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NSB NEW LONDON
5090.3a

Halliburton NUS
CORPORATION

661 ANDERSEN DRIVE • PITTSBURGH, PENNSYLVANIA 15220-2745 • (412) 921-7090

C-49-12-4-026

December 8, 1994

Halliburton NUS Project Number 9594

Mr. Neil Torres
State of Connecticut
Department of Environmental Protection Agency
165 Capitol Avenue
Hartford, Connecticut 06106

Dear Mr. Torres:

On behalf of the United States Navy and per your request on Wednesday, November 23, 1994; we are submitting with this letter our proposed Quay Wall investigation and Emergency Response activities at the Lower Subase, NSB New London, Groton, Connecticut. This attached information is intended to serve as a removal site evaluation work plan to determine if further removal response activities are required per 40CFR Subsections 300.410 and 300.415. Also provided is a summary of previous results, which was taken from the Phase I RI Report (Atlantic, 1992) as well as a preliminary assessment of the present situation and the results from the ongoing Phase II RI being conducted by Halliburton NUS in the vicinity of the Quay Wall. Figures A through E are included to support these discussions.

If you have any questions concerning this letter, please contact me at (412) 921-8418 or Lori Gross at (412) 921-7132.

Very truly yours,

Matthew G. Cochran

Matthew G. Cochran
Project Manager

MGC/sic

Enclosure

cc: Andrew Stackpole (NSBNLON)
Mark Evans (Navy, Northdiv)
Debbie Wroblewski (Halliburton NUS, Pittsburgh)
John Trepanowski (Halliburton NUS, Wayne)
Lori Gross (Halliburton NUS, Pittsburgh)
Tim Evans (Halliburton NUS, Pittsburgh)
Rich McGuire (Halliburton NUS, Wayne)
File: CTO 129

Summary of Previous Investigations and Results

Figure A shows the Lower Subase and the Phase I and Phase II RI data point locations. Refer to Figure A for building locations discussed in this section. Three previous environmental studies have been conducted at the Lower Subase in the vicinity of the Quay wall, and results from these studies are summarized below.

1. NESO (1979)

The NESO report (1979) identified oil contamination near Building 79, and NESO recommended the abandonment of the building waste oil pit. Subsequently, the pit was filled with concrete and a recovery well system was installed near Building 79 in 1985. The recovery system operated for several months and was found to be ineffective. Subsequently, the recovery system was abandoned.

2. Wehran (1987)

In 1987, Wehran Engineers and Scientists completed a subsurface oil investigation in the vicinity of Building 79. The manholes, soils and groundwater were contaminated with No. 6 fuel oil that was greater than one year old in addition to trace levels of waste oil.

3. Phase I RI: Atlantic Environmental (1992)

The Phase I RI investigation of the Lower Subase consisted of a utility manhole inspection and waterfront bulkhead inspection for evidence of contamination. Also included was a soil gas survey, test borings, groundwater monitoring well installation, and soil, and groundwater sampling and analysis.

A brown milky oil was identified in Manhole 83, located west of Building 79. The source of contamination for Manhole 83 was believed to have originated from the Building 79 former waste oil pit.

Soil analyses indicated a mixture of No. 6 fuel oil and waste oil near Building 79. All borings indicated the presence of TPH. One source of contamination was concluded to be an adjacent underground No. 6 fuel oil pipeline located in the vicinity of 13MW12. The extent of contamination was limited in this area. All No. 6 oil pipelines are either abandoned or planned for abandonment in the near future.

TPH concentrations in groundwater were detectable in wells located west of Building 79. A measurable level of free-product was not observed in this area. Historically, oil seeps and sheens have been reported at the waterfront near Building 79. However, during the Phase I inspection, no oils seeps or sheens were observed anywhere along the waterfront at the Lower Subase.

Quay Wall Investigation

1. Summary of Subase Response

0830, 3 Nov 94 - Release first reported by SUBASE Port Services Department to Environmental Dept.

0845, 3 Nov 94 - Environmental Department arrives on-scene. Area between Pier 4 and Pier 6 along the quaywall had been enclosed with boom. Light amounts of brown oily sludge observed on the water inside the boom area. Absorbent pads were applied to remove product.

1015, 3 Nov 94 - Port Services began removing product with vacuum truck. Material seemed to be diminishing at this time.

1350, 3 Nov 94 - Port Services reported additional product appearing in boom area. Product now appeared to be a black thick oily substance in addition to the original brown substance. Source of the product was unknown. It was noted that it was approximately low tide.

1400, 3 Nov 94 - Port Services deployed skimmer to collect product inside boom area. The majority of the spill product was adhering to the quaywall. Environmental Department notified CT DEP of situation. Vacuum truck was used to collect approximately 1100 gallons of oily water including 200 gallons of oil.

1630, 3 Nov 94 - CT DEP arrives on-scene to review spill response. Sample of oil was collected for analysis (See attached analytical results). Investigation continues to determine source; none found at this time.

1700, 3 Nov 94 - Port Services continues clean-up activities through the night using adsorbent pads. Seven 55 gallon drums of contaminated pads were generated.

0800, 4 Nov 94 - CT DEP & SUBASE Environmental Dept. on-scene to assess clean-up efforts. It is decided to utilize a spill contractor to steam clean the quaywall and other contaminated areas. Contracting office contacted to initiate contract.

0900, 4 Nov 94 - It is decided that the stormdrain outfall is the most probable source of the oil. Oil is found inside the stormdrain manhole. Investigations into the drain system further upstream show that there is no contamination further upstream. Assumptions are made that the oil must have come into the stormdrain from the river.

1300, 4 Nov 94 - Dye testing is conducted at the stormdrain manhole upstream of subject outfall to determine if discharge is emanating from manhole. Results conclude the oil must be coming from the manhole. The outfall pipe is found to be approximately 3 feet below the water level at low tide. It is therefore improbable that oil could have made its way into the outfall if the outfall is constantly under water.

1700, 4 Nov 94 - Contractor arrives on-scene to commence clean-up operations. The contractor began steam cleaning the areas contaminated by the oil. The inside of the stormdrain manhole was also cleaned.

0800, 5 Nov 94 - Additional samples taken of spill debris to determine characteristics of oil for disposal. Contractor continued clean-up.

1030, 6 Nov 94 - Contractor completes clean-up of spill area. Spill response is considered complete. 2300 gallons of oily wastewater and twenty-one 55 gallon drums of oil contaminated pads generated.

0800, 8 Nov 94 - Port Services reports that there is more oil in the boom area. Additional oil is also found in the stormdrain manhole. Port services again initiates cleanup of the spill with the skimmer. Further investigation into the source of the oil determines that there have been previous reports of oil floating on the groundwater behind the quaywall. A wooden planking system placed on pilings supports the roadway adjacent to the quaywall in this section of the SUBASE. It is further discovered that the unusually low tides occurring presently are allowing the groundwater level to drop below the level of the planking system and thus allowing the oil to flow into the outfall pipe.

0900, 8 Nov 94 - SUBASE divers place a wooden plug in the outfall to stop any further release from the manhole. Green dye was placed in the stormdrain manhole to test the seal in the outfall. Trace amounts of dye are seen coming from the outfall. Arrangements are made to place an expandable plug in the outfall.

1300, 8 Nov 94 - The wooden plug in the outfall pipe is replaced with an expandable plug to improve the watertight seal. No dye is seen coming from the manhole.

1400, 8 Nov 94 - 24 hour watches are initiated to observe outfall and manhole for signs of oil discharge.

9 Nov 94 - No evidence of discharge into river is seen. Trace amounts of oil were observed in a manhole south of Pier 2 but no release to the river was evident. 24 hour watches terminated. Boom remained in place.

Pending - A remedial action contractor (Halliburton NUS) has been retained to further investigate the remediation of the oil existing behind the quaywall.

2. Present Situation and Phase II RI Sampling

From an inspection of the area by Halliburton NUS personnel, it was determined that the bulk of the product exists below the planking of the historical platform. Figure B is a conceptual cross-section of the current bulkhead construction that overlies and extends beyond the older wooden platform. The wooden platform has been encountered in boring activities and is located approximately 6 to 8 feet below the ground surface. The product was also observed in electrical manholes throughout the Lower Subase.

The product is a very dark brown to black, highly viscous fluid with an oily sheen, and has a fuel-like or aromatic odor. The product floats, but it has also sorbed onto the fine sediments. Some types of heavy fuels have specific gravity values close to water and are only slightly lighter than water. These fuels could sink, once sorbed onto fine sediments.

Figure A shows the maximum concentration of TPH measured in a given boring during the Phase II RI conducted by Halliburton NUS in 1994. In the vicinity of Building 79, the concentration was highest in a soil sample collected from 13TB2A, which is adjacent to the storm sewer where the product was first observed. Test boring 13TB2A is adjacent to Manhole 83, where a mixture of No. 6 fuel and waste oils were identified during the Phase I RI investigation.

The second highest detected concentration was found in a soil sample collected from 13TB4A, which is located to the north of 13TB2A. The remaining test borings in the vicinity of Building 79 had lower concentrations of TPH, but there was a high variability in the measured concentrations. A spatial trend in the data could not be identified.

In the area of the Power House (500 feet northwest of Quay wall, See Figure A), there was a high concentration of TPH in soil at 13MW18. This concentration corresponds to suspected releases from tanks around the Power House.

Figure C shows the cross-section A-A' that parallels the Thames River. The cross-section extends from 13MW11 to 13TB6. The ground surface has a fairly uniform elevation of about 8 feet. There is approximately 14 to 17 feet of fill material, which is composed primarily of sand and gravel. The fill material is underlain by silt, which may be natural or fill material.

The wood planking was identified in 3 of the test borings shown on the cross-section. Oil staining was cited in the boring logs mostly below the planking at depths to 18 feet below the ground surface. The concentration of TPH in soil was highest at 13TB2A at a depth that was comparable to the depth of the wood planking. A smaller concentration was found in the same boring 1 to 3 feet above the planking. All of the soil samples collected in the borings shown in the cross-section had detectable levels of TPH.

Figure D shows the groundwater elevations that were measured in August, 1994 at near-high tide conditions. Groundwater flows in a west direction towards the Thames River. In the area of investigation, the tide influences groundwater elevations up to Building 79, about 75 feet from the Thames River. Upgradient of Building 79, groundwater elevations are greater than 3.0 feet.

3. Current Activities

Tectonic Inc., of Somerville, New Jersey, has been mapping electrical manholes for the Subase that have product in them. The work is unrelated to the Quay wall investigation, however, a list and map of the contaminated manholes will be provided to Halliburton NUS. The information, once received, will be used to further define the extent of contamination.

Halliburton NUS personnel are supervising the installation of 5 recovery wells. Four wells have been installed as of December 5, 1994. The wells are designated as QW-1 through QW-5, and the proposed well locations are shown on Figures A and D. A typical well construction detail is provided on Figure E. Recovery wells consist of 4 inch steel casing spun through the underlying planking. The casing is placed approximately 6 inches below the planking and grouted into place. A void space exists beneath the bottom of the casing underneath the wood planking.

The most contaminated split-spoon soil sample based on visual observation from each boring is to be analyzed. Selected samples will be analyzed for TCL VOA, TCL SVOA, TAL metals, TCLP metals, TCL Pesticides/PCBs, TPH, and BTEX. The remaining samples will be analyzed for TPH and BTEX.

Two water level data loggers are to be installed: one in a well along the Quay wall and one in the Thames River to measure exact water level elevations and tidal fluctuations.

A sludge sample of the saturated silt below the planking is to be analyzed for RCRA characteristics, oil and grease fingerprinting, PCBs, and TAL metals.

On December 5, 1994, approximately 1600 gallons of a water/or mixture was evacuated from two of the installed recovery wells during low tides using a pumping rate of 50-100 gpm. Less than 5 gallons of floating product was recovered. The effectiveness of product recovery was minimal since the water table could not be lowered below the wood planking to allow for product to accumulate in a cone of depression.

A dye and oil recovery test was conducted on December 7, 1994 to determine the hydraulic connection beneath the wood planking and if oil product could effectively be recovered. Water and oil were pumped from well QW-1 at a rate of 30-40 gallons per minute. The liquids were pumped into a 2,500 gallons holding tank. Approximately 3,600 gallons at liquid were pumped from QW-1 during the test. Approximately 1,000 gallons of water was discharged by gravity from the tank to QW-4 .

After the test, the water and oil were allowed to naturally separate in the the tanker. A 1/8 inch thick layer of oil developed on the surface of the water An additional 600-800 gallons of water were discharged to QW-4 after the water & oil separated. The remaining water and oil were taken to OT-10 on the SUBASE for oil/water separation.

Dye tracer was also injected into well QW-3 to determine hydraulic connection between the wells during the test. No dye was observed in any of the wells (QW1,2, 13MW14, 13MW16, or NESO10) or on the Thames River during the test and for 6 hours after the end of the test.

Water level measurements will be collected from the pumping well observation wells and the Thames River during the test to determine the feasibility of long term product recovery.

4. Proposed Activities

Additional soil borings and/or recovery wells will be installed along the Quay wall. Well points may be installed in areas upgradient of the Quay wall in an attempt to find the source(s) of the product.

Continued review of existing data will be conducted to identify a potential source of contamination.

Further investigation and a determination will be made regarding the most feasible long term remedial option. Examples of options which will be evaluated may include, but will not be limited to, groundwater pump and treat, surfactant injection, bioremediation, and/or soil excavation and removal .

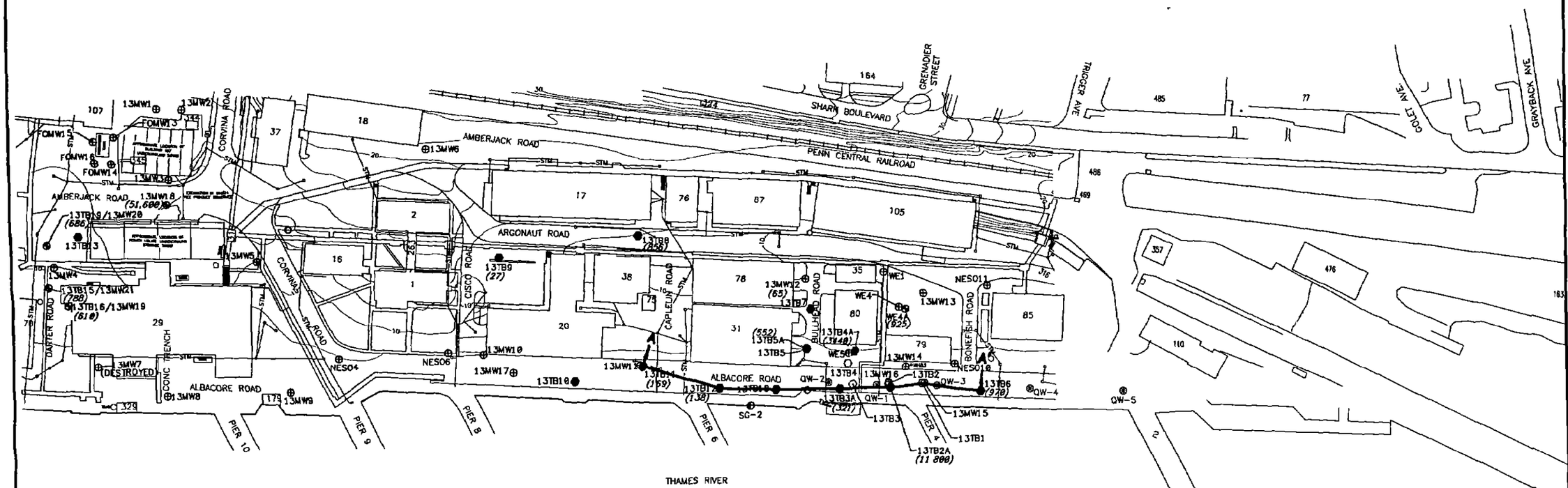
A removal site evaluation report will be prepared to document all activities which were conducted.

5. Discussion of Potential Sources

Based on the site history and previous investigations, the source of contamination in the storm sewer may be either the former waste oil pit that existed near Building 79, a former underground oil pipeline that was associated with hydrocarbons detected at 13MW12 or other previously ruptured or abandoned fuel oil lines that were used to service ships at each pier. All of these locations are upgradient of Pier 4. Historically, fuel was also supplied by railroad tank cars. The railroad operations were serviced near Building 79. Fuel releases could have potentially resulted from these activities. These activities have also been discontinued.

Based on previous investigations, there are other sources of contamination to the northwest of the Quay wall. Oil storage tanks near the Power House have been cited as potential sources. However, according to the groundwater elevations shown on Figure D, groundwater generally flows toward the Thames River. It is unlikely that sources near the Power House contribute to contamination at Building 79. The groundwater elevations upgradient of Building 79 are sufficiently high, and groundwater moves away from the area toward the Thames River.

Halliburton NUS personnel have concluded preliminarily that the source of the product that discharged through the stormdrain outfall is in the vicinity of Building 79. Based on Figure B, Halliburton NUS believes that the product is floating on the groundwater surface and is trapped behind the bulkhead sheet piling and beneath the wood planking. During abnormally low-tides, the groundwater surface and overlying product are at or below the wood planking. As the tide rises, the product rises with the groundwater and moves upgradient. The product apparently becomes trapped under the wood planking and accumulates. In the manhole area, groundwater and the product enter the outfall pipe as the tide recedes.



NOTE

1 UNDERGROUND UTILITY LOCATIONS AREA APPROXIMATE

2 BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB-NLON AND PHASE II RI WORK PLAN

3 TPH VALUE SHOWN IS THE HIGHEST CONCENTRATION MEASURED IN A GIVEN BORING (mg/kg)

4 TPH SAMPLES COLLECTED AUGUST, 1994

LEGEND

- 10 — EXIST CONTOUR
- 123 — BUILDING No
- STM — WATERCOURSE
- STM — STORM SEWER AND CATCH BASIN
- EXPOSED BEDROCK

EXIST. PHASE II

- 6MW1 — MONITORING WELL
- 6TB1 — TEST BORING
- 6SS1 — SURFACE SOIL SAMPLE
- 14SS3 — SEDIMENT SAMPLE
- 20SD1 — SURFACE WATER SAMPLE
- 20SW1 — SURFACE WATER AND/OR SEDIMENT SAMPLE
- 8SW/SD4 — SEEPAGE GAUGE SAMPLE
- SG-1 — PROPOSED WELL
- QW-1 — QUAY WALL

0 150 300 SCALE IN FEET

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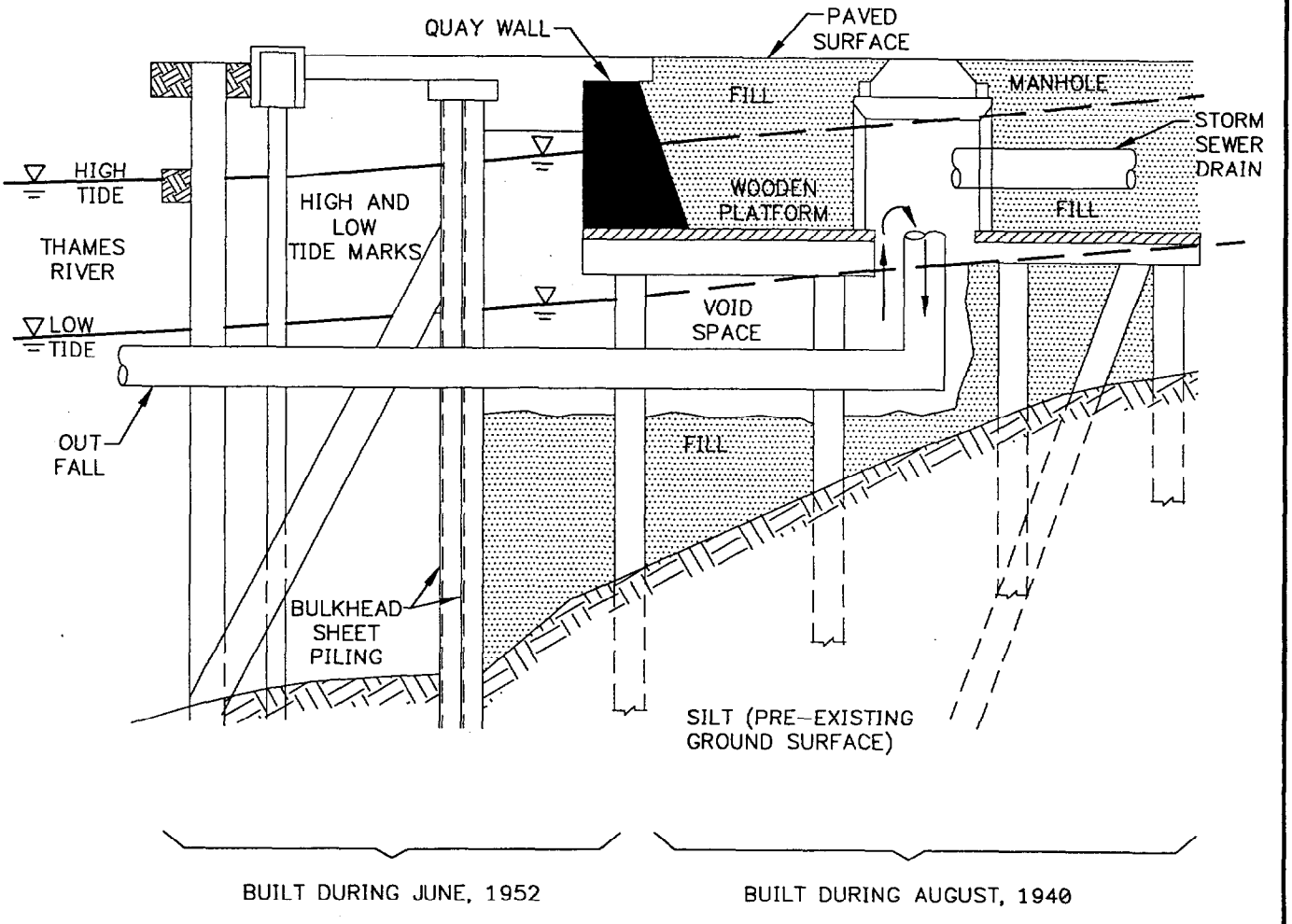
FIGURE A
TPH CONCENTRATIONS IN SOIL SAMPLES
LOWER BASE

HALLIBURTON NUS
Environmental Corporation

0056301Z



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NOT TO SCALE	SOURCE: WEHREN, 1987	FIGURE B QUAY WALL/STORM SEWER DIAGRAM HALLIBURTON NUS Environmental Corporation

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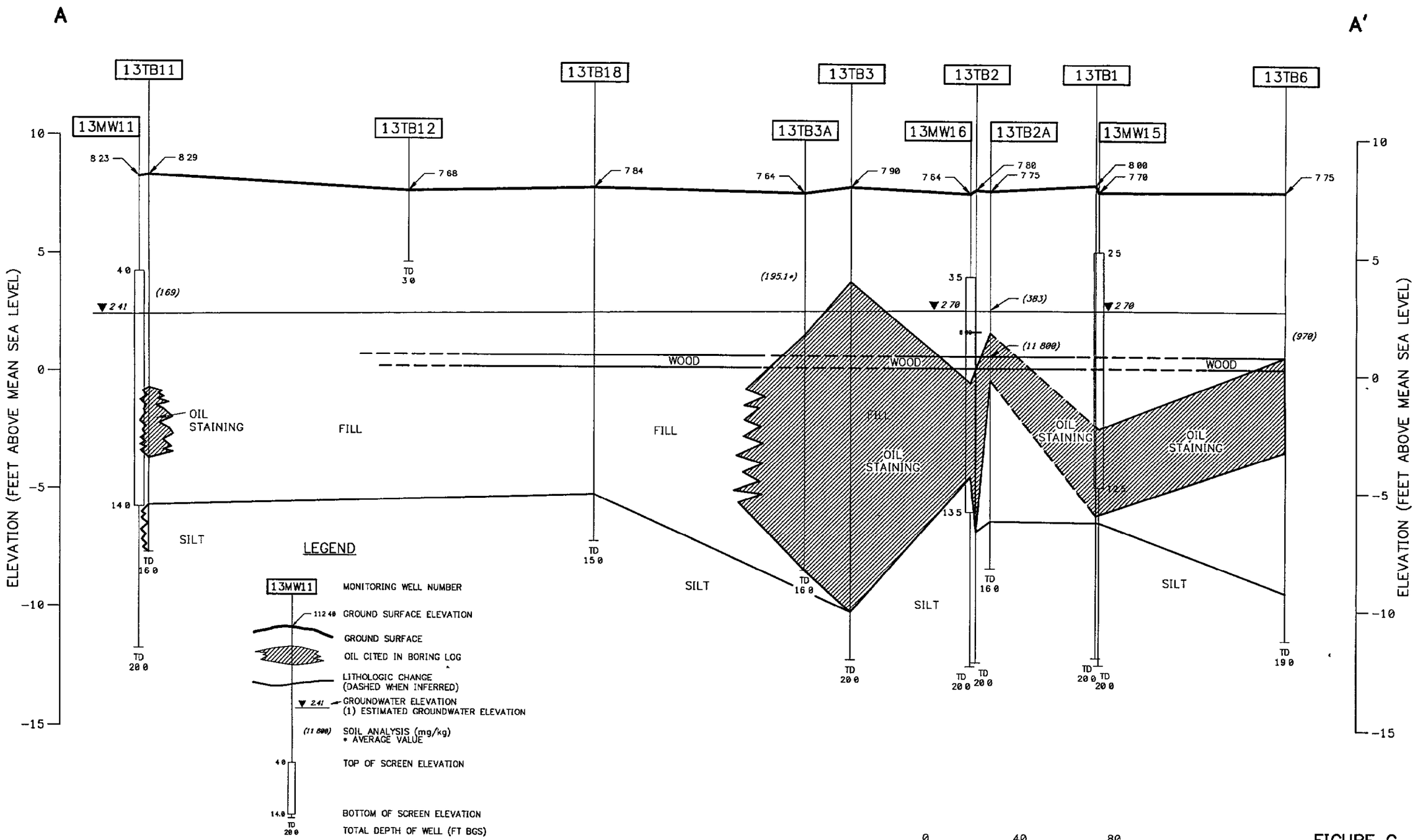
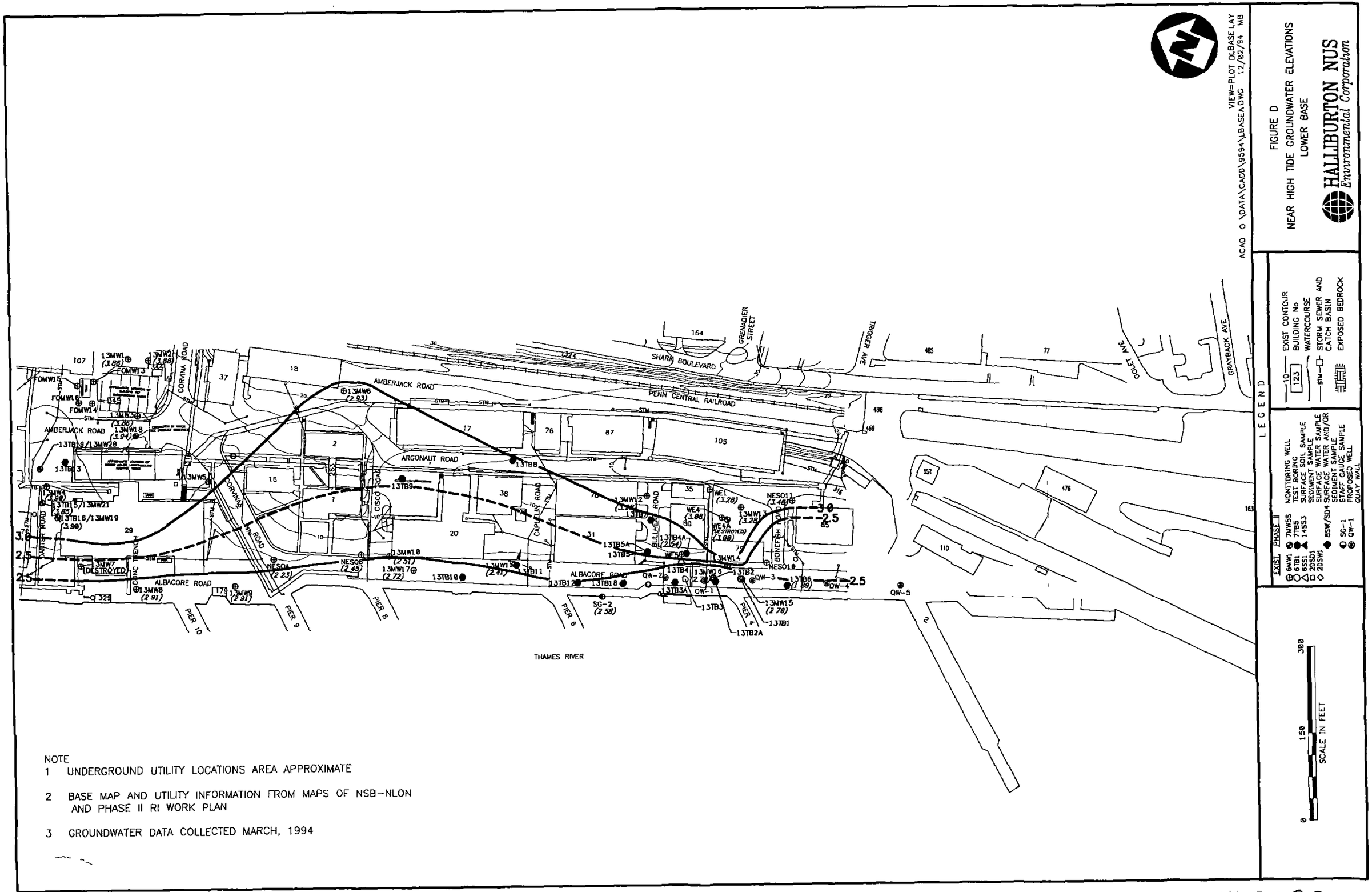


CROSS SECTION A–A'
NEW LONDON SUBBASE, GROTON, CONNECTICUT

FIGURE C

Halliburton NUS CORPORATION

00563022



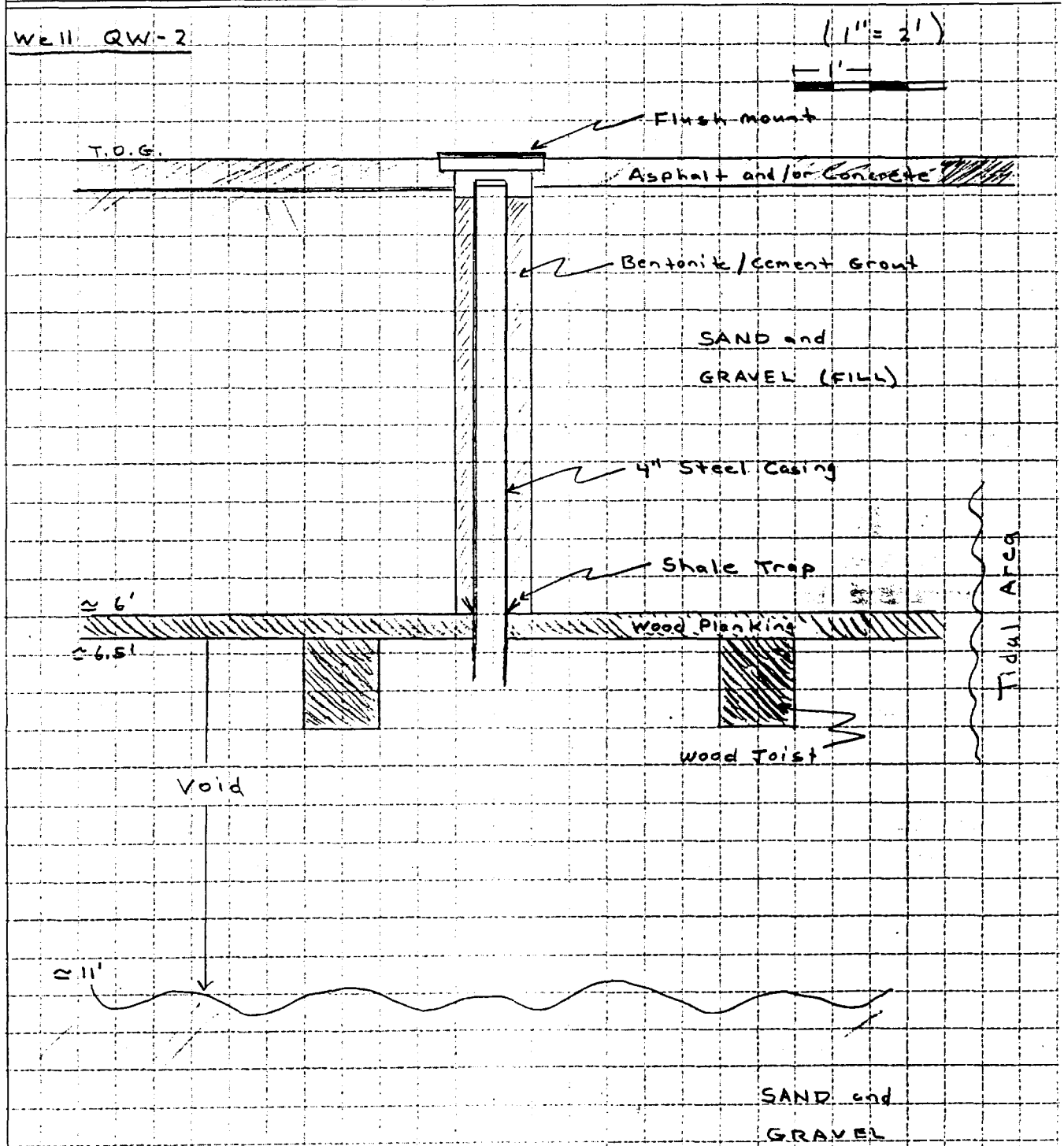
NOTE
1 UNDERGROUND UTILITY LOCATIONS AREA APPROXIMATE
2 BASE MAP AND UTILITY INFORMATION FROM MAPS OF NSB-NLON AND PHASE II RI WORK PLAN
3 GROUNDWATER DATA COLLECTED MARCH, 1994

00563032

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT: NSB New London	JOB NUMBER: 9594-1300
SUBJECT: Quay Wall Recovery Well Detail	
BASED ON:	DRAWING NUMBER: Figure E
BY: A. Kendrick	CHECKED BY:
APPROVED BY:	DATE: 11/30/94

Well QW-2



Crystal Springs Laboratory, Inc.

Environmental & Chemical Testing

CT Dept. of Health #PH-0642

178 Bridge Street R
Groton, Connecticut 06340
(203) 445-1751

Sample ID#: CSLNV-1105

Date: 8 November 1994

Date Received: 11-05-94

Sampled by: E.A. Cioffi

Time Received: 10:00 A.M.

Test: Oil

Location: Vacuum Truck 84-0005
Naval Submarine Base New London
Groton, CT

Report to:

Name: Mike Brown
Street: Environmental Division Code 1600
Naval Submarine Base New London
Town, State: Groton, CT

TCLP Extraction: EPA 1311

TCLP METALS	RESULTS	METHOD	REGULATORY LEVELS
Arsenic	<0.05 mg/L	6010	5.0 mg/L
Barium	<0.05 mg/L	6010	100.0 mg/L
Cadmium	<0.05 mg/L	6010	1.0 mg/L
Chromium	<0.05 mg/L	6010	5.0 mg/L
Lead	3.1 mg/L	6010	5.0 mg/L
Mercury	<0.005 mg/L	7470	0.2 mg/L
Selenium	<0.1 mg/L	6010	1.0 mg/L
Silver	<0.05 mg/L	6010	5.0 mg/L

Sample ID#: CSLNV-1105 Date: 8 November 1994
Page 2

TCLP Volatile Organics (EPA 1311/8240)

PARAMETER	RESULTS	COMPONENT MDL	REGULATORY LEVELS
Acetone	Not Detected	<5.0 ug/L	----------
Acrolein	Not Detected	<5.0 ug/L	----------
Acrylonitrile	Not Detected	<5.0 ug/L	----------
Benzene	Not Detected	<5.0 ug/L	500 ug/L
Bromodichloromethane	Not Detected	<5.0 ug/L	----------
Bromoform	Not Detected	<5.0 ug/L	----------
Bromomethane	Not Detected	<5.0 ug/L	----------
2-Butanone (MEK)	Not Detected	<5.0 ug/L	200,000 ug/L
Carbon Disulfide	Not Detected	<5.0 ug/L	----------
Carbon Tetrachloride	Not Detected	<5.0 ug/L	500 ug/L
Chlorobenzene	Not Detected	<5.0 ug/L	100,000 ug/L
Chlorodibromomethane	Not Detected	<5.0 ug/L	----------
Chloroethane	Not Detected	<5.0 ug/L	----------
2-Chloroethyl vinyl ether	Not Detected	<5.0 ug/L	----------
Chloroform	12 ug/L	<5.0 ug/L	6,000 ug/L
Chloromethane	Not Detected	<5.0 ug/L	----------
1,2-Dichlorobenzene	Not Detected	<5.0 ug/L	----------
1,3-Dichlorobenzene	Not Detected	<5.0 ug/L	----------
1,4-Dichlorobenzene	Not Detected	<5.0 ug/L	7,500 ug/L
1,1-Dichloroethane	Not Detected	<5.0 ug/L	----------
1,2-Dichloroethane	Not Detected	<5.0 ug/L	500 ug/L
1,1-Dichloroethylene	Not Detected	<5.0 ug/L	700 ug/L
cis-1,2-Dichloroethylene	Not Detected	<5.0 ug/L	----------
trans-1,2-Dichloroethylene	Not Detected	<5.0 ug/L	----------
1,2-Dichloropropane	Not Detected	<5.0 ug/L	----------
cis-1,3-Dichloropropene	Not Detected	<5.0 ug/L	----------
trans-1,3-Dichloropropene	Not Detected	<5.0 ug/L	----------
Ethyl benzene	Not Detected	<5.0 ug/L	----------
2-Hexanone	Not Detected	<5.0 ug/L	----------
Methylene chloride	Not Detected	<5.0 ug/L	----------
4-Methyl-2-pentanone	Not Detected	<5.0 ug/L	----------
Styrene	Not Detected	<5.0 ug/L	----------
1,1,2,2-Tetrachloroethane	Not Detected	<5.0 ug/L	----------
Tetrachloroethylene	Not Detected	<5.0 ug/L	700 ug/L
Toluene	Not Detected	<5.0 ug/L	----------
1,1,1-Trichloroethane	Not Detected	<5.0 ug/L	----------
1,1,2-Trichloroethane	Not Detected	<5.0 ug/L	----------
Trichloroethylene	Not Detected	<5.0 ug/L	500 ug/L
Trichlorofluoromethane	Not Detected	<5.0 ug/L	----------
1,2,3-Trichloropropane	Not Detected	<5.0 ug/L	----------
Vinyl Acetate	Not Detected	<5.0 ug/L	----------
Vinyl Chloride	Not Detected	<5.0 ug/L	200 ug/L
Xylene	Not Detected	<5.0 ug/L	----------

Sample ID#: CSLN\-1105 Date: 8 November 1994
Page 4

TOTAL METALS

METALS	RESULTS	METHOD
Arsenic, Total	<1.0 mg/Kg	6010
Barium, Total	5.0 mg/Kg	6010
Boron, Total	<2 mg/Kg	6010
Cadmium, Total	1.0 mg/Kg	6010
Chromium, Total	11.0 mg/Kg	6010
Copper, Total	27.0 mg/Kg	6010
Iron, Total	980 mg/Kg	6010
Lead, Total	225 mg/Kg	6010
Magnesium, Total	236 mg/Kg	6010
Manganese, Total	9.0 mg/Kg	6010
Mercury, Total	0.026 mg/Kg	7471
Selenium, Total	<1.0 mg/Kg	6010
Silver, Total	<1.0 mg/Kg	6010
Tin, Total	25 mg/Kg	6010
Zinc, Total	30.0 mg/Kg	6010

Sample ID#: CSLNV-1104 Date: 8 November 1994
Page 5

OTHER ANALYTES

PARAMETER	RESULTS	METHOD
pH	6.84	1010
Cyanide, Total		
Flash Point	>200° F	9040
Polychlorinated Biphenyls (Total PCB's)	<10.0 mg/Kg	8080

MDL - Method Detection Limit

All procedures are in strict compliance with U.S.E.P.A., CT Dept. of Health, and CT D.E.P. guidelines.

Dr. Eugene A. Cioffi, Director