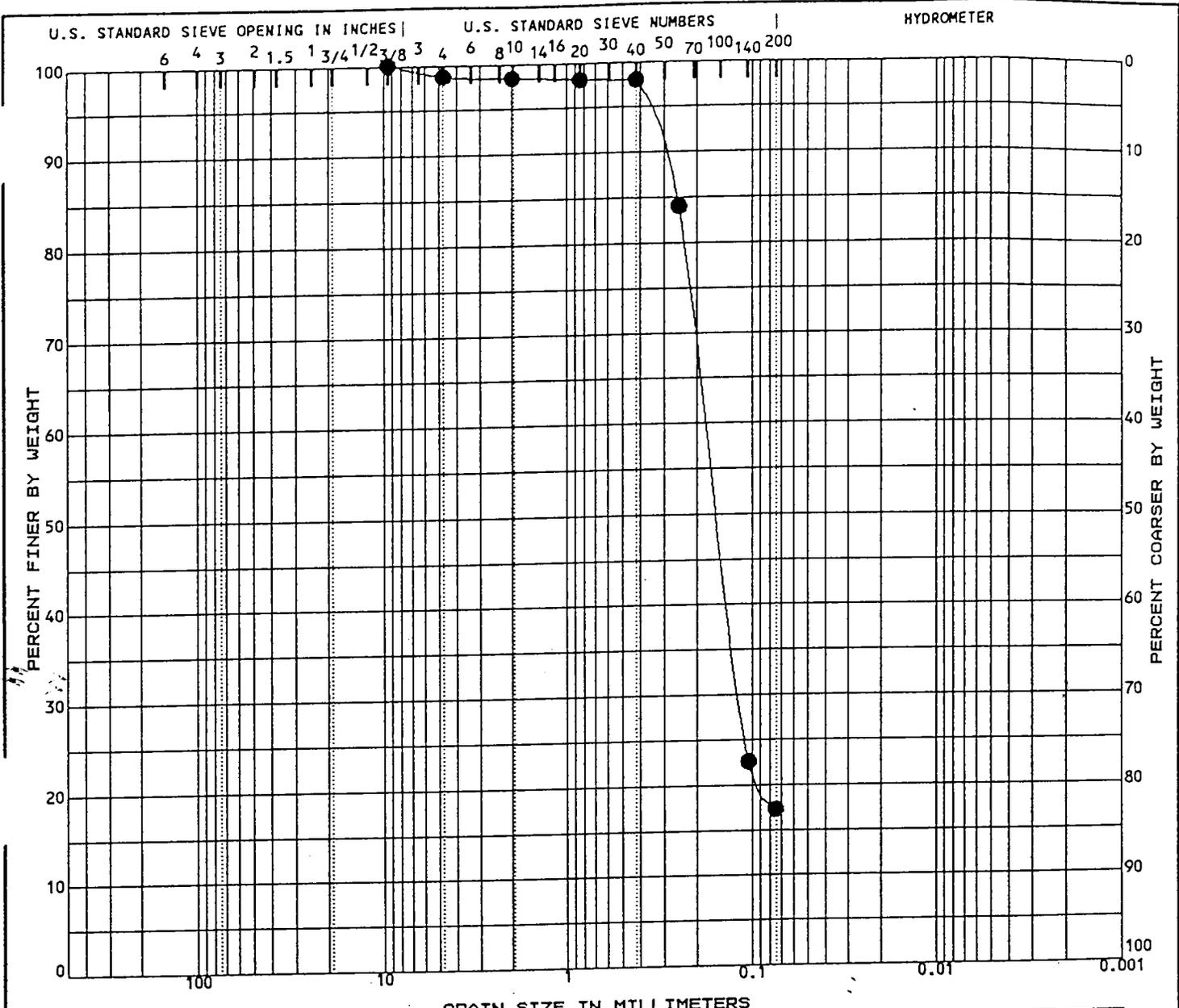
Location: YORKTOWN, VIRGINIA

Date: November 1994

FIGURE 16

GSI Project No.:

GRADATION CURVES



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					WC%	LL	PL	PI	Cc	Cu
● MWB-5S6 12.0	Tan, fine, Silty SAND w/trace of clay & shell pieces					34					

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● MWB-5S6 12.0	9.50	0.18	0.117		1.3	81.4	17.3	

GSI	Project: USCNAVY PIER AREA	GSI Project No.:
	Location: YORKTOWN, VIRGINIA	
	Date: November 1994	GRADATION CURVES

FIGURE 17

APPENDIX D

Certificates of Analysis, Chain of Custody, and Sampling Protocols



TC ANALYTICALS, INC.
(A TC Group Company)

1200 Boissevain Avenue
Tel. (804) 627-0400

Norfolk, Virginia 23507
FAX (804) 627-1118

Sampling Site: Water Sampling

Sampling Date: 11/11/94

Account Info: P.O. # B0073/94

Date Received: 11/11/94

TCC/Cederquist, Rodriguez & Ripley
129 W. Va. Beach Blvd.
Norfolk, VA 23510
Attn: Arnold Rodriguez

Date Reported: 11/15/94

Released By: STEVE LONG

c3

Data: The following are the results for the analysis of your samples, submitted for TPH by the California Method, Standard: Gasoline and Diesel Fuel.

TCA #	Your #	ppm
94-41115	Mw-6	0.11 (Gasoline)
94-41118	B-1	0.30 (Gasoline)
94-41121	Mw-5	1.3 (Diesel Fuel)

The following are the results for BTEX by Method SW846: 5030 and 8020. All values reported in parts per billion.

TCA #	94-41116	94-41119	94-41122
YOUR #	Mw-6	B-1	Mw-5
BENZENE	<10.	<10.	14.
TOLUENE	<10.	<10.	<10.
ETHYLBENZENE	<10.	<10.	<10.
XYLENES	<30.	<30.	<30.

Please feel free to contact me if you have any questions concerning the analysis.

Thank you,

Steven J.E. Long
Steven J.E. Long



TC ANALYTICALS, INC.
(A TC Group Company)

1200 Boissevain Avenue
Tel. (804) 627-0400

Norfolk, Virginia 23507
FAX (804) 627-1118

Sampling Site: Yorktown RTC

Sampling Date: 10/21/94

Date Received: 10/24/94

Date Reported: 10/28/94

Released By: STEVE LONG

c3

Account Info: *****

TCC/Cederquist, Rodriguez & Ripley
129 W. Va. Beach Blvd.
Norfolk, VA 23510
Attn: Arnold Rodriguez

Data:

The following are the results for the analysis of your samples, submitted for TPH by the California Method, Standard: Diesel Fuel.

TCA #	Your #	Description	mg/kg
94-38126	HA12-1	5' Depth, Hand Auger #12 Site,	1800.
94-38128	HA12-3	6 1/2' Depth, Hand Auger #12 Site,	770.
94-38130	HA13-5	2 1/2' Depth, Hand Auger #13 Site,	1700.
94-38132	HA14-7	3' Depth, Hand Auger #14 Site,	70.

The following are the results for BTEX by Method SW846: 5030 and 8020. All values reported in parts per billion.

YOUR #	HA12-2	HA12-4	HA13-6	HA14-8
TCA#	94-38127	94-38129	94-38131	94-38133
BENZENE	<10.	<10.	<10.	<10.
TOLUENE	12.	<10.	<10.	<10.
ETHYLBENZENE	110.	85.	17.	<10.
XYLENES	110.	<30.	31.	<30.

Please feel free to contact me if you have any questions concerning the analysis.

Thank you,

Steven J.E. Long



TC ANALYTICALS, INC.
(A TC Group Company)

1200 Boissevain Avenue
Tel. (804) 627-0400

Norfolk, Virginia 23507
FAX (804) 627-1118

Sampling Site: Yorktown RTC
Site Assessment

Sampling Date: 02/22/95

Date Received: 03/02/95

Date Reported: 03/12/95

Released By: STEVE LONG

c3

Account Info: P.O. # N0073/94

TCC/Cederquist, Rodriguez & Ripley
129 W. Va. Beach Blvd.
Norfolk, VA 23510
Attn: Arnold Rodriguez

Data: The following are the results for BTEX by Method SW846: 5030 and 8020. All values reported as ug/kg.

TCA # **95-10494**
YOUR # B-21A(B)
6'-8' Depth, Groundwater, Bore Hole B-21

BENZENE <10.
TOLUENE <10.
ETHYLBENZENE <10.
XYLENES <30.

The following are the results for the analysis of your samples, submitted for TPH by the California Method, Standard: Diesel Fuel.

TCA #	Your #	Description	mg/kg
95-10495	B-21A(T)	6'-8' Depth, Groundwater, Bore Hole B-21A	<19.

The following are the results for the analysis of your soil samples, submitted for the determination of Lead.

TCA #	Your #	Description	mg/kg
95-10496	B-21A(L)	6'-8' Depth, Groundwater Bore Hole B-21A	<7.8

Please feel free to contact me if you have any questions concerning the analysis.

Thank you,

Steven J.E. Long
Steven J.E. Long



TC ANALYTICALS, INC.
(A TC Group Company)

1200 Boissevain Avenue
Tel. (804) 627-0400

Norfolk, Virginia 23507
FAX (804) 627-1118

Sampling Site: Yorktown RTC
Site Assessment

Sampling Date: 02/21/95

Account Info: P.O. # N0073/94

Date Received: 02/24/95

TCC/Cederquist, Rodriguez & Ripley
129 W. Va. Beach Blvd.
Norfolk, VA 23510
Attn: Arnold Rodriguez

Date Reported: 03/09/95

Released By: STEVE LONG

c3

Data: The following are the results for BTEX by Method SW846: 5030 and 8020. All values reported as ug/kg.

TCA #	95-09279	95-09281	95-09283	95-09286	95-09289
YOUR #	B-11(B)	B-12(B)	B-13(B)	B-14(B)	B-11(B2)
	10' Depth	10' Depth	16' Depth	16' Depth	16' Depth
	Bore Hole	Bore Hole			
	B-11	B-12			
BENZENE	<10.	<10.	<10.	<10.	<10.
TOLUENE	<10.	<10.	<10.	<10.	<10.
ETHYLBENZENE	<10.	<10.	<10.	<10.	<10.
XYLENES	<30.	<30.	<30.	<30.	<30.

The following are the results for the analysis of your samples, submitted for TPH by the California Method, Standard: Diesel Fuel.

TCA #	Your #	Description	mg/kg
95-09280	B-11(T)	10' Depth, Bore Hole B-11	<16.
95-09282	B-12(T)	10' Depth, Bore Hole B-12	<23.
95-09284	B-13(T)	16' Depth	<16.
95-09287	B-14(T)	16' Depth	200.
95-09290	B-11(T2)	16' Depth	<15.



TC ANALYTICS, INCORPORATED

1200 Boissevain Avenue
Tel. (804) 627-0400

Norfolk, Virginia 23507
FAX (804) 627-1118

Data:

Page #2

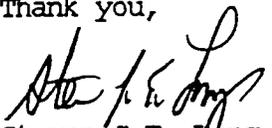
TCA No. 95-09279 to 95-09291

The following are the results for the analysis of your soil samples, submitted for the determination of Lead.

<u>TCA #</u>	<u>Your #</u>	<u>Description</u>	<u>mg/kg</u>
95-09285	B-13(L)	16' Depth	Pb TESTING WAS NOT PERFORMED SINCE SAMPLE DID NOT CONTAIN GASOLINE
95-09288	B-14(L)	16' Depth	<18.
95-09291	B-11(L2)	16' Depth	Pb TESTING WAS NOT PERFORMED SINCE SAMPLE DID NOT CONTAIN GASOLINE

Please feel free to contact me if you have any questions concerning the analysis.

Thank you,


Steven J.E. Long



TC ANALYTICALS, INC.
(A TC Group Company)

1200 Boissevain Avenue
Tel. (804) 627-0400

Norfolk, Virginia 23507
FAX (804) 627-1118

Sampling Site: Yorktown RTC
Site Assessment

Sampling Date: 02/22/95

Date Received: 03/02/95

Date Reported: 03/09/95

Released By: STEVE LONG

c3

Account Info: P.O. # N0073/94

TCC/Cederquist, Rodriguez & Ripley
129 W. Va. Beach Blvd.
Norfolk, VA 23510
Attn: Arnold Rodriguez

Data: The following are the results for the analysis of your samples, submitted for TPH by the California Method, Standard: Diesel Fuel.

TCA #	Your #	Description	mg/kg
95-10483	B-16 14-16(T)	14'-16' Depth	<16.
95-10485	B-17(T)	20'-22' Depth, Groundwater	63.
95-10487	B-18 16-18(T)	16'-18' Depth, Concentration	380.

The following are the results for BTEX by Method SW846: 5030 and 8020. All values reported as ug/kg.

TCA #	95-10484	95-10486
YOUR #	B-17(B)	B-18 16-18(B)
	20'-22' Depth	16'-18' Depth
	Groundwater	Concentration
BENZENE	<10.	<10.
TOLUENE	<10.	<10.
ETHYLBENZENE	<10.	<10.
XYLENES	<30.	47.

Please feel free to contact me if you have any questions concerning the analysis.

Thank you,

Steven J.E. Long



TC ANALYTICALS, INC.
(A TC Group Company)

1200 Boissevain Avenue Norfolk, Virginia 23507
Tel. (804) 627-0400 FAX (804) 627-1118

Sampling Site: Yorktown RTC Site Assessment

Sampling Date: 02/22/95

Date Received: 03/02/95

Date Reported: 03/12/95

Released By: STEVE LONG

c3

Account Info: P.O. # N0073/94

TCC/Cederquist, Rodriguez & Ripley
129 W. Va. Beach Blvd.
Norfolk, VA 23510
Attn: Arnold Rodriguez

Data: The following are the results for BTEX by Method SW846: 5030 and 8020. All values reported as ug/kg.

TCA #	95-10504	95-15076	95-10509
YOUR #	B-7 A(B)	B-16 4-6(T)	B-16 14-16(B)
	6'-8' Depth	4'-6' Depth	14'-16' Depth
	Bore Hole B-7	Concentration	Groundwater
	Site, 2nd Hole		
BENZENE	<10.	<10.	<10.
TOLUENE	44.	<10.	<10.
ETHYLBENZENE	32.	<10.	<10.
XYLENES	220.	<30.	<30.

The following are the results for the analysis of your samples, submitted for TPH by the California Method, Standard: Diesel Fuel.

TCA #	Your #	Description	mg/kg
95-10505	B-7A(T)	6'-8' Depth, Bore Hole B-7 Site, 2nd Hole	390.
95-10508	B-16 4-6(B)	4'-6' Depth, Concentration	<20.

The following are the results for the analysis of your soil samples, submitted for the determination of Lead.

TCA #	Your #	Description	mg/kg	§
95-10506	B-7A(L)	6'-8' Depth, Bore Hole B-7 Site, 2nd Hole	<0.50	<0.02

Please feel free to contact me if you have any questions concerning the analysis.

Thank you,
Steve J.E. Long
Steven J.E. Long



TC ANALYTICALS, INC.
(A TC Group Company)

1200 Boissevain Avenue
Tel. (804) 627-0400

Norfolk, Virginia 23507
FAX (804) 627-1118

Sampling Site: Yorktown RTC
Site Assesment

Sampling Date: 02/23/95

Date Received: 03/01/95

Date Reported: 03/09/95

Released By: STEVE LONG

c3

Account Info: P.O. # N0073/94

TCC/Cederquist, Rodriguez & Ripley
129 W. Va. Beach Blvd.
Norfolk, VA 23510
Attn: Arnold Rodriguez

Data: The following are the results for BTEX by Method SW846: 5030 and 8020. All values reported as ug/kg.

TCA #	95-10497	95-10499	95-10501
YOUR #	B-20(B) 18'-20' Depth Groundwater Bore Hole B-20	B-26(B) 16'-18' Depth Groundwater Bore Hole B-26	B-24A(B) 16'-18' Depth Groundwater Bore Hole B-24A
BENZENE	<10.	<10.	<10.
TOLUENE	<10.	<10.	<10.
ETHYLBENZENE	<10.	<10.	<10.
XYLENES	<30.	<30.	<30.

The following are the results for the analysis of your samples, submitted for TPH by the California Method, Standard: Diesel Fuel.

TCA #	Your #	Description	mg/kg
95-10498	B-20(T)	18'-20' Depth, Groundwater, Bore Hole B-20	<14.
95-10500	B-26(T)	16'-18' Depth, Groundwater, Bore Hole B-26	<16.
95-10502	B-24A(T)	16'-18' Depth, Groundwater, Bore Hole 24A	<23.

The following are the results for the analysis of your soil samples, submitted for the determination of Lead.

TCA #	Your #	Description	mg/kg
95-10503	B-24A(L)	16'-18" Depth, Groundwater Bore Hole 24A	<9.7

Please feel free to contact me if you have any questions concerning the analysis.

Thank you,
Steve Long
Steven J.E. Long



TC ANALYTICALS, INCORPORATED

1200 Boissevain Avenue Norfolk, Virginia 23507
Tel. (804) 627-0400 FAX (804) 627-1118

Page #2

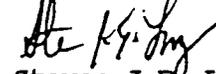
TCA No. 95-09274 to 95-09278

Note: QA/QC analysis of sampels 95-09277 and 95-09278 showed a high deviation for replications. Sample 95-09277 values reanged form 420 to 970 mg/kg and 95-09278 reanged rom 560 to 700 mg/kg.

The higher number of all analysis was reported.

Please feel free to contact me if you have any questions concerning the analysis.

Thank you,


Steven J.E. Long



TC ANALYTICALS, INC.
(A TC Group Company)

1200 Boissevain Avenue
Tel. (804) 627-0400

Norfolk, Virginia 23507
FAX (804) 627-1118

Sampling Site: Yorktown RTC
Site Assessment

Sampling Date: 02/24/95

Date Received: 03/02/95

Date Reported: 03/09/95

Released By: STEVE LONG

Account Info: P.O. # N0073/94

TCC/Cederquist, Rodriguez & Ripley
129 W. Va. Beach Blvd.
Norfolk, VA 23510
Attn: Arnold Rodriguez

c3

Data: The following are the results for BTEX by Method SW846: 5030 and 8020. All values reported as ug/kg.

TCA #	95-10488	95-10490	95-10491	95-10492	95-10493
YOUR #	MW-9(B)	MW-10	MW-11	MW-11	B-25
	6'-8' Depth	18'-20' Depth	6'-8' Depth	18'-20' Depth	16'-18' Depth
	Groundwater	Groundwater	Concentration	Groundwater	Groundwater
	Monitor	Monitor	Monitor	Monitor	Bore Hole
	Well 9	Well 10	Well 11	Well 11	B-25
BENZENE	<10.	<10.	<10.	<10.	<10.
TOLUENE	<10.	<10.	<10.	<10.	<10.
ETHYLBENZENE	<10.	<10.	<10.	<10.	<10.
XYLENES	<30.	<30.	110.	<30.	<30.

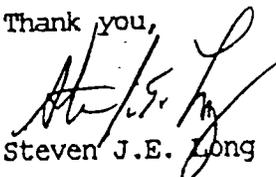
The following are the results for the analysis of your samples, submitted for TPH by the California Method, Standard: Diesel Fuel.

TCA #	Your #	Description	mg/kg
95-10489*	MW-9(T)	6'-8' Depth, Groundwater, Monitor Well 9	23.
95-10490	MW-10	18'-20' Depth, Groundwater, Monitor Well 10	9.5
95-10491*	MW-11	6'-8' Depth, Concentration, Monitor Well 11	340.
95-10492*	MW-11	18'-20' Depth, Groundwater, Monitor Well 11	1200.
95-10493	B-25	16'-18' Depth, Groundwater, Bore Hole B-25	19.

* Sample #95-10489, 95-10491, And 95-10492 showed heavy weight petroleum product quantified as Diesel Fuel by California Method.

Please feel free to contact me if you have any questions concerning the analysis.

Thank you,



Steven J.E. Long



TC ANALYTICS, INC.
(A TC Group Company)

1200 Boissevain Avenue Norfolk, Virginia 23507
Tel. (804) 627-0400 FAX (804) 627-1118

Sampling Site: Yorktown RTC
Site Assesment

Sampling Date: 02/23/95

Account Info: P.O. # N0073/94

Date Received: 02/24/95

TCC/Cederquist, Rodriguez & Ripley
129 W. Va. Beach Blvd.
Norfolk, VA 23510
Attn: Arnold Rodriguez

Date Reported: 03/07/95

Released By: STEVE LONG

c3

Data: The following are the results for BTEX by Method SW846: 5030 and 8020. All values reported as ug/kg.

TCA #	95-09256	95-09259	95-09262	95-09265	95-09268	95-09271
YOUR #	HA-1B	HA-2B	HA-3B	HA-4B	HA-5B	HA-6B
	18"-24"	18"-24"	24"-30"	Between	18"-24"	18"-24"
	Depth	Depth	Depth	Navy &	Depth	Depth
	East Of	Below	Below	Coast	Between	West Of
	Navy Pier	Navy Pier	Stripper	Guard	Coast	Coast
			House	Piers	Guard Pier	Guard Pier
BENZENE	<10.	<10.	4400.	<10.	<10.	50.
TOLUENE	<10.	<10.	2800.	<10.	<10.	<10.
ETHYLBENZENE	<10.	<10.	3300.	<10.	<10.	<10.
XYLENES	<30.	36.	1700.	<30.	<30.	<30.

The following are the results for the analysis of your samples, submitted for TPH by the California Method, Standard: Diesel Fuel and Gasoline.

TCA #	Your #	Description	mg/kg
95-09257	HA-1T	18"-24" Depth, East Of Navy Pier	<22.
95-09260	HA-2T	18"-24" Depth, Below Navy Pier, Gasoline	300.
95-09263	HA-3T	24"-30" Depth, Below Stripper House, Gasoline	3200.
95-09266*	HA-4T	18"-24" Depth, Between Navy & C.G. Piers	130.
95-09269	HA-5T	18"-24" Depth, Below Coast Guard Pier	<18.
95-09272	HA-6T	18"-24" Depth, West Of Coast Guard Pier	<18.

* Sample #95-09266 showed heavy eight petroleum product quantified as Diesel Fuel by California Method.



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Data:

Page #2

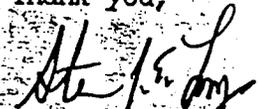
TCA No. 95-09256 to 95-09273

The following are the results for the analysis of your soil samples, submitted for the determination of Lead.

TCA #	Your #	Description	mg/kg
95-09258	HA-1L	18"-24" Depth East Of Navy Pier	Pb TESTING WAS NOT PERFORMED SINCE SAMPLE DID NOT CONTAIN GASOLINE
95-09261	HA-2L	18"-24" Depth Below Navy Pier	<17.
95-09264	HA-3L	24"-30" Depth Below Stripper House	<14.
95-09267	HA-4L	18"-24" Depth Between Navy & Coast Guard Piers	Pb TESTING WAS NOT PERFORMED SINCE SAMPLE DID NOT CONTAIN GASOLINE
95-09270	HA-5L	18"-24" Depth Below Coast Guard Pier	Pb TESTING WAS NOT PERFORMED SINCE SAMPLE DID NOT CONTAIN GASOLINE
95-09271	HA-6L	18"-24" Depth West Of Coast Guard Pier	Pb TESTING WAS NOT PERFORMED SINCE SAMPLE DID NOT CONTAIN GASOLINE

Please feel free to contact me if you have any questions concerning the analysis.

Thank you,


Steven J.E. Long



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(A TC Group Company)

1200 Boissevain Avenue
Tel. (804) 627-0400

Norfolk, Virginia 23507
FAX (804) 627-1118

Sampling Site: USCG RTC
Fuel Pier

Sampling Date: 03/10/95

Date Received: 03/13/95

Date Reported: 03/16/95

Released By: STEVE LONG

Account Info: *****

TCC/Cederquist, Rodriguez & Ripley
129 W. Va. Beach Blvd.
Norfolk, VA 23510
Attn: Arnold Rodriguez

c3

Data: The following are the results for the analysis of your water samples, submitted for TPH by the California Method, Standard: Diesel Fuel.

TCA #	Your #	Description	mg/l
95-12417	7	Well # 7	<0.10
95-12418	8	Well #8	<0.10
95-12419	9	Well #9	<0.10
95-12420	10	Well #10	<0.10
95-12421*	11	Well #11	8.8

* Sample #95-12421 showed heavy weight petroleum product quantified as Diesel Fuel by California Method.

The following are the results for BTEX by Method SW846: 5030 and 8020. All values reported as mg/l.

TCA #	95-12417	95-12418	95-12419	95-12420	95-12421
	7, Well #7	8, Well #8	9, Well #9	10, Well #10	11, Well #11
BENZENE	<0.01	<0.01	<0.01	<0.01	<0.01
TOLUENE	<0.01	<0.01	<0.01	<0.01	<0.01
ETHYLBENZENE	<0.01	<0.01	<0.01	<0.01	<0.01
XYLENES	<0.03	<0.03	<0.03	<0.03	<0.03

The following are the results for the analysis of your water samples submitted for the determination of Lead, EPA Method 239.2.

TCA #	YOUR #	DESCRIPTION	RESULTS
95-12422	7	Well #7	<0.25 mg/l
95-12423	8	Well #8	<0.25 mg/l
95-12424	9	Well #9	<0.25 mg/l
95-12425	10	Well #10	<0.25 mg/l
95-12426	11	Well #11	<0.25 mg/l

MAXIMUM CONTAMINATION LIMIT, EPA

Lead 15. ppb

Please feel free to contact me if you have any questions concerning the analysis.

Thank you,

Steve J. E. Long
Steven J.E. Long

CHAIN-OF-CUSTODY-RECORD



TC ANALYTICS INC.

1200 BOISSEVAIN AVE
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NORFOLK VIRGINIA 23507
FAX (804) 627-1118

COMPANY: TC CONSULTANTS, INC.
CEDERQUIST RODRIGUEZ, RIPLEY
ADDRESS: 179 W 1/4 BEACH BLVD
NORFOLK, VA
CONTACT: ARNOLD RODRIGUEZ
PHONE/FAX: (804) 622-2828
PROJECT: YORKTOWN RTC
SITE ASSESSMENT P.O. # N0073/94

ANALYSIS CODE DESIGNATION

- A. BTEX
- B. TPH
- C. LEAD
- D.
- E.
- F.

SAMPLE ID	SAMPLE LOCATION/DESCRIPTION	ANALYSIS CODES	DATE TIME	MATRIX	PRESERVATION
B-11 (B)	BORE HOLE B-11 10' DEPTH	A	21 FEB 95	SOIL	REFRIGERATE
B-11 (T)	BORE HOLE B-11 10' DEPTH	B	21 FEB 95	SOIL	REFRIGERATE
B-12 (B)	BORE HOLE B-12 10' DEPTH	A	21 FEB 95	SOIL	REFRIGERATE
B-12 (T)	BORE HOLE B-12 10' DEPTH	B	21 FEB 95	SOIL	REFRIGERATE
B-13 (B)	16' DEPTH	A	↑	↑	↑
B-13 (T)	16' DEPTH	B			
B-13 (L)	16' DEPTH	C			
B-14 (B)	16' DEPTH	A			
B-14 (T)	16' DEPTH	B			
B-14 (L)	16' DEPTH	C	21 FEB 95	SOIL	REFRIGERATE

Signature: *[Signature]*
Company: TCC
Date/Time: 21 FEB 95

Released By: _____
Received By: _____
Relinquished By: _____

Possible Sample Hazards: NONE

Turn Around Time: Normal (5 work days)
Accelerated/Date Need

CHAIN-OF-CUSTODY-RECORD



TC ANALYTICALS, INC.
(a TC Group Company)

1200 BOISSEvain AVE
TEL (804) 627-0400

NORFOLK, VIRGINIA 23507
FAX (804) 627-1118

COMPANY: TC CONSULTANTS, INC.
CEFER QUIST, RODRIGUEZ, RIPLEY

ADDRESS: 129 W. VA BEACH BLVD
NORFOLK, VA

CONTACT: ARNOLD RODRIGUEZ

PHONE/FAX: (804) 622-2828

PROJECT: WORKTOWN RTC P.O. # N0073/94
SITE ASSESSMENT

ANALYSIS CODE DESIGNATION

- | | |
|----------------|----|
| A. <u>BTEY</u> | D. |
| B. <u>TPH</u> | E. |
| C. <u>LEAD</u> | F. |

SAMPLE ID	SAMPLE LOCATION/DESCRIPTION	ANALYSIS CODES	DATE TIME	MATRIX	PRESERVATION
<u>B-11(B2)</u>	<u>16' DEPTH</u>	<u>A</u>	<u>21 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
<u>B-11(T2)</u>	<u>16' DEPTH</u>	<u>B</u>			
		<u>C</u>	<u>21 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>

Signature	Company	Date/Time
<u>[Signature]</u>	<u>TC</u>	<u>21 FEB 95</u>
Relinquished By:		
Received By:		
Relinquished By:		
Received By:		

Possible Sample Hazards: NONE

Turn Around Time: Normal (5 work days)

Accelerated/Date Need _____

CHAIN-OF-CUSTODY-RECORD



TC ANALYTICALS, INC.
(a TC Group Company)

1200 BOISSEVAIN AVE
TEL. (804) 627-0400

NORFOLK, VIRGINIA 23507
FAX (804) 627-1118

COMPANY: TC CONSULTANTS, INC.
CEDERQUIST, RODRIGUEZ, RILEY

ADDRESS: 129 W. 1/2 BERRY BLVD
NORFOLK, VA

CONTACT: ARNOLD RODRIGUEZ

PHONE/FAX: (804) 622-2828

PROJECT: YORCTOWN RTC P.O. # N0073/94
SITE ASSESSMENT

ANALYSIS CODE DESIGNATION

A. <u>BTEX / SOIL</u>	D.
B. <u>TPH / SOIL</u>	E.
C. <u>LEAD / SOIL</u>	F.

SAMPLE ID	SAMPLE LOCATION/DESCRIPTION	ANALYSIS CODES	DATE TIME	MATRIX	PRESERVATION
B-15 (B)	BOREHOLE B-15 12'-14' DEPTH	A	22 FEB 95	SOIL	REFRIGERATE
B-15 (T)	BOREHOLE B-15 12'-14' DEPTH	B	22 FEB 95	SOIL	REFRIGERATE
B-15 (L)	BOREHOLE B-15 12'-14' DEPTH	C	22 FEB 95	SOIL	REFRIGERATE
B-7-2 (R)	BOREHOLE B-7 SITE / 2ND HOLE 6'-8' DEPTH	F	22 FEB 95	SOIL	REFRIGERATE
B-7-2 (T)	BOREHOLE B-7 SITE / 2ND HOLE 6'-8' DEPTH	B	22 FEB 95	SOIL	REFRIGERATE
B-7-2 (L)	BOREHOLE B-7 SITE / 2ND HOLE 6'-8' DEPTH	C	22 FEB 95	SOIL	REFRIGERATE
B16 4-6 (B)	4'-6' DEPTH / CONCENTRATION	A	22 FEB 95	SOIL	REFRIGERATE
B16 4-6 (T)	4'-6' DEPTH / CONCENTRATION	B	22 FEB 95	SOIL	REFRIGERATE
B16 4-6 (L)	4'-6' DEPTH / CONCENTRATION	C	22 FEB 95	SOIL	REFRIGERATE
B16 4-16 (B)	14'-16' DEPTH / GROUNDWATER	A	22 FEB 95	SOIL	REFRIGERATE

Signature	Company	Date/Time
<u>P. Rodriguez</u>	<u>TC</u>	<u>22 FEB 95</u>
Released By:		
Received By:		
Relinquished By:		

Possible Sample Hazards: NONE

Turn Around Time: Normal (5 work days) Accelerated/Date Need _____

CHAIN-OF-CUSTODY-RECORD



TC ANALYTICS, INC.
(a TC Group Company)

1200 BOISSEVAIN AVE
TEL. (804) 627-0400

NORFOLK, VIRGINIA 23507
FAX (804) 627-1118

COMPANY: TC CONSULTANTS, INC.
EDER GUIST, RODRIGUEZ, RIPLEY

ADDRESS:
179 W. VA BEACH BLVD
NORFOLK, VA

CONTACT: ARNOUD RODRIGUEZ

PHONE/FAX: (804) 622-2828

PROJECT: YACKTOWN RTC P.O. # N0073/94
SITE ASSESSMENT

ANALYSIS CODE DESIGNATION

- | | |
|-----------------------|----|
| A. <u>BTEX / SOIL</u> | D. |
| B. <u>TPH / SOIL</u> | E. |
| C. <u>LEAD / SOIL</u> | F. |

SAMPLE ID	SAMPLE LOCATION/DESCRIPTION	ANALYSIS CODES	DATE TIME	MATRIX	PRESERVATION
B16 14-16(T)	14'-16' DEPTH	B	22 FEB 95	SOIL	REFRIGERATE
B16 14-16(L)	14'-16' DEPTH	C	22 FEB 95	SOIL	REFRIGERATE
B17 (B)	20'-22' DEPTH / GROUNDWATER	A	22 FEB 95	SOIL	REFRIGERATE
B17 (T)	20'-22' DEPTH / GROUNDWATER	B	22 FEB 95	SOIL	REFRIGERATE
B17 (L)	20'-22' DEPTH / GROUNDWATER	C	22 FEB 95	SOIL	REFRIGERATE
B18 16-18 (B)	16'-18' DEPTH / CONCENTRATION	A	22 FEB 95	SOIL	REFRIGERATE
B18 16-18 (T)	16'-18' DEPTH / CONCENTRATION	B	22 FEB 95	SOIL	REFRIGERATE
B18 16-18 (L)	16'-18' DEPTH / CONCENTRATION	C	22 FEB 95	SOIL	REFRIGERATE
B18 20-22 (B)	20'-22' DEPTH / GROUNDWATER	A	22 FEB 95	SOIL	REFRIGERATE
B18 20-22 (T)	20'-22' DEPTH / GROUNDWATER	B	22 FEB 95	SOIL	REFRIGERATE

Signature	Company	Date/Time
<u>[Signature]</u>	<u>TCC</u>	<u>22 FEB 95</u>
Released By:		
Received By:		
Relinquished By:		

Possible Sample Hazards: NONE

Turn Around Time: Normal (5 work days) Accelerated/Date Need _____

CHAIN-OF-CUSTODY-RECORD



TC ANALYTICALS, INC.
(a TC Group Company)

1200 BOISSEVAIN AVE
TEL (804) 627-0400

NORFOLK, VIRGINIA 23507
FAX (804) 627-1118

COMPANY: TC CONSULTANTS, INC.
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ADDRESS:
129 W. VA BEACH BLVD
NORFOLK, VA

CONTACT: ARNOLD RODRIGUEZ

PHONE/FAX: (804) 622-2828

PROJECT: YORKTOWN RTC P.O. # N0073/94
SITE ASSESSMENT

ANALYSIS CODE DESIGNATION

- | | |
|-----------------------|----|
| A. <u>BTEX / SOIL</u> | D. |
| B. <u>TPH / SOIL</u> | E. |
| C. <u>LEAD / SOIL</u> | F. |

SAMPLE ID	SAMPLE LOCATION/DESCRIPTION	ANALYSIS CODES	DATE TIME	MATRIX	PRESERVATION
	<u>BOREHOLE B-18</u>				
<u>B18-20-22(L)</u>	<u>20'-22' DEPTH / GROUNDWATER</u>	<u>C</u>	<u>22 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
	<u>BOREHOLE B-18 B-19</u>				
<u>B-19 (B)</u>	<u>18'-20' DEPTH / GROUNDWATER</u>	<u>A</u>	<u>22 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
	<u>BOREHOLE B-19</u>				
<u>B-19 (T)</u>	<u>18'-20' DEPTH / GROUNDWATER</u>	<u>B</u>	<u>22 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
	<u>BOREHOLE B-19</u>				
<u>B-19 (L)</u>	<u>18'-20' DEPTH / GROUNDWATER</u>	<u>C</u>	<u>22 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
	<u>BOREHOLE B-21A</u>				
<u>B-21A (B)</u>	<u>6'-8' DEPTH / GROUNDWATER</u>	<u>A</u>	<u>22 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
	<u>BOREHOLE B-21A</u>				
<u>B-21A (T)</u>	<u>6'-8' DEPTH / GROUNDWATER</u>	<u>B</u>	<u>22 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
	<u>BOREHOLE B-21A</u>				
<u>B-21A (L)</u>	<u>6'-8' DEPTH / GROUNDWATER</u>	<u>C</u>	<u>22 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>

Signature	Company	Date/Time
<u>Shed By: P. J. J. J.</u>	<u>TCC</u>	<u>22 FEB 95</u>
Received By:		
Relinquished By:		

Possible Sample Hazards: None

Turn Around Time: Normal (5 work days) Accelerated/Date Need _____

CHAIN-OF-CUSTODY-RECORD



TC ANALYTICALS, INC.
(a TC Group Company)

1200 BOISSEVAIN AVE
TEL (804) 627-0400

NORFOLK, VIRGINIA 23507
FAX (804) 627-1118

COMPANY: TC CONSULTANTS, INC
CEDERQUIST RODRIGUEZ RIPLEY

ADDRESS: 129 W. VA BEACH PLVD
NORFOLK, VA

CONTACT: ARNOLD RODRIGUEZ

PHONE/FAX: (804) 622-3828

PROJECT: YORKTOWN RTC | P.O. # NOCT3/94
SITE ASSESSMENT

ANALYSIS CODE DESIGNATION

- A. BTEX / SOIL D.
- B. TPH / SOIL E.
- C. LEAD / SOIL F.

SAMPLE ID	SAMPLE LOCATION/DESCRIPTION	ANALYSIS CODES	DATE TIME	MATRIX	PRESERVATION
	<u>BOREHOLE B-20</u>				
<u>B-20 (B)</u>	<u>18'-20' DEPTH / GROUNDWATER</u>	<u>A</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
	<u>BOREHOLE B-20</u>				
<u>B-20 (T)</u>	<u>18'-20' DEPTH / GROUNDWATER</u>	<u>B</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
	<u>BOREHOLE B-20</u>				
<u>B-20 (L)</u>	<u>18'-20' DEPTH / GROUNDWATER</u>	<u>C</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
	<u>BOREHOLE B-23</u>				
<u>B-23 (B)</u>	<u>16'-18' DEPTH / GROUNDWATER</u>	<u>A</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
	<u>BOREHOLE B-23</u>				
<u>B-23 (T)</u>	<u>16'-18' DEPTH / GROUNDWATER</u>	<u>B</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
	<u>BOREHOLE B-23</u>				
<u>B-23 (L)</u>	<u>16'-18' DEPTH / GROUNDWATER</u>	<u>C</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
	<u>BOREHOLE B-26</u>				
<u>B-26 (B)</u>	<u>16'-18' DEPTH / GROUNDWATER</u>	<u>A</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
	<u>BOREHOLE B-26</u>				
<u>B-26 (T)</u>	<u>16'-18' DEPTH / GROUNDWATER</u>	<u>B</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
	<u>BOREHOLE B-26</u>				
<u>B-26 (L)</u>	<u>16'-18' DEPTH / GROUNDWATER</u>	<u>C</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
	<u>BOREHOLE B-24A</u>				
<u>B-24A (B)</u>	<u>16'-18' DEPTH / GROUNDWATER</u>	<u>A</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>

Signature	Company	Date/Time
<u>P. Fitzpatrick</u>	<u>TCC</u>	<u>23 FEB 95</u>
Relinquished By:		
Received By:		
Relinquished By:		

Possible Sample Hazards: NONE

Turn Around Time: Normal (5 work days) _____

Accelerated/Date Need _____

CHAIN-OF-CUSTODY-RECORD



TC ANALYTICALS, INC.
(a TC Group Company)

1200 BOISSEVAIN AVE
TEL (804) 627-0400

NORFOLK, VIRGINIA 23507
FAX (804) 627-1118

COMPANY: TC CONSULTANTS, INC.
FEDERQUIST, RODRIGUEZ, RIPLEY

ADDRESS: 129 W. VA BEACH BLVD
NORFOLK, VA

CONTACT: ARNOLD RODRIGUEZ

PHONE/FAX: (804) 622-2828

PROJECT: YORKTOWN RTC P.O. # NO073/94
SITE ASSESSMENT

ANALYSIS CODE DESIGNATION

- A. BTEX / SOIL D.
- B. TPH / SOIL E.
- C. LEAD / SOIL F.

SAMPLE ID	SAMPLE LOCATION/DESCRIPTION	ANALYSIS CODES	DATE TIME	MATRIX	PRESERVATION
<u>HA-18(B)</u>	<u>HAND AUGER 18 SITE NEAR FRONT GATE 6'-7' DEPTH</u>	<u>A</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
<u>HA-18(T)</u>	<u>HAND AUGER 18 SITE NEAR FRONT GATE 6'-7' DEPTH</u>	<u>B</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
<u>HA-18(L)</u>	<u>HAND AUGER 18 SITE NEAR FRONT GATE 6'-7' DEPTH</u>	<u>C</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
<u>R-1</u>	<u>AT FIRING RANGE STORM DRAIN PIPE EXIT 6" DEPTH</u>	<u>C</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
<u>R-2</u>	<u>AT FIRING RANGE 70' DOWNSTREAM OF STORM DRAIN EXIT 6" DEPTH</u>	<u>C</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>

Signature	Company	Date/Time
<u>Delia Patricia</u>	<u>TC</u>	<u>23 FEB 95</u>
Relinquished By:		
Received By:		
Relinquished By:		
Received By:		
Relinquished By:		
Received By:		

Possible Sample Hazards: PETROLEUM PRODUCTS?

Turn Around Time: Normal (5 work days) _____
Accelerated/Date Need _____

CHAIN-OF-CUSTODY-RECORD



TC ANALYTICALS, INC.
(a TC Group Company)

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TEL (804) 627-0400

NORFOLK, VIRGINIA 23507
FAX (804) 627-1118

ANY: TC CONSULTANTS, INC
CEDERQUIST, RODRIGUEZ, RIPLEY

ADDRESS:
129 W. 1/4 BEACH BLVD
NORFOLK, VA

CONTACT: ARNOLD RODRIGUEZ

PHONE/FAX: (804) 622-2828

PROJECT: YACHTOWN RTC P.O. # N0073/94
SITE ASSESSMENT

ANALYSIS CODE DESIGNATION

A. <u>BTEX / SOIL</u>	D.
B. <u>TPH / SOIL</u>	E.
C. <u>LEAD / SOIL</u>	F.

SAMPLE ID	SAMPLE LOCATION/DESCRIPTION	ANALYSIS CODES	DATE TIME	MATRIX	PRESERVATION
<u>HA-1B</u>	<u>18"-24" DEPTH</u> <u>EAST OF NAVY PIER</u>	<u>A</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>
<u>HA-1T</u>	<u>EAST OF NAVY PIER</u> <u>18"-24" DEPTH</u>	<u>B</u>	↑	↑	↑
<u>HA-1L</u>	<u>EAST OF NAVY PIER</u> <u>18"-24" DEPTH</u>	<u>C</u>	↑	↑	↑
<u>HA-2B</u>	<u>BELOW NAVY PIER</u> <u>18"-24" DEPTH</u>	<u>A</u>	2 OF THE 6 LEAD SAMPLES TO BE ANALYZED IF GAS DETECTED.	↓	↓
<u>HA-2T</u>	<u>BELOW NAVY PIER</u> <u>18"-24" DEPTH</u>	<u>B</u>			
<u>HA-2L</u>	<u>BELOW NAVY PIER</u> <u>24"-30" DEPTH</u>	<u>C</u>			
<u>HA-3B</u>	<u>BELOW STRIPPER HOUSE</u> <u>24"-30" DEPTH</u>	<u>A</u>			
<u>HA-3T</u>	<u>BELOW STRIPPER HOUSE</u> <u>24"-30" DEPTH</u>	<u>B</u>			
<u>HA-3L</u>	<u>BELOW STRIPPER HOUSE</u>	<u>C</u>			
<u>HA-4B</u>	<u>BETWEEN NAVY & C.G. PIERS</u>	<u>A</u>	<u>23 FEB 95</u>	<u>SOIL</u>	<u>REFRIGERATE</u>

Signature	Company	Date/Time
<u>P. Rodriguez</u>	<u>TCC</u>	<u>23 FEB 95</u>
Received By:		
Relinquished By:		
Received By:		
Relinquished By:		

Possible Sample Hazards: PETROLEUM PRODUCTS ?

Turn Around Time: Normal (5 work days) _____
Accelerated/Date Need _____

CHAIN-OF-CUSTODY-RECORD



TC ANALYTICALS, INC.
(a TC Group Company)

1200 BOISSEVAIN AVE
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NORFOLK, VIRGINIA 23507
FAX (804) 627-1118

COMPANY: TC CONSULTANTS, INC
FREDERQUIST, RODRIGUEZ, RIPLEY

ADDRESS:
129 W. VA BEACH BLVD
NORFOLK, VA

CONTACT: ARNOLD RODRIGUEZ

PHONE/FAX: (804) 622-2828

PROJECT: YORCTOWN RTC P.O. # ND013/94
SITE ASSESSMENT

ANALYSIS CODE DESIGNATION

- | | |
|-----------------------|----|
| A. <u>BTEX / SOIL</u> | D. |
| B. <u>TPH / SOIL</u> | E. |
| C. <u>LEAD / SOIL</u> | F. |

SAMPLE ID	SAMPLE LOCATION/DESCRIPTION	ANALYSIS CODES	DATE TIME	MATRIX	PRESERVATION
HA-4T	18"-24" DEPTH BETWEEN NAVY & C.G. PIERS	B	23 FEB 95	SOIL	REFRIGERATE
HA-4L	18"-24" DEPTH BETWEEN NAVY & C.G. PIERS	C	↑	↑	↑
HA-5B	BELOW COAST GUARD PIER 18"-24" DEPTH	A	↓	↓	↓
HA-5T	BELOW COAST GUARD PIER 18"-24" DEPTH	B	↓	↓	↓
HA-5L	BELOW COAST GUARD PIER 18"-24" DEPTH	C	23 FEB 95	SOIL	REFRIGERATE
HA-6B	W. OF COAST GUARD PIER 18"-24" DEPTH	A	↑	↑	↑
HA-6T	W. OF COAST GUARD PIER 18"-24" DEPTH	B	↓	↓	↓
HA-6L	W. OF COAST GUARD PIER	C	23 FEB 95	SOIL	REFRIGERATE

Signature	Company	Date/Time
Shed By: <u>[Signature]</u>	<u>TCC</u>	<u>23 FEB 95</u>
Received By:		
Relinquished By:		
Received By:		
Relinquished By:		

Possible Sample Hazards: PETROLEUM PRODUCTS

Turn Around Time: Normal (5 work days) _____
Accelerated/Date Need _____

CHAIN-OF-CUSTODY-RECORD



TC ANALYTICALS, INC.
(a TC Group Company)

1200 BOISSEVAIN AVE
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NORFOLK, VIRGINIA 23507
FAX (804) 627-1118

COMPANY: TC CONSULTANTS, INC.
CEBERQUIST, RODRIGUEZ, RIPLEY

ADDRESS: 129 W. VA BEACH BLVD
NORFOLK, VA

CONTACT: ARNOLD RODRIGUEZ

PHONE/FAX: (804) 622-2828

PROJECT: VORRETTOWN RTC
SITE ASSESSMENT P.O. # N0073/94

ANALYSIS CODE DESIGNATION

- | | |
|-----------------------|----|
| A. <u>BTEX / SOIL</u> | D. |
| B. <u>TPH / SOIL</u> | E. |
| C. <u>LEAD / SOIL</u> | F. |

SAMPLE ID	SAMPLE LOCATION/DESCRIPTION	ANALYSIS CODES	DATE TIME	MATRIX	PRESERVATION
	MONITOR WELL 9				
MW-9(B)	6'-8' DEPTH / GROUNDWATER	A	24 FEB 95	SOIL	REFRIGERATE
	MONITOR WELL 9				
MW-9(T)	6'-8' DEPTH / GROUNDWATER	B	24 FEB 95	SOIL	REFRIGERATE
	MONITOR WELL 9				
MW-9(L)	6'-8' DEPTH / GROUNDWATER	C	24 FEB 95	SOIL	REFRIGERATE
	MONITOR WELL 10				
MW-10	18'-20' DEPTH / GROUNDWATER	A, B, (C?)	24 FEB 95	SOIL	REFRIGERATE
	MONITOR WELL 11				
MW-11	6'-8' DEPTH / CONCENTRATION	A, B, (C?)			
	MONITOR WELL 11				
MW-11	18'-20' DEPTH / GROUNDWATER	A, B, (C?)			
	BOREHOLE B 25				
B-25	16'-18' DEPTH / GROUNDWATER	A, B, (C?)	24 FEB 95	SOIL	REFRIGERATE

Signature	Company	Date/Time
<u>[Signature]</u>	<u>TCC</u>	<u>24 FEB 95</u>
Relinquished By:		
Received By:		
Relinquished By:		
Received By:		

Possible Sample Hazards: PETROLEUM PRODUCTS

Turn Around Time: Normal (5 work days) _____
Accelerated/Date Need _____

APPENDIX E

Release Data Historical Interviews

From Jan 78
SPCC for Naval Supply C

4.0 DETAILED SPCC PLAN

This detailed SPCC Plan is prepared in the sequence set forth in Section 112.7 of 40 CFR 112, as follows.

4.1 History and Account of Spill Events, Section 112.7(a): Table I is a list of spill events during the twelve months prior to 10 January 1974, and since then at the Yorktown Fuel Division.

Three major spills did occur however, in the years before the effective date of 10 January 1973. These include:

- (1) Overfill of tank in 1965 causing a 110,000 gallon spill of MOGAS. Less than half of this quantity reached surface water and most of that which did was contained with booms and cleaned up.
- (2) Pipeline rupture in 1970, causing a 100,000 gallon spill of NSFO. Virtually none of this reached surface water.
- (3) Pipeline rupture in 1971, causing a 2,500 gallon spill of JP-4. Most of this spill saturated adjacent soils which were later excavated and removed from the site. Some of this spill reached surface water; it was contained and cleaned up.

The existing installation of tank high-level alarms has prevented a repetition of tank overfills. Further, the use of pipeline pressure monitoring during tests and actual operations has prevented major spills of this sort since the effective date of 10 January 1973.

4.2 Storage Tanks: Required Engineering Consideration, Section 112.7(b): This Plan is concerned with underground and aboveground oil storage and piping, and problems associated with the following areas:

- . Fuel Handling on Pierhead
- . Fuel Tank Truck Loading Station
- . Oil/Water Separators
- . Fuel Pipelines

09/22/94 09:58 8048982329 KTC YORKTOWN (C) 003

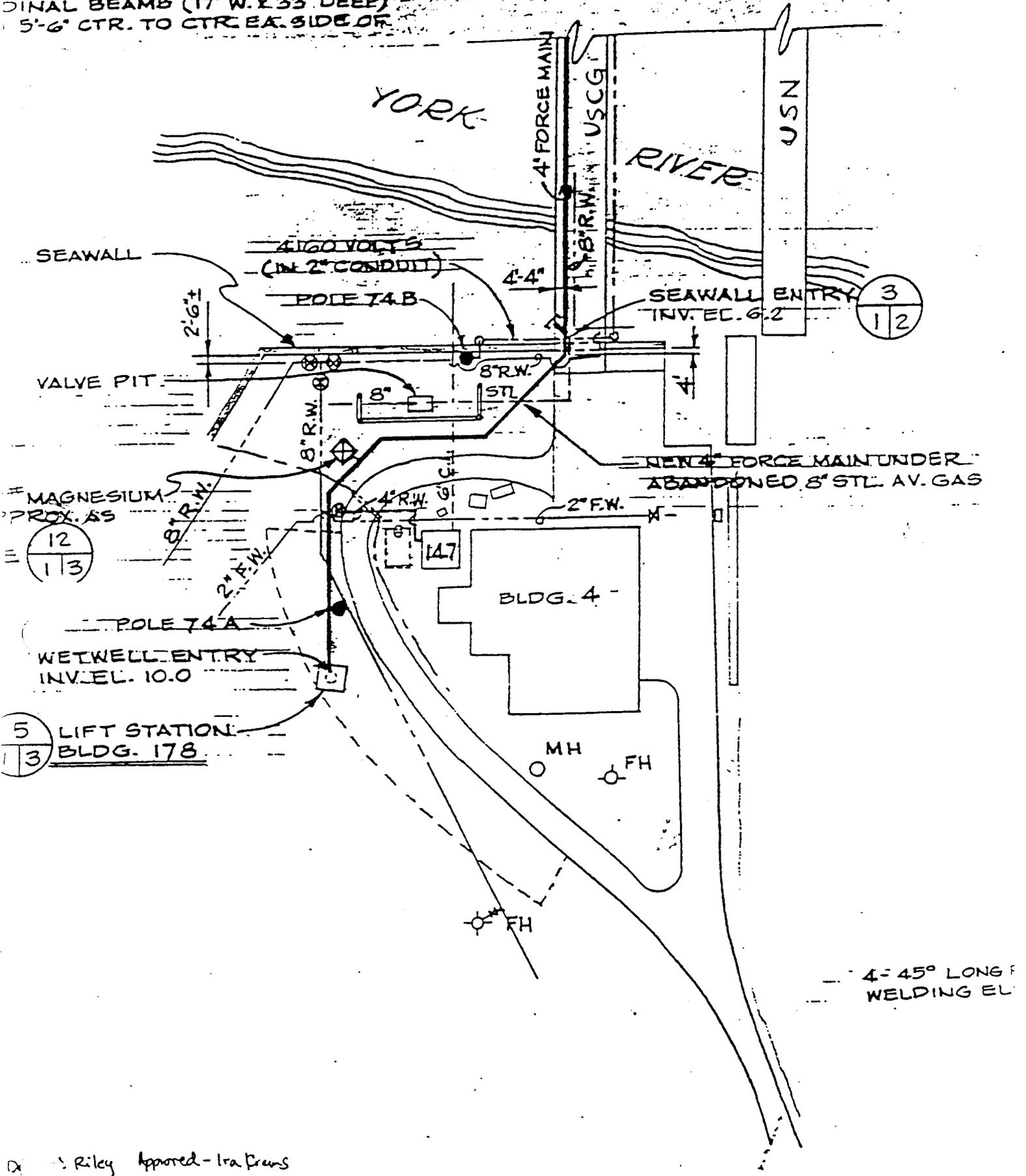
TABLE 1
YORKTOWN FUEL DIVISION OIL SPILL EVENTS SINCE 10 JANUARY 1973

Date	Location	Fuel Type	Amount Recovered (gal.)	Remarks
29 December 1975	Fueling Pier	JP-5	25	Spill was caused when ship tanks were overfilled. Only 5 gallons reached the water, the rest of the fuel oil was cleaned up on board the ship.
18 March 1976	Fueling Pier	NSFO	100	Spill occurred when Coast Guard ship transferred fuel between two onboard tanks. Oil was contained and cleaned up.
22 September 1977	Pipeline	NSFO	2	Spill occurred when personnel were removing abandoned pipelines beneath Coast Guard causeway. Oil was contained and cleaned up.

-7-

24' O.C.

DINAL BEAMS (17" W. x 33" DEEP)
5'-6" CTR. TO CTR. EA. SIDE OF



Dr. Riley Approved - Ira Prens
Drawing # 2-4123
5-17-72

Vessel sewage collection
system (Pier Sanitary Shore Tie)

DETAIL - FOOT OF PIER

SCALE: 1" = 50'

F

APPENDIX F

Original Site Check Report



TC CONSULTANTS, INCORPORATED
(a TC Group Company)

LETTER OF TRANSMITTAL

TO: Virginia DEQ - Water Division RE: Site Check Report
USCG RTC - Yorktown
USCG - Navy Pier Area
Yorktown, Virginia

WE ARE SENDING TO YOU:

Attached Under separate cover via _____ the following items:

- Shop Drawings Prints Plans Report
 Copy of Letter Change Order Specifications
 Other: Site Check Report Submittals Package

Copies	Date	No.	Description
1	21 Sept 94	1	Site Check Report

THESE ARE TRANSMITTED AS CHECKED BELOW:

- For approval Approved Approved as noted For your use
 For review As requested For Signature _____
 Submit ___ copies for distribution Return ___ corrected prints
 Returned prints Return ___ corrected copies
 For Bid Due: _____

REMARKS:

Copy To: CRR, USCG RTC, GSI

Signed: Richard A. Vogel
 Title: Vice President - Operations
 Date: 3 October 1994



TC CONSULTANTS, INCORPORATED
(a TC Group Company)

21 September 1994

Cederquist, Rodriguez, Ripley, P.C.
129 W. Virginia Beach Boulevard
Norfolk, Virginia 23510
Attention: Arnold Rodriguez, P.E.

Dear Mr. Rodriguez:

Enclosed is the Site Check Report requested by the Virginia Department of Environmental Quality - Water Division following the report of possible petroleum contamination at the USCG-Navy Pier area at the USCG Reserve Training Center - Yorktown.

The Site Check Report is a preliminary evaluation of the reported release, an investigation of possible sources of contamination, and initial taken to control the release of petroleum contamination from underground leaks. The completed Site Check Report must be submitted to The Virginia Department of Environmental Quality - Water Division by 1 October 1994.

After evaluation by Lynn Daniels, P.E., Environmental Engineer, USCG RTC - Yorktown, the Site Check Report will be forwarded to DEQ. A copy of the Site Check Report will also be provided to Bruce Spiro, P.E., at GSI, Inc. to assist him with the preparation of the subsequent Site Characterization Report which has also been requested by DEQ to assess the degree and extent of the contaminant plume.

If you have any questions, please feel free to contact me at (804) 627-0400.

Very truly yours,

Richard A. Vogel, Jr., CIH, CSP
Vice President - Operations
TC Consultants, Inc.

Enclosure

cc: Lynn Daniels, P.E.
Bruce Spiro, P.E.

**Site Check Report
USCG Reserve Training Center
- Yorktown
Yorktown, Virginia**

Prepared for: Cederquist, Rodriguez, Ripley, P.C.
129 W. Virginia Beach Boulevard
Norfolk, Virginia 23510
Attention: Arnold Rodriguez

Prepared by: TC Consultants, Inc.
1200 Boissevain Avenue
Norfolk, Virginia 23507
PHONE (804) 627-0400
FAX (804) 627-1118

Date: 21 September 1994

Appendix I
Appendix II

Boring Logs and Data
Virginia DEQ Checklist

Cederquist, Rodriguez, Ripley, P.C.
129 W. Virginia Beach Boulevard
Norfolk, Virginia 23510
Attention: Arnold Rodriguez

Re: Site Check Report
USCG-Navy Pier Area
USCG Reserve Training Center - Yorktown
Yorktown, Virginia

1. RELEASE INVESTIGATION AND CONFIRMATION REPORT

A. BACKGROUND

The Virginia Department of Environmental Quality (DEQ) - Water Division requested a site check report following the receipt of USCG notification of the presence of apparent petroleum product contamination on the beach in front of the retaining wall at the bank of the York River adjacent to the USCG-Navy Pier area. In accordance with an extension granted by DEQ, the completed Site Check Report will be submitted to DEQ by 1 October 1994.

Contamination was discovered during the demolition of a concrete structure on the beach on 16 May 1994. The contamination is located adjacent to an active fuel pier. The fuel pier is served by four pipes that run from the pier to the Navy FISC Fuel Farm, approximately one quarter mile away. Following the discovery of the contamination, contaminated sand was excavated, the area was backfilled with clean sand, and pipes entering the former structure were routed to a temporary oil-water separator located on the beach. The pipes passing through the seawall were traced to locate possible sources of the contamination. Several of the pipes appeared to run through a subsurface concrete structure which was later identified as an abandoned valve pit. Caps were torched off of the pipes entering the valve pit. Two of the pipes entering the pit were found to contain petroleum products. These previously abandoned lines were drained. Contaminated groundwater was pumped from the pit. Approximately 200 gallons of petroleum product was recovered. One pipe running from the pit through the seawall was left open to allow groundwater pooling on the floor of the pit to drain and all other pipes were sealed with concrete. Petroleum contamination appears to be seeping into the former valve pit along with groundwater. Oil spill booms were deployed along the bank of the York River to control surface contamination and the remaining drain pipe was routed through a temporary oil-water separator.

Subsequently, a storm partially undermined the seawall and groundwater flow beneath the seawall is permitting contaminated water to flow onto the beach. Additional oil booms were deployed along the beach to capture petroleum contamination flowing out with groundwater.

B. RELEASE INVESTIGATION

Hand auger samples were collected from beach sand on 24 May 1994, to further evaluate the extent of contamination in the USCG-Navy Pier area. Samples were screened for the presence of possible contamination using a Photo-ionization Detector (11.7 eV H-nu PID).

The results of the screening may be found in the following table:

TABLE 1. PID SCREENING RESULTS

Boring	1	2	3	4	5	6	7	8	9	10
Location	Between Piers	Next to USCG Pier	15' W. of USCG Pier	Beneath Stripper	Beneath Stripper	Beneath Stripper	Adjacent to Navy Pier	9' E. of Navy Pier	15' E. of Navy Pier	20' E. of Navy Pier
Depth	12"	15"	15"	30"	30"	34"	24"	28"	18"	18"
PID Reading	N.D.	N.D.	N.D.	>100 ppm	200 ppm	150 ppm	>200 ppm	none taken	none taken	none taken
Notes				black soil	free product	free product	free product	oil sheen	oil sheen	oil sheen

N.D. = None Detected

ppm = parts per million

Soil samples were submitted from 2 of the 12 augers taken on the beach (#5 and #7). Soil samples were analyzed for Total Petroleum Hydrocarbons (TPH) and for Benzene, Toluene, Ethyl Benzene and Xylene (BTEX). Analysis indicated the presence of weathered petroleum products identified as weathered gasoline and weathered diesel fuels. The laboratory could not identify the specific grade of product present. Based on the results of initial samples, the USCG Reserve Training Center - Yorktown reported to the Virginia Department of Environmental Quality - Water Division that the presence of petroleum contamination had been confirmed. Analysis results for the samples are found in Table 2.

TABLE 2. ANALYSIS RESULTS FROM SOIL SCREENING SAMPLES

TCA#	TCC#	Description	TPH-Gasoline (ppm)	TPH-Diesel (ppm)	Benzene (ppb)	Toluene (ppb)	Ethyl-Benzene (ppb)	Xylenes (ppb)
94-15400	B #5	Soil	460	230	N.A.	N.A.	N.A.	N.A.
94-15402	B #7	Soil	490	35	N.A.	N.A.	N.A.	N.A.

15401	B #5	Soil	N.A.	N.A.	<2200	2600	<2200	9800
94-15402A	B #7	Soil	N.A.	N.A.	13000	100000	40000	270000

ppb = parts per billion

ppm = parts per million

N.A. = Not Analyzed

Maximum Concentration Levels for Drinking Water as mandated by EPA:

Benzene	5 ppb
Toluene	1 ppm
Ethyl Benzene	700 ppb
Xylenes	10 ppm
TPH	1 ppm

All of the active fuel lines were pressure tested by the U.S. Navy in June 1994, and reported to be leak-free.

2. SITE CHECK

A. SOIL BORINGS

On 26 May 1994, a soil boring was conducted by Rock-Ray Drilling, Inc. in the upper end of the parking to attempt to determine the source of the contamination found at the seawall. After numerous auger refusals from debris in the fill material beneath the parking lot, a boring was placed on the grass divider between the upper and lower parking lots. The location of the boring was adjacent to the location of abandoned fuel lines running between the Navy FISC Fuel Farm and a former Navy Fuel Pier, demolished in 1952. Continuous split spoon samples were collected during the soil boring and screened for the presence of petroleum hydrocarbons using a photo-ionization detector (11.7 eV H-nu PID). No hydrocarbons were noted from the surface to 21 feet below grade. Groundwater was encountered approximately 12 feet below grade. A slight oil sheen was detected in water running out of soils taken from 10-12 feet below grade.

Since a soil boring at the upper end of the parking failed to identify significant contamination, it was decided to install a series of four monitoring wells to bracket the existing valve pit since contaminated groundwater was surfacing through cracks in the floor of the concrete pit.

B. MONITORING WELL INSTALLATION

On 26-30 August 1994, Rock-Ray Drilling, Inc. installed four monitoring wells, at various locations surrounding the petroleum contaminated former steam valve pit. The wells were intended to permit sampling of groundwater to assess the extent of the contamination.

During the installation of the monitoring wells, continuous split spoon soil samples were collected and screened on-site for the presence of petroleum hydrocarbon vapors using a calibrated photo-ionization detector. Soil samples were collected from split spoon samples following screening. In addition to the monitoring wells, eight hand auger borings were taken in the vicinity to attempt to identify contaminant flow direction. Soils were screened using a PID, and samples were collected for analysis. Soil samples were then placed in sample bottles on ice, transported to the laboratory for analysis. The location of monitoring wells and hand auger samples are shown on Diagram 1.

C. SOIL ANALYSIS

Soils were analyzed for the presence of total petroleum hydrocarbons (TPH), using gas chromatography (GC) method 8015 (modified). Soils were analyzed for Benzene Toluene Ethyl-Benzene Xylenes (BTEX), using GC Method 8020, and Poly-Chlorinated Biphenyls (PCB) using GC Method 8080. Analysis results for the soil samples are found in table 3.

TABLE 3. ANALYSIS RESULTS FROM MONITORING WELL SPOILS

TCA#	TCC#	Type	TPH-Gasoline (ppm)	TPH-Diesel (ppm)	Benzene (ppb)	Toluene (ppb)	Ethyl-Benzene (ppb)	Xylenes (ppb)	PCB (ppm)
94-30872	MW1(4-6)	Soil	N.D.	390	N.A.	N.A.	N.A.	N.A.	N.A.
94-30873	"	"	N.A.	N.A.	15	39	<10	<30	N.A.
94-30874	MW1(9-11)	Soil	720	2600	N.A.	N.A.	N.A.	N.A.	N.A.
94-30875	"	"	N.A.	N.A.	75	190	170	510	N.A.
94-30876	MW2(4-6)	Soil	N.D.	57	N.A.	N.A.	N.A.	N.A.	N.A.
94-30877	"	"	N.A.	N.A.	12	14	33	270	N.A.
94-30878	MW2(9-11)	Soil	N.D.	<20	N.A.	N.A.	N.A.	N.A.	N.A.
94-30879	"	"	N.A.	N.A.	<10	<10	<10	<30	N.A.
94-30882	MW3(4-6)	Soil	N.D.	<20	N.A.	N.A.	N.A.	N.A.	N.A.
94-30883	"	"	N.A.	N.A.	<10	<10	<10	<30	N.A.
94-30884	MW3(9-11)	Soil	N.D.	<20	N.A.	N.A.	N.A.	N.A.	N.A.
94-30885	"	"	N.A.	N.A.	<10	<10	<10	<30	N.A.

94-30886	MW4(4-6)	Soil	N.D.	<19	N.A.	N.A.	N.A.	N.A.	N.A.
94-30887	"	"	N.A.	N.A.	<10	<10	<10	<30	N.A.
94-30888	MW499-11)	Soil	N.D.	<20	N.A.	N.A.	N.A.	N.A.	N.A.
94-30889	"	"	N.A.	N.A.	14	<10	<10	<30	N.A.
94-30891	HA1(7.5')	Soil	240	300	N.A.	N.A.	N.A.	N.A.	N.A.
94-30892	"	"	N.A.	N.A.	14	<10	13	42	N.A.
94-30893	HA2(52")	Soil	1000	840	N.A.	N.A.	N.A.	N.A.	N.A.
94-30894	"	"	N.A.	N.A.	22	130	330	1200	N.A.
94-30895	HA2(7')	Soil	160	180	N.A.	N.A.	N.A.	N.A.	N.A.
94-30896	"	"	N.A.	N.A.	14	18	30	140	N.A.
94-30880	MW1(14-16)	Soil	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	<35
94-30881	MW2(14-16)	Soil	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	<35
94-30890	HA1(60")	Soil	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	<35

Action level for PCB = 50 ppm

N.A. = Not Analyzed

Maximum Concentration Levels for Drinking Water as mandated by the EPA:

Benzene	5 ppb
Toluene	1 ppm
Ethyl Benzene	700 ppb
Xylenes	10 ppm
TPH	1 ppm

D. GROUNDWATER SAMPLING

Monitoring wells were allowed to stabilize for approximately one week following installation. Water samples collected on 6 September 1994 were analyzed for TPH, BTEX, and PCB.

Water samples were drawn from the wells using disposable bailers. Approximately three well volumes were bailed into the former valve pit, which empties into a temporary oil-water separator, prior to collecting the groundwater samples. Samples were collected in acid preserved glass jars, placed on ice, and transported to the laboratory for analysis. TPH samples were analyzed by gas chromatography (GC) method 8015/3550 (modified), using diesel fuel as a reference standard. BTEX samples were analyzed by GC Method 8020, using gasoline as a reference standard. PCB samples were analyzed by GC Method 8080. The

analytical methods are specified in SW-846, Methods for Analysis of Water and Wastes, and in the most recent edition of EPA/4-79-020.

E. WATER SAMPLE ANALYSIS

The results of the monitoring well sample analysis are listed in the table below.

Monitoring Well	PCB	TPH Water	Ben- zene	Tol- uene	Ethyl Ben- zene	Xy- lene
1	<1 ppm	1.4 ppm	<10 ppb	<10 ppb	<10 ppb	<10 ppb
2	<1 ppm	0.70 ppm	<10 ppb	<10 ppb	<10 ppb	<10 ppb
3	<1 ppm	<0.76 ppm	<10 ppb	<10 ppb	<10 ppb	<10 ppb
4	<1 ppm	0.55 ppm	<30 ppb	<30 ppb	<30 ppb	<30 ppb

Maximum Concentration Levels for Drinking Water as mandated by the EPA:

Benzene	5 ppb
Toluene	1 ppm
Ethyl Benzene	700 ppb
Xylenes	10 ppm
TPH	1 ppm

TPH levels are elevated above Maximum Concentration Levels listed for drinking water at Monitoring Well 1. The contaminant plume appears to be moving off the property towards the York River in a northeasterly direction, carried under the seawall by the rapid groundwater flow.

F. SITE ASSESSMENT

Since the contamination contains both gasoline and diesel oil components, it is likely that the plume may result from leaking underground fuel lines, both active and abandoned, located on the property, and from previous spills of gasoline and Special Fuel Oil at the site. The analysis of preliminary samples indicated that the product present was weathered, giving the appearance of some age. An underground fuel tank supplying Special Fuel Oil to the power plant, which formerly occupied this site, was removed a number of years ago. Hand auger

borings in the vicinity of the former fuel tank, and downhill in the direction of the valve pit did not reveal any contamination evident to PID screening. The Navy has reported a number of fuel leaks and spills from the fuel lines serving the Navy Fuel Pier. The largest of these, approximately 110,000 gallons of gasoline, was reported in 1965. A ruptured fuel line released 100,000 gallons of Special Fuel Oil in 1970, and another ruptured fuel line released 2,500 gallons of JP-4. Additional information regarding releases will be provided in the Site Characterization Report.

The contaminant plume remaining appears to be moving off the property to the northeast, towards the York River, less than fifty feet away. With the exception of gasoline found on the beach beneath the Stripper House, most of the contamination appears to be residual contamination from leaks, possibly from fuel lines abandoned-in-place, or from the previously reported release incidents.

3. INITIAL ABATEMENT MEASURES

Contaminated sand was excavated from the USCG-Navy Pier area on 16 May 1994 after petroleum contamination was found beneath a concrete structure on the beach in front of the seawall during demolition. Clean fill sand was brought in, and a temporary oil-water separator was constructed on the beach.

Pipes entering the concrete structure through the seawall were traced back to a former valve pit. Oil contaminated water was pumped out of the concrete pit on 24 May 1994 to permit the location and sealing of abandoned piping. All of the abandoned pipes terminating in or passing through the valve pit except for one drain line have been cut off and plugged with concrete. Oil catch booms have been installed to contain any contamination flowing under the seawall with groundwater which has undermined the existing seawall footings. Fuel pumps and related equipment were removed by the Navy from the Stripper House following leak testing of the fuel lines..

Monitoring wells were installed to bracket the valve pit to permit sampling of groundwater for potential contamination. Additional hand auger borings were made in the vicinity of the monitoring wells to attempt to identify groundwater flow direction and to permit further evaluation of the contamination.

A Site Characterization Report is being prepared for the site, along with preliminary designs for site remediation.

The Site Characterization Report will be completed by 25 October 1994, in accordance with an extension granted by the Virginia Department of Environmental Quality - Water Division.

DIAGRAM 1. MONITORING WELL AND BORING LOCATIONS

APPENDIX I

BORING LOGS AND DATA

Appendix I

Boring Log RTC Yorktown Monitoring Wells Valve Pit @ USCG-Navy Pier Area

Monitoring Well #1

Depth	Blow Count	PID Reading	Notes
1-3 Feet Below Grade	5/2/2/3	N.D.	Oil Sheen on Surface prior to boring
4-6 Feet Below Grade	3/2/2/3	4-5 ppm	Oil Sheen, Diesel Odor, Standing Water @ 6'
9-11 Feet Below Grade	3/2/3/6	2-3 ppm	Running Sands, pronounced oil sheen, diesel odor, oil droplets visible in sand after standing
14-16 Feet Below Grade	9/7/8/9	N.D.	Running Sands with shells

Monitoring Well #2

Depth	Blow Count	PID Reading	Notes
1-3 Feet Below Grade	6/5/4/4	N.D.	
4-6 Feet Below Grade	3/2/2/3	2-3 ppm	Oil pockets in sand
9-11 Feet Below Grade	3/4/5/9	1-2 ppm	oil sheen, diesel odor, oil droplets visible in sand after standing
14-16 Feet Below Grade	5/6/7/11	N.D.	Running Sands

Monitoring Well #3

Depth	Blow Count	PID Reading	Notes
1-3 Feet Below Grade	6/4/4/4	N.D.	Sand
4-6 Feet Below Grade	2/2/1/3	N.D.	Silty Sand, Slight diesel odor
9-11 Feet Below Grade	3/3/4/8	N.D.	Running Sands (fine beach sands with shells)
14-16 Feet Below Grade	5/4/6/9	N.D.	

Monitoring Well #4

Depth	Blow Count	PID Reading	Notes
1-3 Feet Below Grade	3/3/3/6	N.D.	
4-6 Feet Below Grade	5/4/4/4	N.D.	
9-11 Feet Below Grade	3/4/3/5	N.D.	
14-16 Feet Below Grade	4/3/5/8	N.D.	

Soils screened for petroleum hydrocarbons using PID (H-nu, 11.7 eV). Samples were collected for analysis by GC. Samples were analyzed for TPH, BTEX, PCB.

ADDITIONAL HAND AUGERS

In addition to the four monitoring wells, a series of eight hand augers were made through the asphalt and concrete parking pad using a diamond bit concrete coring saw and hand auger. Auger locations were adjacent to the monitoring wells to the southeast (Borings 1-4) and to the northwest (Borings 5-8). Soils were screened for the presence of petroleum contamination using a PID. Samples were collected for analysis. Additional borings were taken on top of the hill at the site of the former fuel tank for the power station, and several points towards the valve pit, after heavy contamination was identified on the southeast side of the valve pit.

Hand Auger #1

Depth	Description	PID Reading
0-6" below Pad	Crush-or-Run	N.D.
6-24"	Yellow-brown fine sand	N.D.
24-42"	Yellow-brown clayey sand with gray mottles	N.D.
42-90"	Gray fine wet sand Sample @ 60" & 90" strong petroleum smell below-48"	N.D.

Hand Auger #2

Depth	Description	PID Reading
0-4" below Pad	Crush-or-Run	N.D.
4-16"	Yellow-brown clayey sand	N.D.
16-38"	Yellow-gray sticky	N.D.
38-48"	Gray sticky sand with oil, strong petroleum odor strong petroleum smell below 48"	15-20
48-84"	fine gray silty sand with oil, thick tarlike sludge at 84"	120 ppm

Hand Auger #3

Depth	Description	PID Reading
0-6" below Pad	Crush-or-Run	N.D.
6-36"	Yellow-brown sandy clay loam	N.D.
36-50"	Yellow-brown sand	N.D.
50-78"	yellow-brown sandy clay	N.D.
78-84"	gray silty sand with oil sludge at 84", strong petroleum smell	190 ppm

Hand Auger #4

Depth	Description	PID Reading
0-6" below Pad	Crush-or-Run	N.D.
6-24"	Red-brown sandy clay loam	N.D.
24-42"	Yellow-brown sand , gravel bed starting @ 36"	N.D.
42"	Auger refusal on rock strong petroleum smell below 48"	N.D.

Hand Auger # 5

Auger refusal at 24" on subsurface debris from the demolition of the former power station on the site.

Hand Auger #6

Auger refusal at 24" on subsurface debris from the demolition of the former power station on the site.

Hand Auger #7

Depth	Description	PID Reading
0-12"	Asphalt/Crush-or-Run	N.D.
12-24"	Yellow-brown sandy clay loam	N.D.
24-72"	Yellow-brown sticky sand	N.D.
72-80"	yellow-brown sandy clay	N.D.
80-84"	gray silty wet sand	2-3 ppm

Hand Auger #8

Depth	Description	PID Reading
0-12"	Concrete	N.D.
12-30"	Red-brown sandy clay loam	N.D.
30-84"	Yellow-brown sand with gray mottles & coal chunks	N.D.
84"	Standing Water, no petroleum odor	N.D.

The concrete boring for Hand Auger #8 found that subsurface soils are washing away from beneath the concrete slab at the base of the pier. Groundwater is undermining the seawall, and contaminants are being drawn directly to the York River by this subsurface water flow.

ADDITIONAL HAND AUGER BORINGS

Additional hand augers were made uphill of the valve pit to identify possible sources of contamination, and the direction of contaminant flow.

Boring #9, Side of hill between valve pit and current Navy fuel lines

Hand Auger #9

Depth	Description	PID Reading
0-15"	Brown sandy loam topsoil	N.D.
15-30"	Yellow-brown sandy clay loam	N.D.
30-42"	Yellow-brown silty sand	N.D.
42"	Auger refusal on subsurface debris	N.D.

A series of five borings were made at this location, with similar results. Auger refusal appears to be on piping or conduit. Subsurface debris consisted of old brick, cut nails, and pieces of leather. Borings were stopped to permit an archeological evaluation after bone fragments were pulled up. The Coast Guard Archeological advisor recommended that the site not be disturbed further unless excavation was planned at this site.

Hand Auger #10 Former Tank Location in front of Barracks

Depth	Description	PID Reading
0-18"	Yellow gray silty loam	N.D.
18-36"	Yellow-brown sandy clay loam	N.D.
36-72"	Yellow-brown sticky sand	N.D.
72-84"	Gray sticky sand, slight petroleum odor and tarlike sludge	N.D.

Hand Auger #11 Southeast of Navy fuel lines on top of the hill

Depth	Description	PID Reading
0-18"	Brown silty loam	N.D.
18-32"	Yellow beach sand	N.D.
32-120"	Yellow-brown sandy clay	N.D.
120"	Fragipan layer	N.D.

APPENDIX II

**VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
INITIAL ABATEMENT MEASURES REPORT CHECKLIST**

INITIAL ABATEMENT MEASURES REPORT CHECKLIST

site: RTC Yorktown USCG-Navy ParAreaPC# Region Tidewater

The following checklist must be filled out by the Responsible Party (RP) and/or the RP's Consultant and included in the Initial Abatement Report. Indicate on the checklist the page and section number where each item is addressed in the attached report. Also indicate on the checklist the section and page number where justification is given for items omitted from the attached report. The contents of the report should reflect and be commensurate with the nature of the release, degree of contamination and complexity of the site investigation.

1. RELEASE INVESTIGATION AND CONFIRMATION STEPS

Page	Section	
<u>2</u>	<u>/ 1A</u>	Evidence for suspecting a release has occurred
<u>3</u>	<u>/ 1B</u>	Monitoring results from release detection used
<u>4</u>	<u>/ 1B</u>	Results of tank/line tightness test
<u>2</u>	<u>/ 1A</u>	Actions taken to repair, replace, upgrade UST

2. SITE CHECK

<u>3</u>	<u>/ 1B</u>	Measures taken to identify the source of release
<u>4</u>	<u>/ 2A</u>	Depth to ground water § 12/Appendix I
<u>5</u>	<u>/ 2B</u>	Description and justification of sampling
	<u>5-7 / 2B-E</u>	types (ground water, soil)
	<u>9 / DIA 1</u>	locations (include site map)
	<u>5-7 / 2C/2E</u>	parameters, EPA methods, units, and detection limits

3. INITIAL ABATEMENT MEASURES

<u>2</u>	<u>/ 1A</u>	Release inspection results and measures taken to prevent further migration of contaminants into soils and ground water
<u>8</u>	<u>/ 3</u>	Regulated substance removed from UST system
<u>NA</u>	<u>/</u>	Efforts to mitigate fire and safety hazards
<u>8</u>	<u>/ 3</u>	Efforts to measure for the presence of free product
<u>8</u>	<u>/ 3</u>	Efforts to remove free product
<u>8</u>	<u>/ 3</u>	Measures taken, as part of Initial Abatement, to address contaminated ground water and soils, tank water and sludges, and debris (i.e. tanks, piping, concrete) Include permits
<u>2</u>	<u>/ 1A</u>	Initial Abatement Measures Report submitted within 20 days of release confirmation or extension granted (extension to 1 October)

FOR OFFICE USE ONLY

COMMENTS: _____

DEFICIENCIES: _____

REVIEWED BY: _____ DATE: _____



TC ANALYTICS, INC.
(A TC Group Company)

1200 Boissevain Avenue
Tel. (804) 627-0400

Norfolk, Virginia 23507
FAX (804) 627-1118

Sampling Site: FISC

Sampling Date: 09/16/94

Date Received: 09/19/94

Date Reported: 09/22/94

Released By: STEVE LONG

c3

Account Info: *****

TCC/Cederquist, Rodriguez & Ripley
129 W. Va. Beach Blvd.
Norfolk, VA 23510
Attn: Arnold Rodriguez

Data: The following are the results for the analysis of your samples, submitted for TPH by the California Method, Standard: Gasoline.

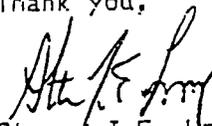
<u>TCA #</u>	<u>Your #</u>	<u>Description</u>	<u>ppm</u>
94-33234	BS1	Soil Boring Water Sample	3.1
94-33236	BS2	" "	.17

The following are the results for BTEX by Method SW846: 5030 and 8020. All values reported in parts per billion.

<u>TCA #</u>	<u>94-33235</u>	<u>94-33237</u>
<u>YOUR #</u>	<u>BS1 - Soil Boring Water Sample</u>	<u>BS2 - Soil Boring Water Sample</u>
BENZENE	2300.	430.
TOLUENE	<10.	190.
ETHYLBENZENE	1000.	350.
XYLENES	2800.	790.

Please feel free to contact me if you have any questions concerning the analysis.

Thank you,


Steven J.E. Long



TC ANALYTICALS, INC.
(A TC Group Company)

1200 Boissevain Avenue Norfolk, Virginia 23507
Tel. (804) 627-0400 FAX (804) 627-1118

Sampling Site: Site Check-RTC
Yorktown

Sampling Date: 08/26/94

Account Info: *****

Date Received: 08/30/94

TCC/Cederquist, Rodriguez & Ripley
129 W. Va. Beach Blvd.
Norfolk, VA 23510
Attn: Arnold Rodriguez

Date Reported: 09/09/94

Released By: STEVE LONG

Data:

The following are the results for the analysis of your samples, submitted for TPH by the California Method, Standard: Diesel Fuel and Gasoline.

TCA #	Your #	Description	Diesel	Gas
			ppm	ppm
94-30872	1-(4-6)	Split Spoon Sample	390.	
94-30874	1-(9-11)	" "	2600.	720.
94-30876	2-(4-6)	" "	57.	
94-30878	2-(9-11)	" "	<20.	
94-30882	3-(4-6)	" "	<20.	
94-30884	3-(9-11)	" "	<20.	
94-30886	4-(4-6)	" "	<19.	
94-30888	4-(9-11)	" "	<20.	
94-30891	HA1 (7.5)	" "	300.	240.
94-30893	HA2 (52")	" "	840.	1000.
94-30895	HA2 (7')	Split Spoon Sample	180.	160.

The following are the results for BTEX by Method SW846: 5030 and 8020. All values reported in parts per billion.

TCA	#YOUR #	DESCRIPTION	RESULTS			
			BENZENE	TOLUENE	ETHYLBENZENE	XYLENES
94-30873	1-(4-6)	Split Spoon Sample	15.	39.	<10.	<30.
94-30875	1-(9-11)	" "	75.	190.	170.	510.
94-30877	2-(4-6)	" "	12.	14.	33.	270.
94-30879	2-(9-11)	" "	<10.	<10.	<10.	<30.
94-30883	3-(4-6)	" "	<10.	<10.	<10.	<30.
94-30885	3-(9-11)	" "	<10.	<10.	<10.	<30.
94-30887	4-(4-6)	" "	<10.	<10.	<10.	<30.
94-30889	4-(9-11)	" "	14.	<10.	<10.	<30.
94-30891	HA1 (7.5)	" "	14.	<10.	13.	42.
94-30894	HA2 (52")	" "	22.	130.	330.	1200.
94-30896	HA 2 (7')	Split Spoon Sample	14.	18.	30.	140.



TC ANALYTICALS, INCORPORATED

1200 Boissevain Avenue Norfolk, Virginia 23507
Tel. (804) 627-0400 FAX (804) 627-1118

Data:
The following are the results for the analysis of your samples for PCBs by Method SW846: 8080.

TCA #	94-30880	94-30881	94-30890
YOUR #	1-(14-16) Split Spoon Sample	2-(14-16) Split Spoon Sample	HA 1 5'- Hand Auger Sample

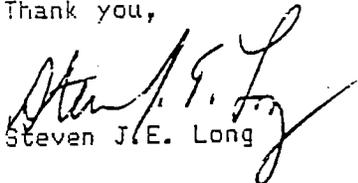
PARAMETERS

PCB - 1016	<35.	<35.	<35.
PCB - 1221	<35.	<35.	<35.
PCB - 1232	<35.	<35.	<35.
PCB - 1242	<35.	<35.	<35.
PCB - 1248	<35.	<35.	<35.
PCB - 1254	<35.	<35.	<35.
PCB - 1260	<35.	<35.	<35.

% Moisture 12%

Please feel free to contact me if you have any questions concerning the analysis.

Thank you,


Steven J.E. Long



TC ANALYTICALS, INC.
(A TC Group Company)

1200 Boissevain Avenue
Tel. (804) 627-0400

Norfolk, Virginia 23507
FAX (804) 627-1118

Sampling Site: Site Check

Sampling Date: 09/06/94

Date Received: 09/07/94

Date Reported: 09/13/94

Released By: STEVE LONG

c3

Account Info: *****

TCC/Cederquist, Rodriguez & Ripley
129 W. Va. Beach Blvd.
Norfolk, VA 23510
Attn: Arnold Rodriguez

Data: The following are the results for the analysis of your samples, submitted for TPH by the California Method, Standard: Diesel Fuel.

<u>TCA #</u>	<u>Your #</u>	<u>Description</u>	<u>ppm</u>
94-31194	MW-1A	Well #1	1.4
94-31197	MW-2A	Well #2	0.70
94-31200	MW-3A	Well #3	0.76
94-31203	MW-4A	Well #4	0.55

The following are the results for BTEX by Method SW846: 5030 and 8020. All values reported in parts per billion.

<u>YOUR #</u>	<u>MW-1B Well 1</u>	<u>MW-2B Well 2</u>	<u>MW-3B Well 3</u>	<u>MW-4C Well 4</u>
<u>TCA#</u>	<u>94-31195</u>	<u>94-31198</u>	<u>94-31201</u>	<u>94-31204</u>
BENZENE	<10.	<10.	<10.	<10.
TOLUENE	<10.	<10.	<10.	<10.
ETHYLBENZENE	<10.	<10.	<10.	<10.
XYLENES	<30.	<30.	<30.	<30.



TC ANALYTICALS, INCORPORATED

1200 Boissevain Avenue Norfolk, Virginia 23507
Tel. (804) 627-0400 FAX (804) 627-1118

Data: The following are the results for the analysis for PCBs. Procedure from SW846 is Method: 8080.

<u>YOUR #</u>	<u>MW-1C Well 1</u>	<u>MW-2C Well 2</u>	<u>MW-3C Well 3</u>	<u>MW-4C Well 4</u>
TCA#	94-31196	94-31199	94-31202	94-31205

<u>PARAMETERS</u>					<u>UNITS</u>
PCB - 1016	<1.0	<1.0	<1.0	<1.0	ug/L
PCB - 1221	<1.0	<1.0	<1.0	<1.0	ug/L
PCB - 1232	<1.0	<1.0	<1.0	<1.0	ug/L
PCB - 1242	<1.0	<1.0	<1.0	<1.0	ug/L
PCB - 1248	<1.0	<1.0	<1.0	<1.0	ug/L
PCB - 1254	<1.0	<1.0	<1.0	<1.0	ug/L
PCB - 1260	<1.0	<1.0	<1.0	<1.0	ug/L

Please feel free to contact me if you have any questions concerning the analysis.

Thank you,

Steven J.E. Long