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SITE INSPECTION REPORT NSY PORTSMOUTH VA
3/28/1986
NUS CORPORATION

(194)

R-585-5-5-28

SITE INSPECTION OF ATLANTIC WOOD INDUSTRIES, INCORPORATED

PREPARED UNDER

TDD NO. F3-8405-40
EPA NO. VA-126
CONTRACT NO. 68-01-6699

FOR THE

HAZARDOUS SITE CONTROL DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

MARCH 28, 1986

NUS CORPORATION
SUPERFUND DIVISION

SUBMITTED BY	REVIEWED BY	APPROVED BY
Charles Meyer	William Wentworth	
CHARLES MEYER	WILLIAM WENTWORTH	GARTH GLENN
ENV. TECHNICIAN	ASSISTANT MANAGER	MANAGER, FIT III

TABLE OF CONTENTS

APPENDICES

SECTION 1

1.0 INTRODUCTION

1.1 Authorization

NUS Corporation performed this work under Environmental Protection Agency Contract No. 68-01-6699. This specific report was prepared in accordance with Technical Directive Document No. F3-8405-40 for the Atlantic Woods Industries, Incorporated site , located in Portsmouth, Virginia.

1.2 Scope of Work

NUS FIT III was tasked to conduct a site inspection of the Atlantic Wood Industries, Incorporated site, located in Portsmouth, Virginia.

1.3 Summary

The Atlantic Wood Industries, Incorporated site is a wood processing plant which uses pentachlorophenol and creosote in its process. The site is located in Portsmouth, Virginia, adjacent to the Portsmouth Naval Ship Yard and the Naval Reserve property. The site, which is 47.5 acres in size, consists of 4 areas that are used for different purposes (see appendix B, figures 5 and 6). The first area is an area which is used for the storage of finished pilings, area no. 2 is the actual processing plant, area no. 3 is the raw material storage area, and area no. 4 is used for the storage of finished railroad ties. The major area of concern is the process area, area no. 2, which includes 4 storage tanks. These tanks have allegedly been leaking into a city storm sewer which flows into the South Branch of the Elizabeth River.

During the NUS FIT III site inspection of Tuesday, July 10, 1984, site access was not granted. However, samples were obtained from the storm sewer upgradient of the storage tanks, the storm sewer outfalls on the city of Portsmouth property, and an intertidal ditch receiving drainage from the outfall. Air sampling conducted at and around the site by the Environmental Response Team (ERT) of EPA, on July 18 and 19, 1985, detected contamination. Analyses results and a toxicological evaluation of samples collected during the FIT inspection can be found in sections 6.0 and 7.0 of this report, respectively.

SECTION 2

2.0 THE SITE

2.1 Location

The Atlantic Wood Industries, Incorporated site is located in the central eastern portion of Portsmouth, Virginia. The Portsmouth Plant is located on 47.5 acres between the United States Naval Ship Yard on the north and the Portsmouth Naval Reserve on the south. The Southern Branch of the Elizabeth River borders the site to the east and Victory Boulevard is the western border. The site street address is 3950 Elm Avenue. Elm Avenue runs in an east-west direction just north of the Atlantic Wood Industries site.

2.2 Site Layout

The Atlantic Wood Industries, Incorporated site is comprised of 4 areas. Area no. 1 is a storage area for finished pilings, area no. 2 is the actual processing plant, area no. 3 is the raw material storage area, and area no. 4 is the storage area for finished railroad ties. Area no. 4 contained an unlined waste disposal lagoon. Area no. 2 is the area of most concern because there are 4 storage tanks which are located to the north of a storm sewer which runs into the Elizabeth River. These tanks are allegedly leaking material into the storm sewer. Discharges from the storm sewer into the South Branch of the Elizabeth River could be impacting estuarine biota. The northwestern corner of the property is another area of concern. This area was used as an unlined process waste disposal lagoon from approximately 1929 to 1972. In July 1982, the lagoon was filled in under the direction of the Virginia State Department of Health (see appendix C).

2.3 Ownership History

The site was owned by the Atlantic Creosoting Company from December 1, 1926 until August 1978. In August 1978, the company was taken over by Atlantic Wood Industries, Incorporated, the present owners of the site.

2.4 Site Use History

The Atlantic Wood Industries, Incorporated site has been the site of a wood processing plant since 1929. The facility presently uses pentachlorophenol and creosote in their process. Four storage tanks have been located on the south side of Elm Avenue. Darius Ostrauskas, of EPA, reported that Mr. Kenneth Cosgriff, plant manager, informed him that these tanks were used for the storage of actively used creosote until approximately 1975. Since 1975, actively used creosote has been stored in smaller tanks located in the central part of the site (see appendix B, site location map). Darius Ostrauskas also reported that Charles Kerr, environmental engineer of Atlantic Wood Industries, stated that the 4 unused storage tanks contained a total volume of 350,000 gallons of material as of November 26, 1984. Mr. Cosgriff described this material as a creosote sludge containing less than 3 percent water (see appendix D). The site also used an unlined waste disposal lagoon for the storing of process wastes. The disposal lagoon was used for a period of time, from approximately 1926 until 1972, but exact dates are unknown.

2.5 Permit and Regulatory Action History

According to a preliminary assessment conducted by Ronald Jones, EPA Central Regional Laboratory (CRL), on August 18, 1982, the Atlantic Wood Industries site has an NPDES permit (VA 000 4189) allowing the owners to discharge all surface waters from the plant site to 3 outfalls around the site. On December 17, 1981, W.E. Landford, of the Virginia State Department of Health, Division of Solid and Hazardous Waste Management, inspected the site and recommended that the site be closed. This information was provided by Charles Kerr, environmental engineer of Atlantic Wood Industries, Incorporated. Also, the plant had a RCRA interim status permit as a small quantity generator and storer. This permit was received on November 19, 1980 and was revoked on November 16, 1985. The permit number is VAD 990710410 (see appendix E).

2.6 Remedial Action To Date

In early July 1982, Atlantic Wood Industries, Incorporated closed the unlined waste disposal pit at the request of the Virginia State Department of Health. The pit was operated for several years prior to 1982. A total of 20,000 cubic feet of creosote-contaminated wood chips were disposed of in the waste pit during this time. Darius Ostrauskas, of EPA, reports that, according to Terry Switzer, of the Virginia State Water Control Board (VA SWCB), tank no. 1 (see appendix B, site map) was dismantled in the spring of 1985. The contents of the tank were recycled into the treatment process, according to Mr. Kenneth Cosgriff, plant manager of Atlantic Wood Industries. Also according to Mr. Kenneth Cosgriff, tank no. 2 (see appendix B, site map) was also dismantled in September 1985, and the contents were recycled through the system.

SECTION 3

3.0 ENVIRONMENTAL SETTING

3.1 Water Supply

The water supply for the area within 3 miles of the site is supplied by the Portsmouth Water Company. The Portsmouth Water Company services Chesapeake, Suffolk, and Portsmouth, and uses a combination of sources from Suffolk County. These sources consist of 4 lakes: Lake Kilby, Lake Meade, Lake Lahon, and Speaghts Run. Three deep groundwater wells, located to the west of Lake Kilby, are other sources for Portsmouth Water Company. These supplies are located 17 miles to the southwest of the site. Chesapeake has an emergency supply which is located 7 miles from the site and uses deep groundwater for its source. The city of Norfolk uses a combination of surface and groundwater for its supply of potable water. Norfolk gets these supplies from Suffolk County, which is located outside the 3-mile radius of the site. Groundwater within a 3-mile radius of the site is not being used for a potable water source. However, there is some industrial use of groundwater in the area within a 3-mile radius of the site. These wells are drilled to a depth of approximately 600 feet into the lower Cretaceous Series Patuxent Formation. (For cooling waters and process water, see appendix G.)

3.2 Surface Waters

The Atlantic Wood Industries plant lies on the west bank of the southern branch of the Elizabeth River, which is an estuarine area with tidal influence. The southern branch of the Elizabeth River flows north, into the Chesapeake Bay. Surface water runoff from the site is collected by 4 NPDES permitted outfalls which flow into the Elizabeth River. Outfall no. 003 discharges into a storm sewer, which is used by the Portsmouth area and is located in the northwestern corner of the property. The runoff is then released to the river. Outfall no. 001 discharges directly into the river in the southeastern corner of the property. Outfall no. 002 discharges into the outfall of the storm sewer, but never actually enters the sewer (see appendix B, site map).

The South Branch of the Elizabeth River is used for recreational activities such as crabbing. Darius Ostrauskas, of EPA, reports that, according to Daniel Horme, of the Virginia Division of Water Programs, local residents catch oysters and crabs within 2 miles downstream of the site. Also, studies conducted by the Virginia Institute of Marine Science have found highly elevated concentrations of polynuclear aromatic compounds downstream and adjacent to the facility. These compounds bioacummulate in oysters (see appendix C).

3.3 Geology and Soils

The subject site is located within the Virginia Coastal Plain Province. The sediments of the Coastal Plain range in age from Early Cretaceous to Holocene and consist of an eastward-thickening wedge of unconsolidated sand, silt, clay, gravel, and varying quantities of shells. In general, these sediments consist of a sequence of marine deposits underlain by a thicker sequence of nonmarine deposits.

According to the "Hydrogeologic Framework of the Virginia Coastal Plain," the deposition of sediments within the Coastal Plain Province has been affected by 3 major structural deformation features: the Salisbury embayment, the Norfolk arch, and the Albemarle embayment. Within the study area, deposition has been modified by the Norfolk arch. The Norfolk arch delineates the separation between the limestone-rich Albemarle embayment to the south from the glauconite-rich Salisbury embayment to the north. In general, sediments to the south of the Norfolk arch dip to the southeast, while sediments to the north dip to the northeast. The strike of these depositional units is approximately parallel or subparallel to the Fall Line.[1]

The following table, adapted from "General Hydrogeologic Column and Correlations for Sediments of the Virginia Coastal Plain," summarizes the Coastal Plain sediments, in order of decreasing age and in stratigraphic sequence, that underlie the study area.[1]

Group	Stratigraphic Formation	Lithology	Origin
Columbia	Undifferentiated	Sand and gravel, interbedded with silt and clay	Fluvial and marine
Chesapeake	Yorktown Formation	Sand, interbedded with silt, clay, shell beds, and gravel	Shallow, open marine
Chesapeake	Eastover Formation	Sand, interbedded with silt, clay, shell beds, and gravel	Shallow, restricted marine
Chesapeake	St. Mary's Formation	Clay, silt, and shelly	Shallow, open marine
Chesapeake	Calvert Formation	Clay, silt, diatomaceous, sparsely sandy, and shelly	Quiet, restricted marine
Chesapeake	Old Church Formation	Sand and glauconite, interbedded with shell beds, silts, and clays	Shallow, open marine, inner shelf basin
Pamunkey	Chickahominy Formation	Sand and glauconite, interbedded with shell beds, silts, and clays	Shallow, open marine, inner shelf basin
	Piney Point Formation	Sand and glauconite, interbedded with shell beds, silts, and clays	Shallow, open marine, inner shelf basin

Group	Stratigraphic Formation	Lithology	Origin
	Nanjemoy Formation	Clay, silt, shelly, glauconite, and sandy	Shallow, open marine, inner to middle shelf basin
Pamunkey	Marlboro Clay	Pink and gray clay	Shallow, open marine, inner to middle shelf basin
	Aquia Formation	Sand, glauconite, interbedded with shell beds	Shallow, open marine inner shelf basin
	Undifferentiated	Clay, silty, micaceous	Marine
Potomac	Potomac Formation	Sand, occasional gravels, interbedded with silty clays.	Continental, fluvial deltaic, back swamp basins

The thicknesses of these sediments in the study area is unknown.

The basement complex, which is located approximately 2,250 feet below sea level, consists of eastwardly dipping crystalline rocks. In general, these rocks are Precambrian to lower Paleozoic in age and consist of massive igneous intrusives, highly deformed metamorphic rocks, and consolidated sediments.[1]

Native soils of the study area are classified as Tidal Marsh soils, which consist of silty clays mixed with varying amounts of sands. These native soils have been disturbed due to urban development.[3] Site-specific information from the "Phase I Pollution Abatement Plan for Atlantic Wood Industries, Incorporated, Wood Preserving Plant," indicates that soils underlying the site consist of find sand and silt with thin clay layers at depths to approximately 15 to 20 feet below the surface.[2] Based on soil borings conducted for this study, these clay lenses are discontinuous and are most likely fill material.[2]

3.4 Groundwaters

The eastwardly thickening wedge of Coastal Plain sediments forms a multi-layered aquifer system within the study area. In general, this multi-layered aquifer system consists of a thin, generally continuous sequence of marine sands and clays, which are underlain by a thicker sequence of discontinuous nonmarine sands and interbedded clays. Underlying the study area, these sediments have been divided into 7 aquifers and 7 confining beds.[1]

The following table, adapted from information from a well located in Portsmouth, summarizes the underlying hydrogeologic units in order of decreasing age and stratigraphic sequence:[1]

Hydrogeologic Unit	Lithology	Approx. Thickness (ft.)
Columbia aquifer	Sand and gravel, interbedded with silt and clay, generally unconfined	50
Yorktown confining bed	Clay, silty and shelly	20
Yorktown-Eastover aquifer	Sand, interbedded with silt, clay, shell beds and gravel	210
St. Mary's confining bed	Clay, silty and shelly, interbedded with sand	70
Calvert confining bed	Clay, silty, diatomaceous	90
Chickahominy-Piney Point aquifer	Sand, interbedded with shell beds, silts, and clays	60
Nanjemoy-Marlboro	Clay, silty, shelly, glauconitic, and sandy	90
Aquia aquifer	Sand and glauconite, interbedded with shell beds	20
Upper Potomac confining bed	Clay, silty, micaceous, interbedded with sand	30
Upper Potomac aquifer	Sand, micaceous, lignitic, and clayey	210

Hydrogeologic Unit	Lithology	Approx. Thickness (ft.)
Middle Potomac confining bed	Clay, silty, interbedded with sands	30
Middle Potomac aquifer	Sand, occasional gravels, interbedded with silty clays	470
Lower Potomac confining bed	Clay, silty, and sandy	50
Lower Potomac aquifer	Sand and gravels, clayey, interbedded with silty clays	Unknown

Groundwaters in the Portsmouth area are presently used for industrial purposes, such as process waters. There are presently no residents known to be using groundwater for domestic purposes within 3 miles of the site.

3.5 Climate and Meteorology

The average annual temperature of the Norfolk and Portsmouth, Virginia area is 59.5°F. The coldest month is generally January, with a mean temperature of 39.9°F. The hottest month is July with a mean temperature of 78.4°F. The average annual precipitation for the area is 45.22 inches. The month of highest precipitation is April with 5.23 inches and the month of lowest is November with 2.88 inches (see appendix H).

3.6 Land Use

The Atlantic Wood Industries site covers an area of about 47.5 acres. The site is bounded to the east by the South Branch of the Elizabeth River. To the north and south of the site are the United States Naval Ship Yard and the Naval Reserve Station, respectively. To the west of the site is a mixed area of Naval Reserve Station property and residential areas.

3.7 Population Distribution

Darius Ostrauskas, of EPA, reports that, according to Robert Robinson, of the Office of City Planning for the city of Portsmouth, the 1980 Census estimates that 77,000 persons live within a 4-mile radius of the site in Portsmouth. The Norfolk Naval Ship Yard employs approximately 14,000 persons. The ship yard is within 1/2 mile of the site (see appendix I).

3.8 Critical Environments

Darius Ostrauskas, of EPA, reports that, according to the United States Fish and Wildlife Service, an estuarine intertidal wetland is located 2,650 feet south of the site. According to VA SWCB, contaminants from the site could reach this wetland, which is upstream, due to tidal influence. According to the United States Fish and Wildlife Service, there are no known habitats of endangered species within a 2-mile radius of the site (see appendix J).

3.9 References

1. Meng, Andrew A. III, and John F. Harsh. Hydrogeoloic Framework of the Virginia Coastal Plain. Open file report 84-728.

2. M.M.M. Design Group. Phase I Pollution Abatement Plan for Atlantic Wood Industries, Incorporated Wood Perserving Plant at Portsmouth, Virginia. August 28, 1984.

3. United States Department of Agriculture, Soil Conservation Service. Soil Survey of Norfolk County, Virginia. May 1959.

SECTION 4

4.0 WASTE TYPES AND QUANTITIES

The Atlantic Wood Industries site has 4 liquid storage tanks, which are located on Elm Avenue. Darius Ostrauskas reports that Mr. Kenneth Cosgriff, plant manager, informed him that these tanks were used for the storage of actively used creosote until approximately 1975. Since 1975, the actively used creosote has been stored in smaller tanks located in the central portion of the site. Darius Ostrauskas also reports that Charles Kerr, environmental engineer for Atlantic Wood Industries, stated that the 4 unused storage tanks contained a total volume of 350,000 gallons of material as of November 26, 1984. There is also an unlined lagoon that was used for the disposal of process wastes from 1926 to 1972. The lagoon was 55 feet wide, 150 feet long, and 5 feet deep, and held approximately 1,527 cubic yards of waste material. However, there is an unknown amount of liquid waste that was lost because the lagoon was unlined. From 1972 until 1983, the lagoon was used to hold cuttings from the processed wood. In July 1983, the lagoon was backfilled at the request of the Virginia State Department of Health. Prior to 1972, the lagoon was used for the disposal of waste preservative from the on-site processes. The volume of these wastes is unknown because the lagoon was unlined. In addition to known disposal areas and tanks, there is also an undetermined quantity of contaminated soils on site in the treated wood stoage area and the process area. Other unknown waste quantities would include material in the storm sewer, the intertidal drainage ditch, and the South Branch of the Elizabeth River.

SECTION 5

5.0 FIELD TRIP REPORT

5.1 Summary

On Tuesday, July 10, 1984, FIT III staff members Eugene Dennis, William Wentworth, and Garth Glenn visited the Atlantic Wood Industries site in Portsmouth, Virginia for the purpose of conducting a site inspection. The weather at the time of inspection was sunny, hot, and humid and the temperature was in the mid-80s.

5.2 Persons Contacted

5.2.1 Prior to Field Trip

Darius Ostrauskas
U.S. EPA
841 Chestnut Building
Ninth and Chestnut Streets
Philadelphia, PA 19107
(215) 597-6488

5.2.2 At The Site

Darius Ostrauskas
U.S. EPA
841 Chestnut Building
Ninth and Chestnut Streets
Philadelphia, PA 19107
(215) 597-6488

D Number F3-8405-40
A Number VA-12C

5.3 SAMPLE LOG

Site Name Atlantic Wood Industries

TRAFFIC REPORTS			SAMPLING LOCATION	PHASE	SAMPLE DESCRIPTION	DATE	TIME	pH	COMMENTS/OBSERVATIONS	LABORATORY
ganic	Inorganic	High Hazard								
9153	MC 3660		Storm Sewer Upgradient	Aq	Storm Sewer Upgradient	7/10/84	10:05			Radian ECT
9154	MC 3661		Storm Sewer Prefilter	Aq	Storm Sewer Prefilter	7/10/84	10:44			Radian ECT
9155	MC 3662		Outfall Sediment Prefilter	Sed	Outfall Sewer Prefilter	7/10/84	10:44			Radian ECT
9156	MC 3663		Storm Sewer After Filter	Aq	Storm Sewer After Filter	7/10/84	10:50			Radian ECT
9157	MC 3664		Outfall sediment After Filter	Sed	Outfall sediment Afterfilter	7/10/84	10:50			Radian ECT
9158	MC 3665		Blank Aqueous	Aq	Blank	7/10/84	11:05			Radian ECT
9159	MC 3666		Blank Solid	Sed	Blank	7/10/84	11:05			Radian ECT

5.4 Site Observations

- The background HNU reading was 3 ppm. Readings in the storm sewer and at a point downgradient of the sewer, near the Elizabeth River, were between 5 and 8 ppm.

- Upon arriving at the site, it was found that site access for July 10, 1984 had not been granted.

- Sample locations were found outside the site. The first sample was taken from a storm sewer on Elm Avenue, upgradient of the storage tanks.

- The upgradient storm sewer had an HNU reading up to 5 ppm above background.

- The water in the storm sewer was approximately 4 inches deep. There was a slight sheen on the surface.

- The downgradient sediment sample, taken before the filter fence, consisted of coarse sand, gravel, and shell fragments. The soil seemed to be oil soaked and had a distinct odor. The HNU reading was 8 ppm at a point 2 inches above the water.

- Sample location no. 3, located on the tidal flats of the South Branch of the Elizabeth River, showed a bright, oily sheen on the water surface. An HNU reading of 7 ppm at 2 inches above the water was recorded.

- An area of piling storage, with what looked like creosote-stained soil, was observed. The stained soil extended down to the property line and the tidal flats.

5.5 PHOTOGRAPH LOG

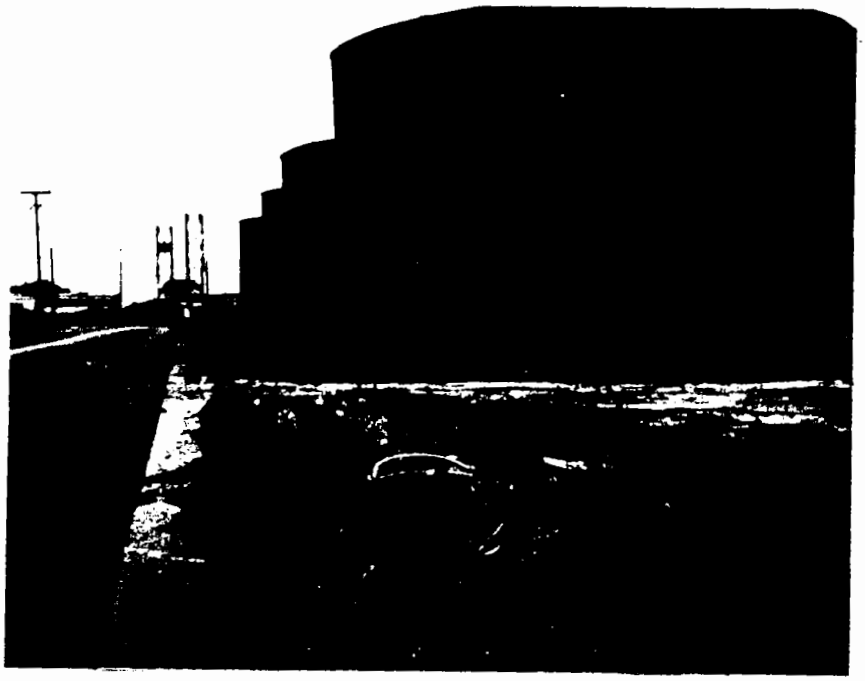

Photo 1 - shows sample location no. 1, the storm sewer upgradient of the storage tanks.

Photo 2 - shows sample location no. 2, downgradient looking towards the river before the filter.

Photo 3 - shows sample location No. 3 below the filter towards the Elizabeth River.

Photo 4 - shows site from sample location No. 3 with filter in foreground and site in background

Photo 5 - shows filter area looking towards the Elizabeth River.

Photo 6 - Shows ponded water above filter area.

Photo 7 - shows a close-up view of filter area.

F3-8405-40

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

EPA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
VA	126

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER			
Atlantic Wood Industries, Incorporated	3950 Elm Avenue			
03 CITY	**04 STATE**	**05 ZIP CODE**	**06 COUNTY**	**07 COUNTY CODE**
Portsmouth	VA	23704	Norkfolk	740

09 COORDINATES		10 TYPE OF OWNERSHIP (Check one)
LATITUDE	LONGITUDE	
36° 48' 15"	78° 17' 50"	X A. PRIVATE ☐ B. FEDERAL _____ ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☐ F. OTHER _____ ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION	02 SITE STATUS	03 YEARS OF OPERATION
07 / 10 / 84 (MONTH DAY YEAR)	X ACTIVE ☐ INACTIVE	1929 (BEGINNING YEAR) present (ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)

☐ A. EPA X B. EPA CONTRACTOR NUS Corporation (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR _____ (Name of firm)
☐ E. STATE ☐ F. STATE CONTRACTOR _____ (Name of firm) ☐ G. OTHER _____ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO
Eugene Dennis	Environmental Engineer	NUS Corp.	(215 687-95
09 OTHER INSPECTORS	**10 TITLE**	**11 ORGANIZATION**	**12 TELEPHONE NO**
William Wentworth	Assistant Manager	NUS Corp.	(215 687-95
Garth Glenn	Regional Manager	NUS Corp.	(215 687-95
			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO
None			( )
			( )
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☐ PERMISSION ☐ WARRANT	9:00 to 11;15 AM	Hazy, hot, and humid, temperatures in the mid-80s

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO
Darius Ostrauskas	U.S. Environmental Protection Agency	215 597-648

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
Charles Meyer	EPA	NUS Corp.	(215) 687-9510	02 25 / (MONTH DAY YE

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
VA	126

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☒ A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE _____) — ☒ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: unknown — 04 NARRATIVE DESCRIPTION

Sampling of onsite monitoring wells by EPA on 8/18/82 and Virginia State Water Control Board Atlantic Wood Industries site inspection of 6/13/84, indicated that groundwater is contaminated with crecosote constituents.

01 ☒ B. SURFACE WATER CONTAMINATION — 02 ☒ OBSERVED (DATE: 07/10/84) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: unknown — 04 NARRATIVE DESCRIPTION

NUS FIT III site inspection of July 10, 1984 indicated there were high level of polynuclear aromatic compounds which are associated with creosote, found in the intertidal drainage ditch which receives surface water drainage from the Atlantic Wood Industries site and deposits in the Elizabeth River.

01 ☒ C. CONTAMINATION OF AIR — 02 ☒ OBSERVED (DATE: 07/10/84) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: unknown — 04 NARRATIVE DESCRIPTION

Sampling of the air above the intertidal ditch by the EPA's team indicates that there is contamination of the air by substances associated with creosote eminating from the intertidal ditch.

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

According to the Department of Fire Prevention, city of Portsmouth no fire or explosion threat exists.

01 ☒ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: _____) — ☒ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: unknown — 04 NARRATIVE DESCRIPTION

Access is not restricted to the storm sewer outfall area. The sample taken from this area by FIT III was contaminated

01 ☒ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE: _____) — ☒ POTENTIAL — ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: 47.5 (Acres) — 04 NARRATIVE DESCRIPTION

Soil samples which have been taken onsite indicate contamination from constituents of creosote and these soils are the most likely source of contaminants found in the groundwater of this area.

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

N/A

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

FIT III was not permitted on site. However, the plant is active and it appeared, through visual observations from the plant boundaries, that poor hoursekeeping procedures are followed at the plant.

01 ☐ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

See E above

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
VA	126

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A. NPDES	VA 000 4189	9/30/85	9/30/90	Inspections by the VDH
☐ B. UIC				recommended that the site
☐ C. AIR				be closed down (12/17/81)
☐ D. RCRA				
☒ E. RCRA INTERIM STATUS	VDA 990710410	11/19/80	11/16/85	small quantity generator, storer.
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☒ A. SURFACE IMPOUNDMENT	1.527	cu. yds.
☐ B. PILES		
☐ C. DRUMS, ABOVE GROUND		
☒ D. TANK, ABOVE GROUND	350,000	gallons
☐ E. TANK, BELOW GROUND		
☐ F. LANDFILL		
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☐ I. OTHER (Specify)		

04 TREATMENT (Check all that apply)
☒ A. INCINERATION
☐ B. UNDERGROUND INJECTION
☐ C. CHEMICAL/PHYSICAL
☐ D. BIOLOGICAL
☐ E. WASTE OIL PROCESSING
☐ F. SOLVENT RECOVERY
☐ G. OTHER RECYCLING/RECOVERY
☐ H. OTHER (Specify)

05 OTHER
☒ A. BUILDINGS ON SITE

06 AREA OF SITE
47.5 (Ac.)

07 COMMENTS

Material was stored in a 1.527 cubic yard unlined lagoon from 1926 1972 and the 4 above ground storage tanks along Elm Avenue appear to have been leaking; off of Elm Avenue.

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☐ B. MODERATE ☐ C. INADEQUATE, POOR ☒ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

The 1,527 cubic yard lagoon was unlined and the above ground storage tanks along Elm Avenue appear to have been leaking.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE ☒ YES ☐ NO

02 COMMENTS

There is no fence present around the site or contaminated offsite sewer outfall and ditch.

Information from EPA files and NUS FIT III Preliminary Assessment from March 31, 1983 and from state files on the site.
NUS FIT III 7/10/84 Site Inspection

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE: VA | 02 SITE NUMBER: 126

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. 10^{-6} - 10^{-8} cm/sec ☐ B. 10^{-4} - 10^{-6} cm/sec ☒ C. 10^{-4} - 10^{-3} cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

Unknown

02 PERMEABILITY OF BEDROCK (Check one)

Unknown

☐ A. IMPERMEABLE (Less than 10^{-6} cm/sec) ☐ B. RELATIVELY IMPERMEABLE (10^{-4} - 10^{-6} cm/sec) ☒ C. RELATIVELY PERMEABLE (10^{-2} - 10^{-4} cm/sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH	
3-5 (ft)	unknown (ft)	unknown	

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLO
10 (in)	3 (in)	3-5 %	E	0-3

09 FLOOD POTENTIAL

SITE IS IN N/A YEAR FLOODPLAIN

10 N/A ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE: A. 2,650 ft (mi) OTHER: B. N/A (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)

N/A (mi)

ENDANGERED SPECIES: N/A

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AG LAND
A. onsite (mi)	B. 3,000 (mi)	C. N/A (mi)	D. N/A (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The area surrounding the site is generally flat with an eastward slope towards the South Branch of the Elizabeth River.

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

State files along with NUS FIT III Preliminary Assessment March 31, 1983 and the U.S.G.S. Portsmouth 7.5 Minute Quadrangle Map.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
VA	126

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
Atlantic Wood Industries, Inc.		3950 Elm Avenue	2491	Portsmouth	VA	23704
N/A						
N/A						
N/A						

PARENT COMPANY (If applicable)

08 NAME	09 D+B NUMBER	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE	12 CITY	13 STATE	14 ZIP CODE
Atlantic Wood Industries, Inc.		P.O. Box 1608	2491	Savannah	GA	31498
N/A						
N/A						
N/A						

III. PREVIOUS OWNER(S) (List most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
Atlantic Creosoting Company		3950 Elm Avenue	2491	Portsmouth	VA	23704
N/A						
N/A						

IV. REALTY OWNER(S) (If applicable; list most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
N/A						
N/A						
N/A						

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

EPA files on the site and from NUS FIT III Preliminary Assessment of March 31, 1984

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
VA	126

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER
Atlantic Wood Industries, Inc.	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
3950 Elm Avenue	2491

05 CITY	06 STATE	07 ZIP CODE
Portsmouth	VA	23704

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A		N/A	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A		N/A	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A		N/A	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A		N/A	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

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

EPA files, NUS FIT III Preliminary Assessment of March 31, 1984 and NUS FIT III Site Inspection of July 10, 1984.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
VA	126

II. PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☒ S. CAPPING/COVERING — 02 DATE 7/23/82 — 03 AGENCY _____

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ V. BOTTOM SEALED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ W. GAS CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ X. FIRE CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ Y. LEACHATE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ Z. AREA EVACUATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ 2. POPULATION RELOCATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

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

State and EPA files

SECTION 6

6.0 LABORATORY DATA

6.1 Sample Data Summary

The following inorganic Quality Assurance Review and Sample Data Summary have been prepared by CRL.

TDD Number E3-8405-40

EPA Number VA-126

S/A DAT MM/
TARGET COMPOUNDS

☒ Organic ☐ Inorganic

Site Name Atlantic Wood Industries

Date of Sample July 17, 1984

Quality Assurance performed by
Rock J. Vitale (215) 687-9510.

Solid sample results reported as dry weight.

Sample Number	Sample Description and Location	Phase	Units	Compounds Detected: Benzo (a) Anthracene	Benzo (a) Pyrene	Benzo (b) Fluoranthene	Benzo (k) Fluoranthene	Chrysene	Acenaphthylene	Anthracene	Benzo (GHI) Perylene	Fluorene	Phenanthrene	Indeno (1,2,3-cd) Pyrene	Pyrene	Dibenzo furan	2-Methyl naphthalene	Remarks
C9153	Storm Sewer Upgradient	Aq	ug/L															
C9154	Storm Sewer Outfall Before Filter	Aq	ug/L					40	2 K		10 K			15				
C9155	Outfall Sediment Before Filter	Sed	mg/kg	24,000K	12,000K		20,000K	23,000K	5,000K	50,000		96,000	320,000		99,000	74,000	110,000	
C9156	Storm Sewer Outfall After Filter	Aq	ug/L															
C9157	Outfall Sediment After Filter	Sed	mg/kg	150,000	64,000	64,000	64,000	160,000	10,000K	140,000	23,000	420,000	970,000	27,000	480,000	300,000	140,000	
C9158	Blank Aqueous	Aq	ug/L															
C9159	Blank Sediment	Sed	mg/kg															

NOTE: For a review of this data and non-target, tentatively identified compounds, please see the Analytical Quality Assurance section of this report.

◇ Denotes results of questionable qualitative significance based upon quality assurance review of data.

K - Approximate value: detected below

SAN DAT/ IMAI
TA ...T CC JND!

TDD Number F-3-8405-40
EPA Number VA-126

☒ Organic ☐ Inorganic

Quality Assurance performed by Rock J. Vitale (215) 687-9510.

Site Name Atlantic Wood Industries
Date of Sample July 17, 1984

Solid sample results reported as dry weight.

Compounds Detected

Sample Number	Sample Description and Location	Phase	Units	Benzene	Chloroform	Ethyl-Benzene	Methylene Chloride	Toluene	Acetone	Styrene	Total Xylenes	2,4 Dimethyl-phenol	Acenaphthene	Fluoranthene	Naphthalene	Bis (2-ethylhexyl) Phthalate	Di-n-butyl Phthalate	Diethyl phthalate	Remarks
C9153	Storm Sewer Upgradient	Aq	ug/L		1K◊		2K◊									4K◊	2K◊	4K◊	
C9154	Storm Sewer Outfall before Filter	Aq	ug/L	3K			4K◊					51	29	31		4K◊	2K◊		
C9155	Outfall Sediment Before Filter	Sed	ug/kg	2K		730	16◊	200◊	25◊	320	2,000		110,000	160,000	80,000				
C9156	Storm Sewer Outfall After Filter	Aq	ug/L	38		8	1K◊	40◊			75					17◊	3K◊	2K◊	
C9157	Outfall Sediment After Filter	Sed	ug/kg	89		1,200	48◊	480	150◊	190	2,300		460,000	650,000	370,000				
C9158	Blank Aqueous	Aq	ug/L				4K												
C9159	Blank sediment	Sed	ug/kg				77	22	13										

NOTE: For a review of this data and non-target, tentatively identified compounds, please see the Analytical Quality Assurance section of this report.

◇ Denotes results of questionable qualitative significance based upon quality assurance review of data.

K-Approximate value: detected below

TDD Number F3-8405-40
EPA Number VA-126

SAMPLE DATA SUMMARY
TARGET COMPOUNDS

☐ Organic ■ Inorganic

Site Name Atlantic Wood
Date of Sample 7-10-84

Sample Number	Sample Description and Location	Phase	Units	Compounds Detected: SELENIUM	TIN	NANADIUM	ZINC	MERCURY									Remarks
MC3660	Storm Sewer upgradient	AQ	µg/L	◇ 6		79	29	0.5									
MC3661	Storm Sewer Outfall Before Filter	AQ	µg/L	◇ 8			8	0.5									
MC3662	Outfall Sediment Before Filter	SOL	mg/kg		◇ 3.45		110	0.27									
MC3663	Storm Sewer Outfall After Filter	AQ	µg/L	◇ 11				0.5									
MC3664	Outfall Sediment After Filter	SOL	mg/kg	◇ 0.1	◇ 3.0	25	240	0.3									
MC3665	BLANK	AQ	µg/L	◇ 10	◇ 48			0.6									
MC3666	BLANK	SOL	mg/kg					0.5									

NOTE: For a review of this data and non-target, tentatively identified compounds, please see the Analytical Quality Assurance section of this report.

◇ Denotes results of questionable qualitative significance based upon quality assurance review of data

TDD Number F3-8405-40
EPA Number VA-126

SAMPLE DATA SUMMARY
TARGET COMPOUNDS

☐ Organic ■ Inorganic

Site Name Atlantic Wood
Date of Sample 7-10-84

Sample Number	Sample Description and Location	Phase	Units	Compounds Detected: Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Manganese	Nickel	Remarks
MC3660	Storm Sewer Upgradient	AQ	MG/L	420	6	◇ 3	◇ 36	◇ 2	◇ 1	15	18	37	◇ 280		◇ 8	17	
MC3661	Storm Sewer Outfall Before Filter	AQ	MG/L	76	5	◇ 7	◇ 26		◇ 8				◇ 210		◇ 5		
MC3662	Outfall Sediment Before Filter	SOL	MG/KG	880	0.2	11	30		◇ 1.3			19	5300	60	110		
MC3663	Storm Sewer Outfall After Filter	AQ	MG/L		7	27	◇ 33	◇ 2	◇ 11				◇ 290	◇ 33			
MC3664	Outfall Sediment After Filter	SOL	MG/KG	1100		11	23		◇ 0.9			59	5200	69	44		
MC3665	BLANK	AQ	MG/L				17		27				◇ 140	◇ 28			
MC3666	BLANK	SOL	MG/KG				11										

NOTE: For a review of this data and non-target, tentatively identified compounds, please see the Analytical Quality Assurance section of this report.

◇ Denotes results of questionable qualitative significance based upon quality assurance review of data.

6.2 Quality Assurance Review

6.2.1 Organic Data: Lab Case 2991

6.2.1.1 Introduction

The findings offered in this report are based upon a general review of all available sample data for VOA and BNA analyses only, blank analysis results, surrogate and matrix spike results, duplicate analysis, and target compound matching quality.

6.2.1.2 Qualifiers

It is recommended that this data package be utilized only with the following qualifier statements:

- All positive results for methylene chloride, acetone, chloroform, di-n-butyl phthalate, diethyl phthalate, and bis(2-ethylhexyl) phthalate are questionable.

- The positive results for toluene in samples C9155 and C9156 are questionable.

The aforementioned results were designated questionable because there is evidence to doubt the presence of these compounds at concentrations less than or similar to the levels reported. However, with certain exceptions listed below, it can be assumed that concentrations significantly greater than the levels reported cannot be present.

- The actual concentrations of all qualitatively confident VOA compounds in all samples may be substantially higher than reported. In addition, the actual detection limits for all VOA compounds may be substantially higher than reported. This is particularly true for the light VOA compounds. (Although the presence of several VOA compounds was questionable, if these compounds are actually present, their concentrations may be substantially higher than reported.)

- The actual detection limits for all phenolic compounds in all samples may be substantially higher than reported. In addition, the actual concentration of 2,4-dimethylphenol in sample C9154 may be substantially higher than reported.

- The actual detection limits for all BN compounds in all samples may be slightly higher than reported. In addition, the actual concentration of all positive BN compounds may be slightly higher than reported. (Although the presence of some phthalate compounds were questioned, if these compounds are present, their concentrations may be slightly higher than reported.)

- Due to a laboratory quantitation error, the reported concentrations of acenaphthene and acenaphthylene in sample C9154 was reported incorrectly. The corrected concentrations of the compounds have been incorporated into the sample data summary.

- Per EPA request, tentatively identified compounds, which were reported by the laboratory, are not included in this report.

6.2.1.3 Findings

- Methylene chloride, acetone, di-n-butyl phthalate, diethyl phthalate, bis(2-ethylhexyl) phthalate, toluene, and chloroform were detected in field and/or laboratory blanks at sufficient levels to question the aforementioned sample results for these compounds.

- The maximum contractual holding times were exceeded for all VOA samples by 4 weeks. As a result, substantial losses may have occurred, particularly for the lighter VOA compounds.

- The BNA sample extracts for all samples except C9155 and C9157 were not analyzed for several months after these samples were extracted. Furthermore, samples C9155 and C9157 were not extracted for BNA analysis until 4 months after receipt of these samples. In both circumstances, either recommended extract holding times or required holding time prior to extraction were exceeded by approximately 3 months. Consequently, there is a strong possibility that substantial losses of phenolic compounds and slight losses of BN compounds occurred during storage of samples/extracts.

- Tentatively identified compounds were only examined for possible target compound identification.

6.2.1.4 Summary

The attached Quality Assurance Review has identified blank contamination, quantitation errors, and exceeded holding times as the primary areas of concern. Please see the accompanying Support Documentation appendix to this report for specifics on this Quality Assurance Review.

Report prepared by Rock J. Vitale Rock J. Vitale Date: March 28, 1986

6.2.2 Inorganic Data Lab Case 2991

6.2.2.1 Introduction

The findings offered in this report are based upon a review of all available sample data, blank results, matrix spike and duplicate analysis results, ICP interference QC, calibration data, and quality assurance documentation.

6.2.2.2 Qualifiers

It is recommended that this data package be utilized only with the following qualifier statements:

° The results which may be qualitatively questionable are listed below:

Constituent	Samples With Questionable Results
Arsenic	MC3660, MC3661
Barium	MC3660, MC3661, MC3663
Beryllium	MC3660, MC3663
Cadmium	MC3660, MC3661, MC3662, MC3663, MC3664
Iron	MC3660, MC3661, MC3663, MC3665
Lead	MC3663, MC3665
Manganese	MC3660, MC3661
Selenium	MC3660, MC3661, MC3663, MC3664, MC3665
Tin	MC3662, MC3664, MC3665

° The aforementioned results were designated questionable since there is evidence to doubt the presence of these constituents at any concentration less than or equal to the levels reported. However, it can be assumed that concentrations significantly greater than the levels reported for these samples cannot be present.

° The reported result for lead in sample MC3662 may not accurately reflect the average concentration of this constituent.

6.2.2.3 Findings

° Laboratory preparation blank analysis revealed the presence of arsenic, cadmium, beryllium, iron, lead, manganese, selenium, and tin at levels sufficient to question the aforementioned results for these parameters.

° Field blank analysis revealed the presence of barium, cadmium, and selenium at levels sufficient to question the aforementioned results for these parameters.

° Duplicate analysis of sample MC3662 revealed poor precision for lead.

6.2.2.4 Summary

This Quality Assurance Review has identified the following areas of concern; laboratory preparation blank and field blank contamination, transcription and calculation errors.

Please see the accompanying support documentation appendix for specifics on this Quality Assurance Review.

Report prepared by Debra K. White: _____ Date: 9/18/84

SECTION 7

7.0 TOXICOLOGICAL EVALUATION

7.1 Summary

Elevated levels of polycyclic aromatic hydrocarbons (PAHs) (up to 4,507,000 ug/kg total or 0.4 percent dry weight) were measured in sediment samples taken downgradient of the site, including a tidal flat sample from the South Branch of the Elizabeth River. A few aromatics (up to 2,000 ug/kg for individual contaminants) were also identified. Known site use of creosote suggests the contamination is site related. PAHs might be injurious to bottom-dwelling organisms and taint the flesh of local aquatic organisms. The possible contamination of local seafood might pose a potential health concern to regular consumers. Some PAHs have evidence of animal carcinogenicity and local residents are known to consume crabs and oysters that are caught within 2 miles downstream of the site.

7.2 Support Data

7.2.1 Scope of Contamination

Based on limited sampling, the most apparent potential hazard is posed by the contamination of the South Branch of the Elizabeth River with PAHs, and, to a lesser extent, with aromatics. Although samples were not taken on site due to an inability to gain site access, the results of the analysis of off-site samples and known site usage suggest that PAHs and aromatics are migrating from the site to the river via surface water.

Elevated levels of PAHs (1,083,100 ug/kg or approximately 0.1 percent) were measured in a sediment sample taken from ponded water below an outfall from the site; 127 ug/l were measured in the aqueous sample. An even higher total concentration of PAHs (4,507,000 ug/kg or 0.4 percent) was measured in a sediment sample taken on the tidal flat of the river, downgradient of a filter through which the outfall effluent flows. There were no PAHs reported within quantifiable limits in the aqueous sample from the tidal flat. There were also no PAHs reported within quantifiable limits in the aqueous sample from the storm sewer, located upgradient of the site. The possibility that PAHs were present in the sediment of the storm sewer cannot be ruled out, however. PAHs tend to partition into sediments because of their sorption to organic materials and their low water solubilities.

Benzene and other aromatics were also measured in the sediment sample collected below the outall (up to 2,000 ug/kg for individual contaminants); low levels of benzene (approximately 38 ug/l) and 2,4-dimethylphenol (51 ug/l) were present in the aqueous fraction.

Similarly, aromatics were identified in the sediment and aqueous samples (up to 2,300 ug/kg and up to 75 ug/l for individual compounds, respectively) taken on the tidal flat. There were no aromatics or any other organic priority pollutants confidently identified in the aqueous sample from the upgradient storm sewer.

It should be noted that, according to the FIT III quality assurance chemist, the levels of volatile organics in all samples may have been higher than those reported. Since samples were held beyond contract limits by the laboratory, substantial losses may have occurred (see section 6.2.1).

The PAHs and aromatics measured in off-site samples may have been derived from the creosote that is used on site as a wood preservative. Stained soil could be observed by FIT III in the on-site piling storage area. The stained soil extended to the property line and the tidal flats.

There were no inorganics identified in any samples at levels of potential concern, with the possible exception of mercury (0.5 ug/l in downgradient aqueous samples). Although the quality assurance review by CRL did not qualify the results for mercury, the presence of mercury in all samples is questionable. Mercury was reported at higher concentrations in blanks (0.5 ug/kg in solid, 0.6 ug/l in aqueous) than in field samples (up to 0.3 ug/kg in solid, 0.5 ug/l in aqueous).

HNU readings of 5, 8, and 7 ppm were measured at the upgradient storm sewer, the sampling location below the outfall, and the tidal flat sampling location, respectively. The background reading was 2 ppm.

There was no information available concerning the quality of local groundwater. Groundwater in the area is used for industrial processing, but not as a potable water source.

7.2.2 Toxicological Considerations

Of the identified priority pollutants, PAHs were measured in the highest concentrations. PAHs could be of potential concern to local aquatic life in the river and possibly to its consumers. In general, PAHs are not highly persistent in surface waters. In the aqueous phase they are degraded by photolysis and, to a lesser extent, by oxidation.[1] Those in the sediment can undergo biodegradation and biotransformation by benthic organisms.[1] It has been reported that creosote, which may have been the source of the measured PAHs, decomposes at a rate of approximately 90 percent in 5 days in river water flowing 50 to 250 miles; approximately 99 percent was reported to have decomposed in a lake environment in 1 year.[2] However, if incorporated into sediments below the aerobic surface layer where biodegradation is slow, PAHs may remain in surface waters for long periods of time.[3] Up to 20,000 ug/kg of fluoranthene have been reported in water solids of European rivers.[4] Atypically high concentrations (5,000 ug/l) of benzo(a)pyrene (BaP) have been reported in marine sediments.[2] The South Branch of the Elizabeth River is semi-haline. The accumulation of oils on the bottom of surface waters can potentially be injurious to aquatic life by interfering with the development of eggs and larvae which are deposited on the floor. They can also interfere with feeding or other physiological processes of bottom-dwelling/feeding organisms.[3] There are no criteria for levels of PAHs in sediments for the protection of aquatic life.

PAHs can enter food chains from sediments via sorption by plants and ingestion by bottom-feeding organisms. PAHs can show notable bioconcentration in some invertebrates; a bioconcentration factor (BCF) of approximately 134,000 has been reported for a species of Daphnia after a 3-day exposure.[5] BCFs of up to 18,000 have been reported for individual PAHs in a species of oyster after an 8-day exposure.[4] BCFs for vertebrates tend to be lower than those measured in invertebrates; a value of 30 is considered typical of fish.[5] PAHs tend to be rapidly metabolized and excreted, and any bioaccumulation, especially in vertebrates, is considered to be short term.[5] Continuous exposure to PAHs might potentially result, however, in the maintenance of elevated tissue levels of PAHs, especially in invertebrates.

The ingestion of seafood from PAH-contaminated waters could potentially be a source of PAH exposure of some concern, particularly to shellfish consumers. A number of PAHs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene, which were identified in downgradient sediment samples, have evidence of carcinogenicity in animals.[6] Others, including acenaphthene and chrysene, have evidence of mutagenicity.[4] Pyrene and benzo(g,h,i)perylene have evidence of co-carcinogenicity in animals.[5] It has been calculated that the lifetime ingestion of 6.5 of seafood per day from water containing 0.311 ug/l PAHs (total) could pose a carcinogenic risk of 1 in 100,000.*[5] Although PAHs were not reported at or above contract required minimal quantifiable limits (20 to 40 ug/l) in the aqueous sample of the tidal flat, it is possible that concentrations below these limits may have been present, especially since some PAHs were detected in the aqueous sample taken below the outfall. The South Branch of the Elizabeth River is used for recreational crabbing and oystering within 2 miles downstream of the site. The analysis of tissue from local aquatic organisms would be necessary to further assess whether the ingestion of local seafood might be of potential concern to seafood consumers.

*Out of 100,000 individuals exposed, it is estimated that 1 additional case of cancer might result in addition to those normally expected.

There is insufficient information to predict the extent to which PAHs might potentially migrate down the river. Since PAHs sorb strongly to organic particulates, their mobility would be expected to be largely limited by the mobility of the particulate material. The latter would depend on the hydrogeologic conditions in this tidally influenced area.

The aromatics and other organic priority pollutants measured in downgradient samples would not be expected to pose a significant threat to aquatic life and its consumers. They do not persist in the environment, do not notably bioaccumulate, have a low toxicity, and/or were present in low concentrations.

There was no information available concerning the quality of the groundwater. Considered individually, of the contaminants measured in downgradient samples, it could be predicted on the basis of their octanol/water partition coefficients* that the aromatics (including benzene, a recognized human carcinogen), and possibly naphthalene, would be able to readily infiltrate, and be mobile in, groundwater.[7] The mobility of most PAHs would be expected to be very low. However, the concurrent presence of organic solvents and the sandy/silty nature of the soil in the area might aid the PAHs in infiltrating the groundwater in this case. Contaminants might potentially penetrate the groundwater through contaminated soil, through surface water sediments, and possibly from an unlined on-site lagoon that was reportedly previously used for waste disposal. Groundwater within 3 miles of the area is not currently used as a potable water source.

*Ratio of a substance's solubility in octanol to its solubility in water

Since sampling and air monitoring could not be carried out on site, the potential on-site exposure hazards cannot be assessed. Dermal contact with PAHs at levels similar to those measured off site (up to 0.4 percent in sediments) might be an exposure route of potential concern, if contact occurred on a regular basis. Although PAHs tend to bind to organic material in soils and sediments, in this case the sandy nature of the soils/sediments and the presence of organic solvents could potentially increase the amount of free PAHs available for skin penetration. As previously noted, some of the PAHs identified in sediment samples have evidence of carcinogenicity and/or mutagenicity. Skin cancers have been produced in rodents by the dermal application, several times a week, of as little as 250 ug of BaP.[8] Primates do not appear to be as sensitive to PAH-induced tumors as rodents, although crude petroleum oil has induced cancer in monkeys.[8] Creosote is considered carcinogenic by EPA's Carcinogen Assessment Group.[2] Dermal application of creosote in mice has been shown to produce skin and lung tumors, and there is epidemiological evidence from workplace exposure linking it mainly with skin and, to a lesser extent, with visceral tumors in humans.[2] There is insufficient evidence correlating its carcinogenicity with its PAH content. Repeated dermal exposure to PAHs and creosote can also cause other skin disorders including irritation and lesions.[2,5] Any health risks posed by dermal contact with PAHs would be expected to outweigh those posed by the other identified contaminants, most of which (except benzene) are less toxic and all of which were present in substantially lower concentrations.

Slightly elevated HNU readings (3 to 6 ppm higher than the background reading of 2 ppm) were measured directly above the sampled off-site surface waters. It is possible that low ppm levels of toxic substances might be present in the air in the vicinity of the site. The readings may have been higher than usual, since the temperature was in the mid-80s the day of the site inspection. Ambient air levels of organics could potentially be higher on site.

Prepared by: _____ Date: March 28, 1986
Isabel Mandelbaum, Ph.D.
Toxicologist

Reviewed by: _____ Date: March 28, 1986
Kenneth Symms, Ph. D., Toxicologist

Site Name: Atlantic Wood
TDD No.: F3-8405-40

LIST OF SOURCES

1. United States Environmental Protection Agency. 1979. Water-Related Fate of 129 Priority Pollutants, Vol II.

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APPENDIX A

1. COST CENTER:	REM/FIT ZONE CONTRACT TECHNICAL DIRECTIVE DOCUMENT (TDD)	2. NO.: VA1051 F3-8405-40
ACCOUNT NO.:		

3. PRIORITY:	4. ESTIMATE OF TECHNICAL HOURS:	5. EPA SITE ID:	6. COMPLETION DATE:	7. REFERENCE INFO.:
[X] HIGH [ ] MEDIUM [ ] LOW	200	VA-126	3 wks after QA	[X] YES [ ] NO [ ] ATTACHED [X] PICK UP
	4A. ESTIMATE OF SUBCONTRACT COST:	5A. EPA SITE NAME: Atlantic Wood Industries Portsmouth, VA		

8. GENERAL TASK DESCRIPTION: Perform site inspection of subject site.

9. SPECIFIC ELEMENTS:

1.) Review background information.
2.) Contact state and local agencies for relevant information.
3.) Submit sampling plan for approval.
4.) Coordinate lab analysis.
5.) Arrange for site access.
6.) Conduct on and off site inspection and sampling.
7.) Take and ship samples according to standard protocol.
8.) Perform Quality Assurance Review of lab data.
9.) Prepare and submit report.

10. INTERIM DEADLINES:

11. DESIRED REPORT FORM: FORMAL REPORT [X] LETTER REPORT [ ] FORMAL BRIEFING [ ]

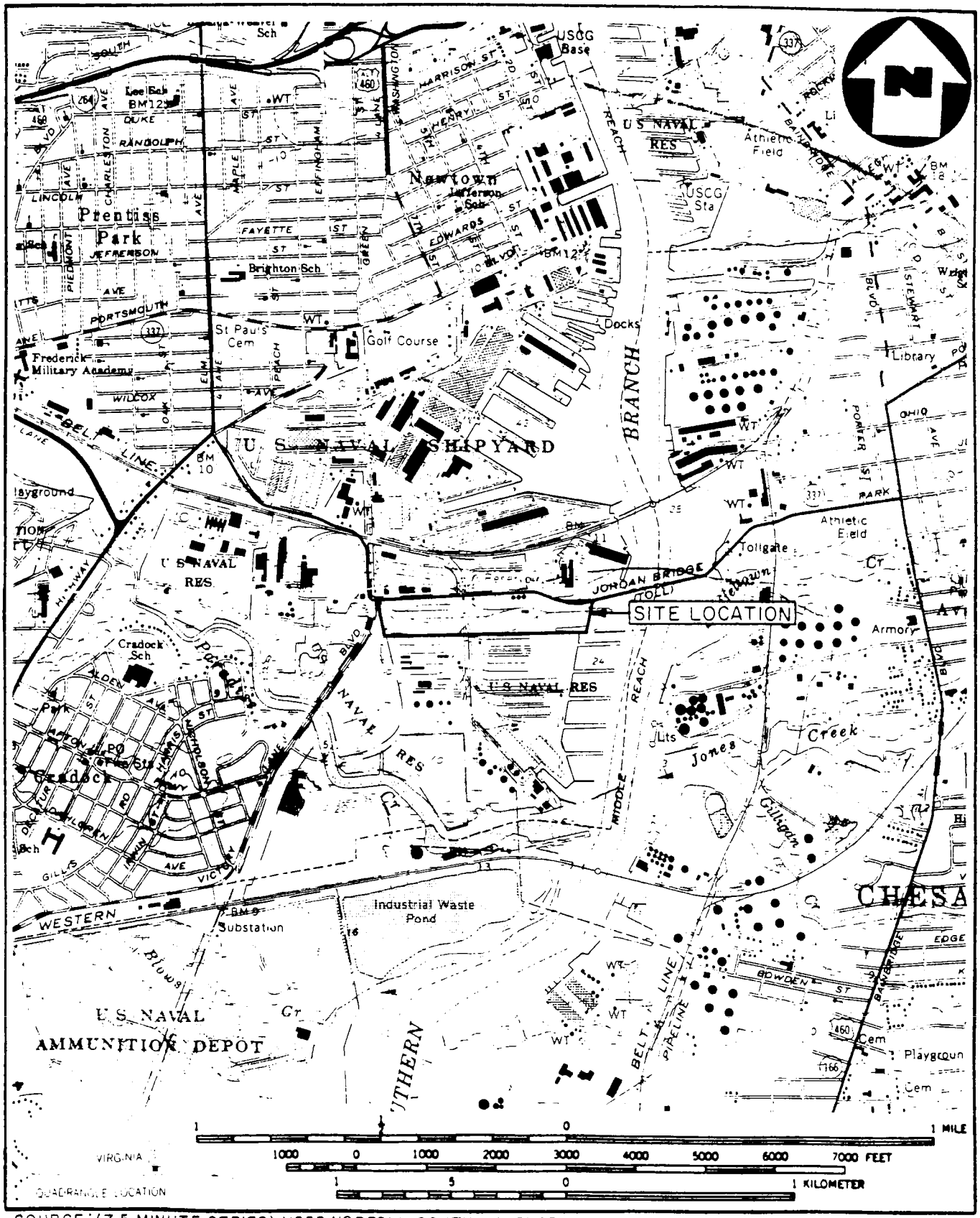
OTHER (SPECIFY):

12. COMMENTS: Contact Darius Ostrauskas.

13. AUTHORIZING RPO: (SIGNATURE)	14. DATE:
15. RECEIVED BY: [ ] ACCEPTED [ ] ACCEPTED WITH EXCEPTIONS [ ] REJECTED (CONTRACTOR RPM SIGNATURE)	16. DATE:

Sheet 1 White – FITL Copy
Sheet 2 Canary – DPO Copy
Sheet 3 Pink – Contracting Officer's Copy (Washington, D. C.)
Sheet 4 Goldenrod – Project Officer's Copy (Washington, D. C.)

APPENDIX B



SOURCE: (7.5 MINUTE SERIES) USGS NORFOLK SOUTH, VA. QUAD.

SITE LOCATION MAP

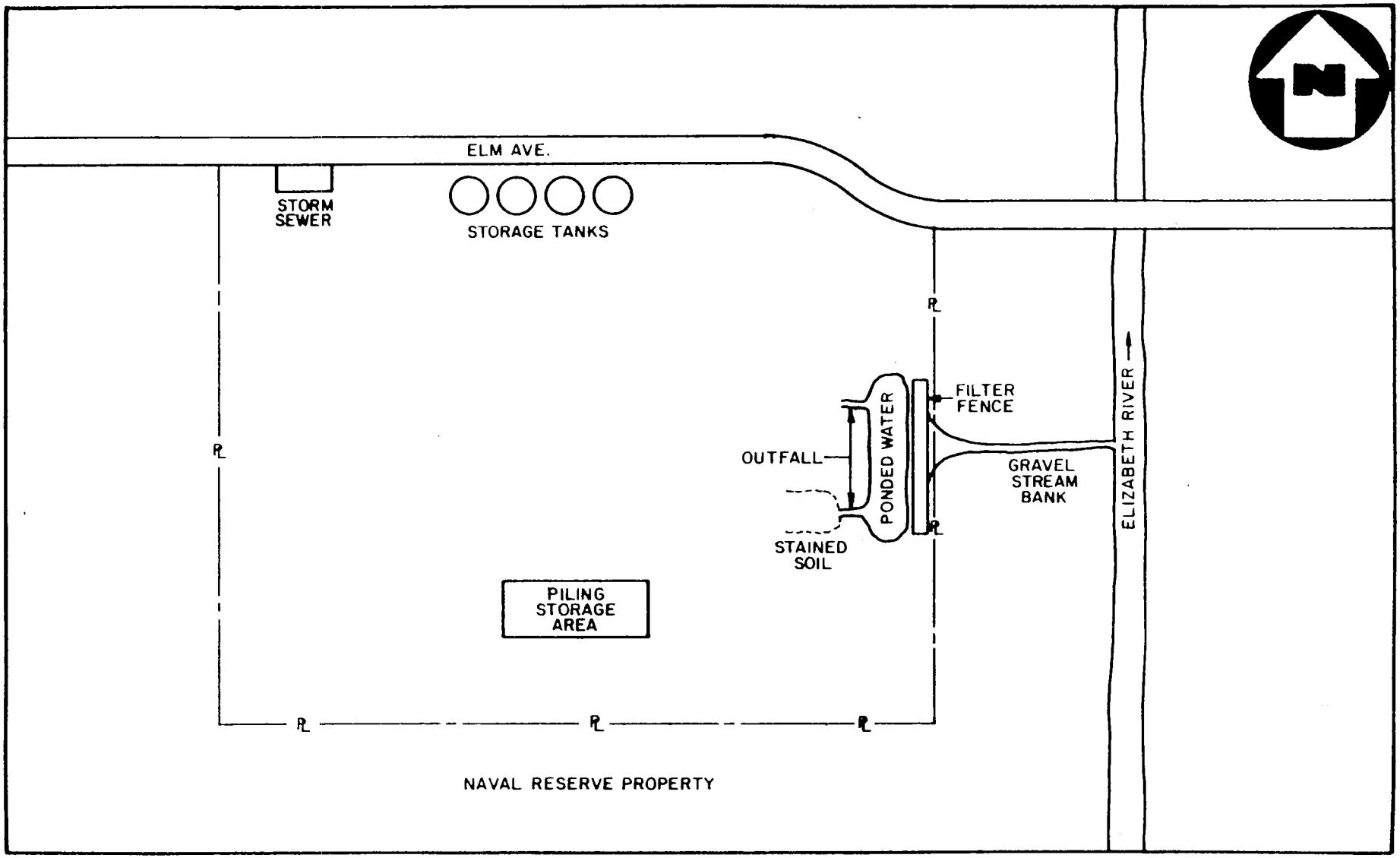
ATLANTIC WOOD IND., NORFOLK, VA.

SCALE 1:24000

FIGURE 1

NUS CORPORATION

A Halliburton Company



SITE SKETCH

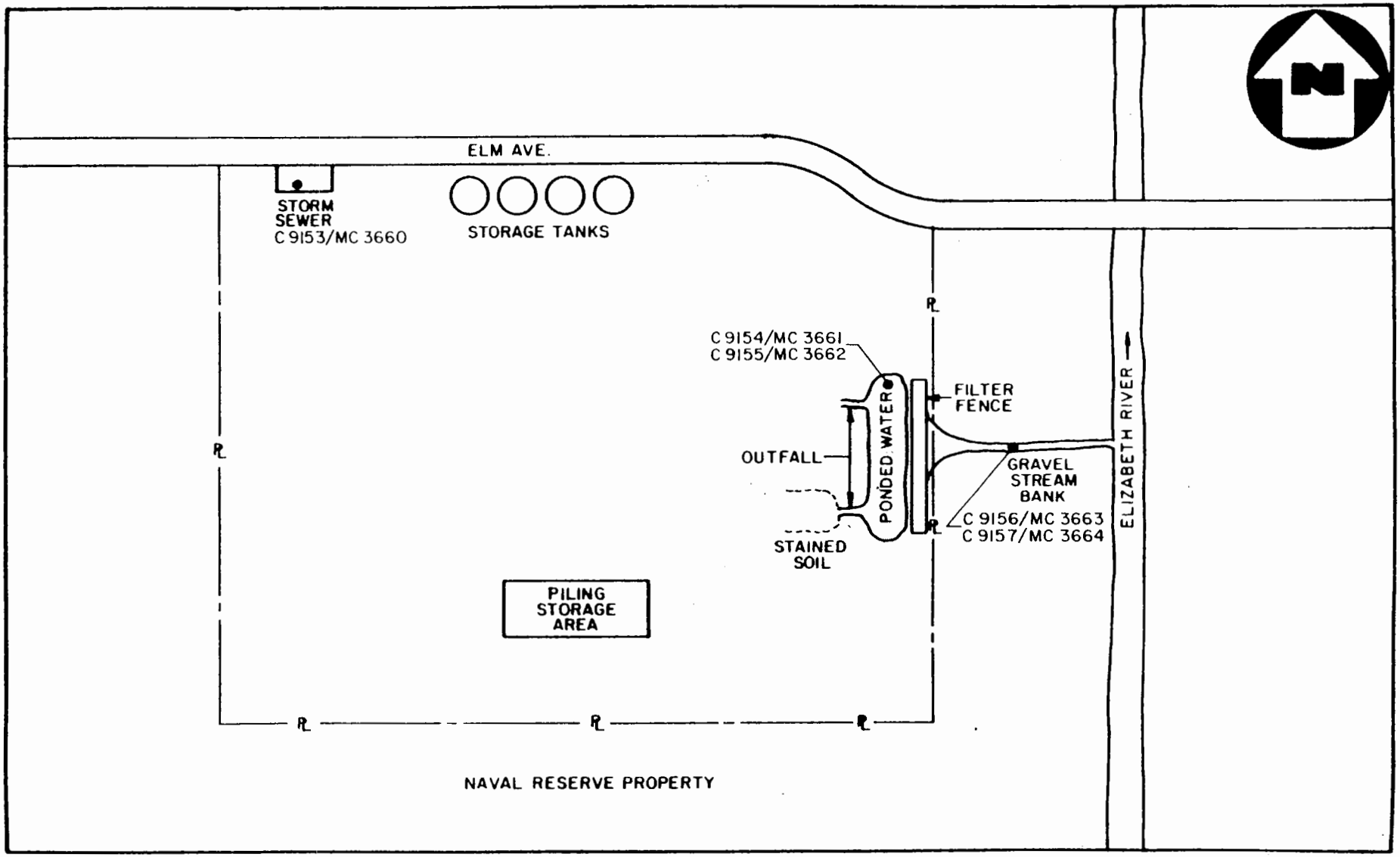
ATLANTIC WOOD IND., NORFOLK, VA.

(NO SCALE)

FIGURE 2

NUS CORPORATION

A Halliburton Company



SAMPLE LOCATION MAP

ATLANTIC WOOD IND., NORFOLK, VA.

(NO SCALE)

FIGURE 3

NUS CORPORATION

A Halliburton Company

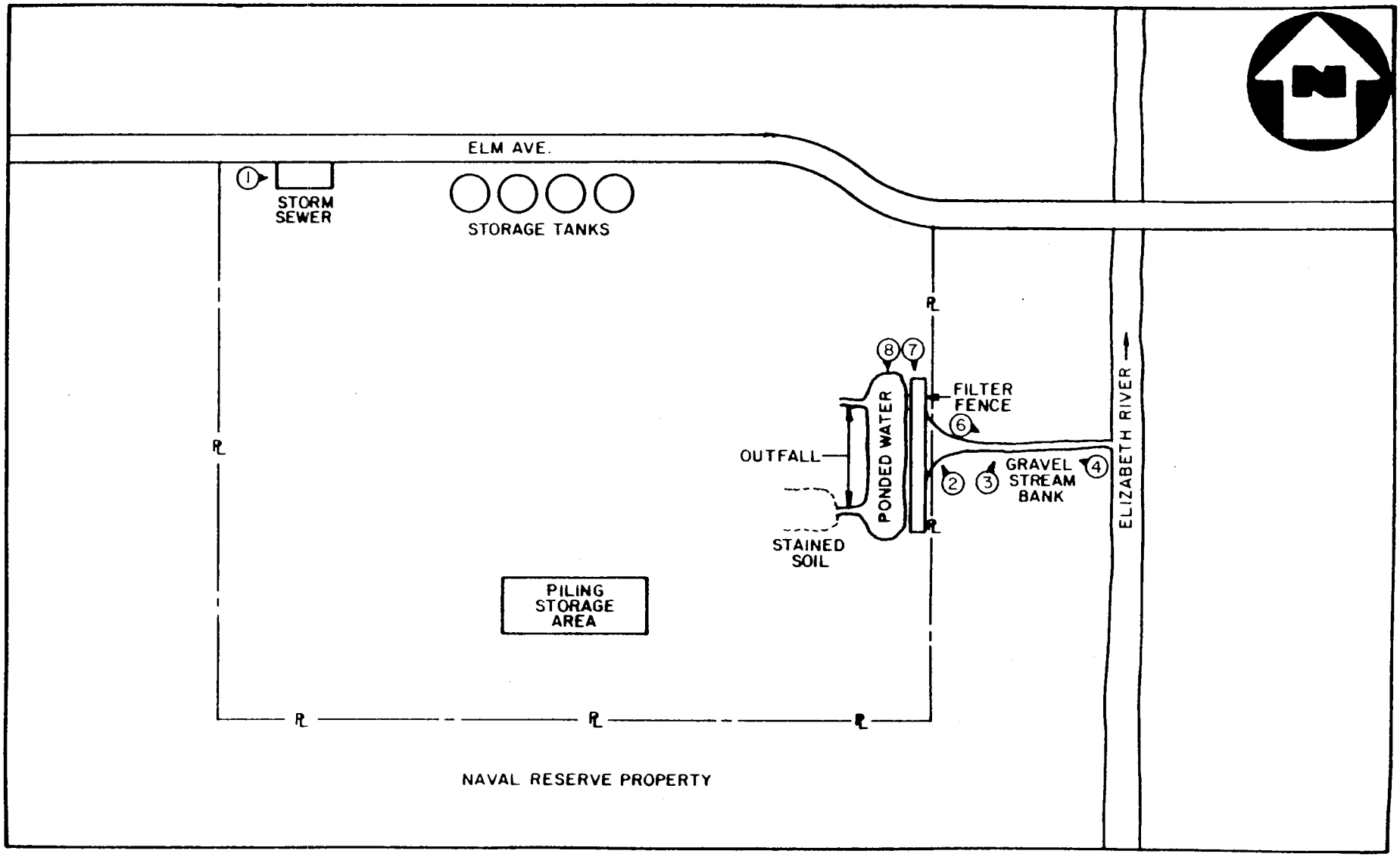


PHOTO LOCATION MAP

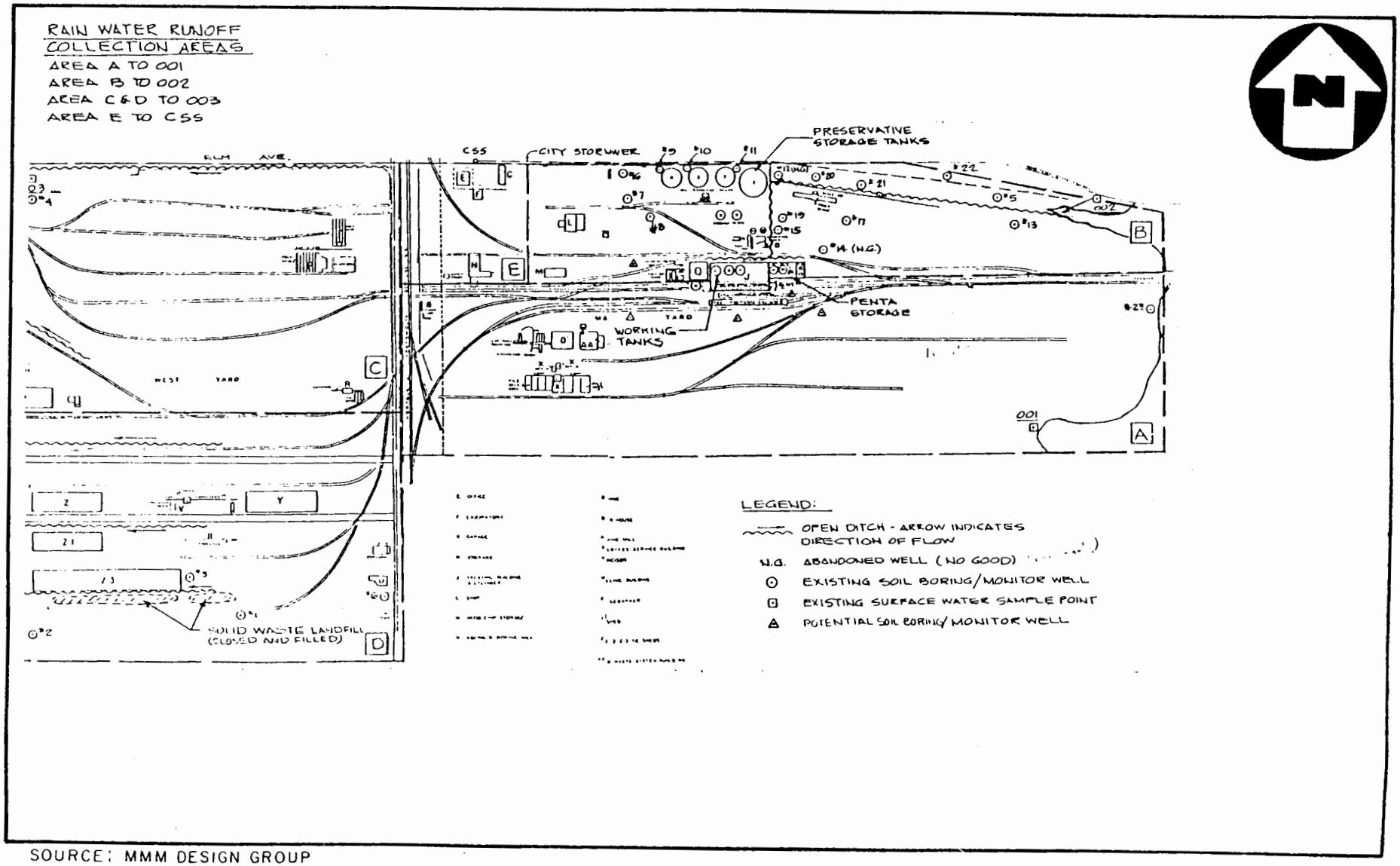
ATLANTIC WOOD IND., NORFOLK, VA.

(NO SCALE)

FIGURE 4

NUS CORPORATION

A Halliburton Company



SOURCE: MMM DESIGN GROUP

SITE LAYOUT

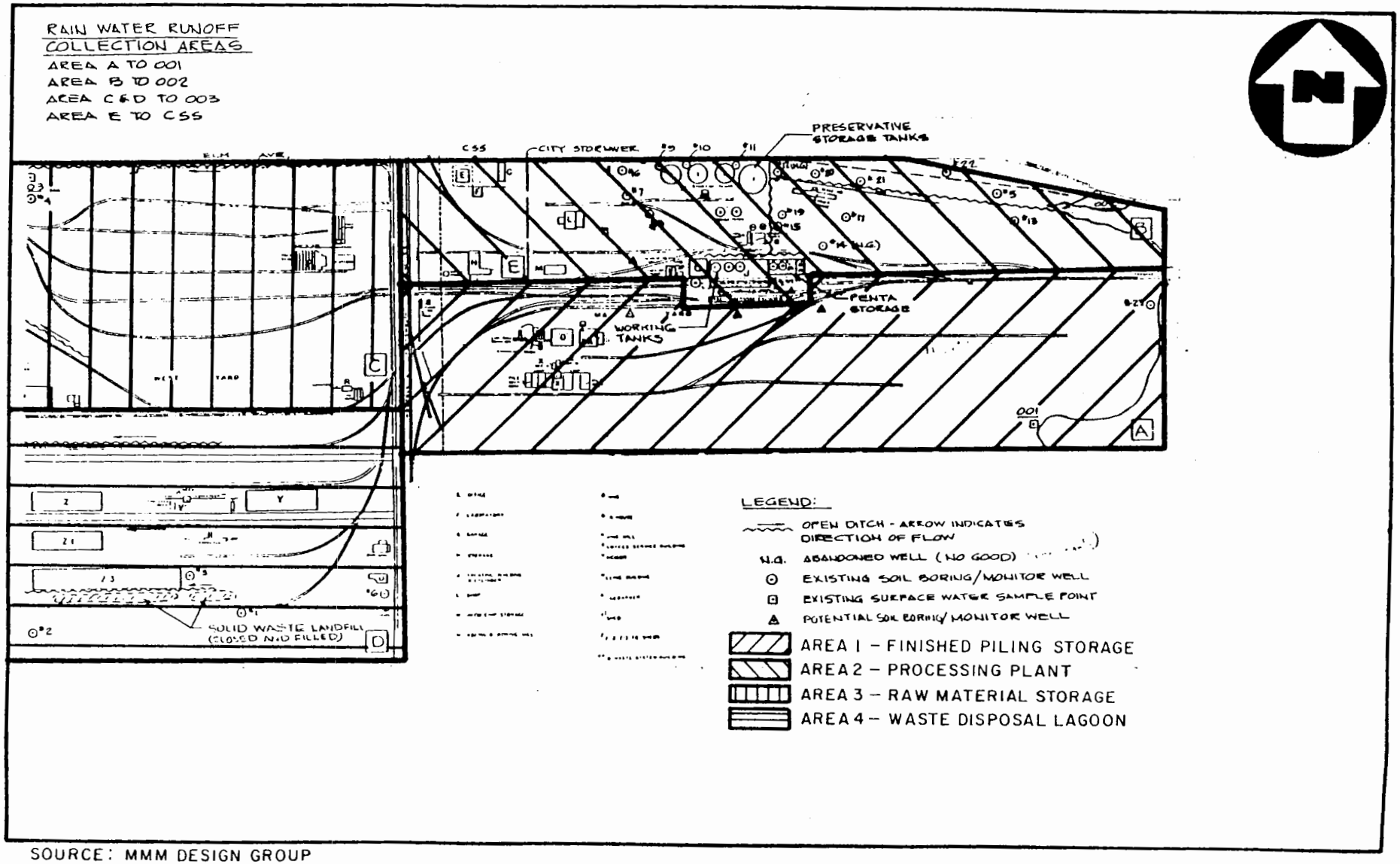
ATLANTIC WOOD IND., NORFOLK, VA.

(NO SCALE)

FIGURE 5

NUS CORPORATION

A Halliburton Company



SOURCE: MMM DESIGN GROUP

SITE USE AREAS

ATLANTIC WOOD IND., NORFOLK, VA.

(NO SCALE)

FIGURE 6

NUS CORPORATION

A Halliburton Company

APPENDIX C

Ref. 31

Polynuclear Aromatic Hydrocarbons in the Elizabeth River, Virginia

By

R. J. Huggett, M. E. Bender and M. A. Unger

Virginia Institute of Marine Science
School of Marine Science
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Gloucester Point, Virginia 23062

VIMS Contribuiton Number 1196

Abstract — Gradients in sediment concentrations of polynuclear aromatic hydrocarbons (PAHs) exist in the Elizabeth River, Virginia. Levels increase as one moves upstream from the river mouth and surface sediments are highest near abandoned wood treatment plants which used creosote. The compounds are bioavailable as shown by their accumulation in transplanted oysters, which attained residues of total PAHs of 60 ppm after 4 weeks of exposure. Fish collected along the estuary show responses correlated to the PAH contamination levels of the sediments through changes in abundance and by increasing frequencies of physical abnormalities.

Key words -- Polynuclear aromatic hydrocarbon, Effects in Elizabeth River

INTRODUCTION

The Elizabeth River is the most polluted estuary in Virginia. It is bordered by numerous civilian and military facilities. It has been a center of human activities for approximately three centuries. Chemical pollutants, both inorganic and organic, from numerous sources have collected in the sediments and in the case of polynuclear aromatic hydrocarbons (PAHs) have reached dangerous and toxic levels.

Chemical data show that concentrations of PAHs exceed thousands of ppm in the bottom sediments from some areas of the river. It appears to have the highest concentrations of PAHs of any estuary in the world. Biological data derived from the collection and analysis of organisms from the river reveal that the natural community has been impacted and that the impacts are greatest in the areas where the PAHs are in highest concentrations.

Recently both state and private entities began contemplating the development of more and better port facilities in the Hampton Roads area. The Elizabeth River is included. The basic question then arises, which is: Will deepening of the Elizabeth River, either during dredging or afterwards, create a situation whereby PAHs will impact the biota outside the river? Nearby, in the James, seed oysters are produced which supply the majority of stock for the private oyster industry in Virginia. Just downstream in the Bay, the majority of the Bay's blue crabs spawn. All fish entering the Bay spend some period of time near its mouth, and therefore the Elizabeth River, to equilibrate to the Bay's lower salinity. Obviously this area is quite sensitive from an ecological standpoint and potential threats to its inhabitants must be carefully evaluated.

A secondary but also important reason to study the PAHs in the Elizabeth River stems from the fact that these compounds are the major organic pollutants in the Chesapeake Bay proper (Bieri, et al., 1). As expected the levels are much lower than in the Elizabeth River but with the increasing human and industrial densities around the Bay, the concentrations are likely to increase. By studying the Elizabeth, information may be gained which will be applicable to better management of the Bay itself. In addition knowledge gained will be of use elsewhere since PAHs are such widespread contaminants.

This paper is not intended to address the questions of biological impacts from dredging activities in the river, but rather describes some of the observations, both chemical and biological, which indicate that PAHs cause biological damage in estuarine systems. The results discussed deal with: (1) bioavailability of PAHs in the system; (2) the distribution of contamination within the river as indicated by sediment loads and (3) abnormalities observed in fishes resident in the river. Other field studies are being conducted in the system, to determine PAH effects on benthic microbial and animal populations.

METHODS

Oysters for transplanting were collected on the 26th of September, 1983, by dredge from two rocks located ~35 km upstream from the mouth of the Rappahannock River. Salinities at the time of collection ranged between 15-17 °/oo. The day after collection the oysters were transplanted to five stations located 7, 12, 17, 19 and 24 Km upstream from the mouth of the Elizabeth River (Figure 1). At each station 76 oysters were placed in steel mesh trays which were suspended from a stake ~0.3 m above the bottom.

Salinities at the transplant locations ranged from 21 °/oo at the most downstream location to 12 °/oo at the upstream station. Resident oysters were sampled at the Hospital Point station on the day the transplants were initiated. At intervals of 7, 14, 28, 42 and 63 days, twelve oysters were removed from each sampling location for PAH analysis. Prior to extraction the transplanted oysters were depurated for 24 hours in the York River at Gloucester Point. This brief period of depuration was conducted to reduce the contribution of PAHs sorbed on solids in the digestive system of the oysters. After depuration the oysters were cleaned by vigorously scrubbing each shell under flowing tap water with a brush and then frozen at -20° C. The frozen oysters were allowed to thaw slightly and shucked by opening through the bill. The tissues and fluids were then homogenized at high speed in a Virtis tissue blender and freeze-dried. The dried samples were ground by mortar and pestle and a 10 gram sample of pulverized tissue was spiked with internal standard (2,2′ binaphthyl) and soxhlet extracted for 24 hours with ~350 ml of methylene chloride.

Sediments were collected by gravity cores and with a 0.1 m^2 Smith-MacIntyre grab. Samples were freeze dried or desiccated with a 9:1 mixture of anhydrous sodium sulfate and precipitated silica. The dried samples were ground with a mortar and pestle, spiked with internal standard and soxhlet extracted for 24 hours with methylene chloride.

Fish were sampled by bottom trawling with a 30 foot (9 meter) lined semi-balloon trawl. At each station 2 five minute tows were made, one with and one against the tide. Fish collected in each tow were identified, examined for abnormalities, counted and weighed by species. Depending on abundance, 25-50 fish of a species were measured for total length in

millimeters. Surveys were conducted during October, November and December of 1983.

High concentrations of biogenic compounds are often found in environmental samples necessitating a "clean-up" step to remove as many interferences as possible prior to gas chromatographic analysis. Extracts of oysters and sediments were reduced in volume with a rotary evaporator and "cleaned" by gel permeation chromatography on Biobeads S-X8 size exclusion resin using methylene chloride as the elution solvent. Most biogenic molecules, which are generally larger than simple hydrocarbons, are unretained by the resin and eluted before the molecules of interest (1). Two fractions called G1+G2 and G3 were collected. Aromatic hydrocarbons and many polar anthropogenic substances are eluted in the G3 fraction which was then separated into 2 subfractions, G3.1+G3.2, of increasing polarity using high pressure liquid chromatography. HPLC fractionation was carried out on a semi-preparative normal phase column with a cyano-amino phase bond to silica. The first, non-polar, subfraction was eluted with hexane, after which methylene chloride was programmed into the solvent mixture. Twenty five percent methylene chloride in hexane was used to elute the aromatic fraction. Compound classes eluted in each fraction are given below:

G3.1	aliphatic (stored)
G3.2	polynuclear aromatic hydrocarbons (PAHs) polychlorinated biphenyls (PCBs) DDT DDD DDE mononitro-PAHs

The G3.2 fraction was analyzed by capillary column gas chromatography using flame ionization detection. A Varian 3700 gas chromatography

temperature programmed from 75°C to 300°C at 6°/min was used for all analyses. Persilated glass capillary columns coated with 0.2μ of SE52 were prepared in this laboratory according to the method of Grob (2). Columns were approximately 25m x 0.32 mm id and used Helium carrier gas at a linear flow of 27 cm/sec. Data were collected and stored on a Hewlett Packard 3354B laboratory data system. Peak identification on the G3.2 fraction was done using the aromatic retention index system of Bieri, et al. (1). Selected marker peaks from each chromatogram were identified by visual comparison with standard runs the same day. Using these markers, computer programs written in this laboratory used the stored data to assign each peak an aromatic retention index (ARI). The ARI is calculated by the formula:

$$ARI_x = \frac{T_x - T_{mp}}{T_{mf} - T_{mp}} \times 100 + ARI_{mp}$$

T_x = retention time of peak x

T_{mp} = retention time of the last marker preceeding peak x

T_{mf} = retention time of the next marker following peak x

ARI = ARI defined for the last marker preceeding x (ARI of the markers are defined as 000 = naphthalene; 100 = biphenyl; 200 = phenanthrene; 300 = pyrene; 400 = chrysene/triphenylene; 500 = perylene; 600 = benzo(ghi)perylene)

Using the calculated ARI, computer programs then identified peaks whose ARI's are known from previously injected standards and mass spectral identifications. Quantitation of these chromatograms was done using the internal standards added prior to extraction (2,2'binaphthyl). This method corrects automatically for extraction efficiency variations and losses of material during the analytical procedure.

Recoveries from spiked samples usually range between 50 to 80%; duplicate extractions of the same sample typically yield results within 10-20%.

RESULTS

Sediments

Before presenting data on PAH concentrations in the river's sediments, a brief statement as to their likely origin is in order. The Elizabeth River is bordered by three highly populated cities: Norfolk, Portsmouth and Chesapeake. Being a relatively deep and sheltered port it has a major naval base, private shipyards, numerous coal and cargo handling piers, sewage treatment plants and recreational marinas along its borders. Therefore, the Elizabeth River sediments could be expected to contain higher than natural background levels of PAHs due to combustion sources and oil spills. In addition, since the turn of the century, five wood treatment facilities which used creosote as a preservative for telephone poles, pilings and railroad ties have, at one time or another, operated along the river (3). Since creosote contains numerous PAHs at high concentrations, it is obviously a potential source for the compounds in sediment. In fact grab or core samples from some parts of the river contain what appears to be (both visually and chemically) globular creosote inclusions which sometimes measure centimeters across.

All but one of the wood treatment facilities have ceased operation but creosote still seeps into the river from contaminated soils at abandoned plant sites. Lu (3) analyzed PAHs in a 1 meter core collected from the river near one of the abandoned facilities. She found a total aromatic hydrocarbon concentration of 400 mg/Kg in the top 4.5 cm of the sediment and 13,000 mg/Kg at a depth between 24.5 cm to 30.5 cm. At several depths in the sediment she found unusually high concentrations of both total aromatic hydrocarbons and individual PAHs. She attributed these to

documented spills from the wood treatment facility and by doing so, calculated a sedimentation rate of 2 cm/yr for this area. This agrees with a current estimate obtained by 137Cs profiles. These observations suggest that past inputs of creosote to the river were much higher than those presently entering.

Bieri, et al. (4) collected surface sediment from the river and analyzed them for PAHs. They found a gradient of increasing concentrations from the mouth to approximately 19 kilometers upstream, the most upstream sample collected. In the study over three hundred aromatic compounds were identified by glass capillary gas chromatography–mass spectrometry. Most were PAHs. The concentrations of selected PAHs which were determined in the top 2 cm of sediments are presented in Table 1. Since then other samples have been collected and analyzed to give a more complete picture of the distribution. The concentrations of benzo(a)pyrene in the top 2 cm of bottom sediments are given in Figure 2. The increasing trend upstream noted by Bieri, et al. (4) can be seen. In addition where transects have been completed the resulting data show that considerable variability in concentrations exist in any one segment of the river. This may be due to either different depositional patterns from one site in the river to another or perhaps past dredging activities which could have removed contaminated sediments.

Fish

Fish collected along the river show responses correlated to the PAH contamination levels of the sediments through changes in abundance and by increasing frequency of several gross abnormalities. Averages from the three cruises for biomass, total number of individuals and abundance of selected

species are presented in Table 2. Contamination of sediments by PAHs is most severe between 19-21 Km upstream from the river mouth, as indicated from Figure 2. As can be seen in Table 2, depressions in biomass, total numbers of individuals and abundance of selected species are indicated in this region of the river. Even more dramatic is the increasing frequency with which abnormalities occur. Table 3 shows the % of the fish collected along the river with fin erosion and cataracts. The frequencies of these abnormalities increase as one progresses upstream into the more heavily contaminated regions. Figure 3 graphically depicts these results for cataracts in croaker and gray trout. For individual species, the frequency of cataracts increases with size. Figure 4 shows the % occurrence of cataracts for three different size classes of gray trout, fish below 120 mm total length showed no incidence of cataracts. A similar increase in the occurrence of cataracts with increasing size was noted for croaker.

Chemical analysis for PAHs was performed on the flesh of selected fishes from the October sampling period and only trace (<ppb) levels of PAHs were detected. Analysis of other organs, e.g., liver, and for metabolites is planned.

Oysters

The bioavailability of PAHs in the river is indicated by their accumulation in transplanted oysters (Tables 4 and 5). Uptake was rapid reaching 27 ppm of total resolved aromatics within one week, at the station located 17 Km upstream. Figure 5 shows the accumulation of total resolved aromatics at each station over the 63 day exposure period. Uptake at most of the stations appeared to plateau between 2-4 weeks. Concentrations decreased at most stations after exposures of 6 weeks and then increased

again. Analysis of the data for individual compounds shows considerable fluctuation in levels with time, particularly at some locations. These two observations indicate that some variability may be present in the source of PAHs for the oysters in the system. PAH residues as a function of distance in the river are shown in Figure 6. The highest residues are found in oysters located 17 Km upstream from the river mouth, while the highest sediment burdens are found 2-3 Km further upstream. However, the 17 Km site is located near the only operational wood treatment plant on the river and runoff from the plant site may be responsible for the higher residues observed.

The most consistently abundant compounds identified were benzofluoranthene, benzo(a&b)fluorene, benzo(a)pyrene, fluoranthene, pyrene, benz(a)anthracene and chrysene/triphenylene. Concentrations of benzo(a)pyrene ranged from 2 ppm at the 17 Km site to 0.1 ppm near the river mouth.

DISCUSSION

Laboratory experiments conducted with spot and contaminated sediments from the Elizabeth River have shown that relatively brief exposure, 8 days, to contaminated sediment can induce many pathological changes in fish. Margis, et al. (3) observed: (1) integumental lesions within 3 days after exposure began and later severe fin and gill erosion; (2) hematocrits were significantly reduced; (3) pancreatic and liver alterations were observed in some specimens; and (4) opacity of the eyes was observed in fishes exposed to contaminated effluent from the sediment exposure tank. Weeks and Warinner (6) found that the phagocytic efficiency of macrophages from spot and hogchokers from the Elizabeth was markedly reduced when compared to fish

from control locations. The macrophage phagocytic activity of Elizabeth River fish returned to normal after fish were held in clean water for several weeks, indicating that the decreased activity was related to exposure to Elizabeth River pollutants.

The studies discussed above support our field observations, that fishes in the Elizabeth River are severely stressed due to contamination of the sediments with PAHs.

Observations from the field studies that indicate the occurrence of cataracts is related to the size of the individuals are at present unexplained. However, if we assume that size is an indication of length of residence and hence exposure duration, this simple hypothesis could be presented as a possible explanation. In addition, physiological changes related to the uptake and/or metabolism of PAHs may be occurring as the fish grow making them more susceptible to the formation of cataracts.

Additional studies are needed to define the sediment contamination levels necessary to cause effects. As mentioned in the introduction field studies are in progress which address this question for benthic animals. Longer term exposures with fishes to graded contamination levels in sediments will be required to refine estimates of "semi-chronic" toxic levels. In addition questions remain as to the sources of PAHs accumulated by oysters. As well the biological availability of the PAHs in the Elizabeth may be considerably different than PAHs only sorbed to particulate matter.

Acknowledgments - The help of our colleagues must be acknowledged: H. Slone, J. Greene and D. Hunt for assistance in chemical analysis; and J. Colvocoresses, W. J. Hargis, Jr. and J. Warinner for help in collecting and examining the fishes. Financial assistance for this program was provided by the Commonwealth of Virginia, the Coastal Energy Impact Program through the State Council on the Environment and the U. S. Environmental Protection Agency.

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Figure 1. Reference view of Elizabeth River with distance from the river mouth shown in kilometers.

Table 1

Concentrations of Selected PAHs in Surface Sediments from the Elizabeth River (ng/g dry weight)

Sample* Code	Phe	Fla	Pyr	BbF	BaA	Chr	BFls	BeP	BaP	IPy	Bghi
06	86	290	250	89	83	160	210	90	84	21	28
07	110	300	260	82	79	140	150	57	53	n.d.	n.d.
08	180	460	410	160	190	340	590	280	260	100	76
09	200	840	880	470	320	470	1,100	420	480	380	350
10	130	320	440	160	150	280	870	380	380	260	230
11	410	860	980	290	350	590	1,100	480	520	200	110
12	580	1,500	1,400	530	560	970	1,700	740	740	280	170
13	670	1,900	1,800	720	660	1,400	2,600	1,200	1,200	550	500
14	750	2,200	2,000	900	840	1,400	2,700	1,200	1,200	660	560
15	780	2,200	2,800	1,200	1,000	1,700	4,100	1,300	1,700	940	820
16	2,300	5,500	4,800	2,000	1,900	3,200	4,900	2,000	2,100	730	340
17	950	3,800	3,600	1,500	1,500	3,500	6,300	2,800	2,600	1,400	750
18	710	2,600	2,000	760	940	1,700	2,400	970	1,000	200	84
19	25,000	42,000	28,000	12,000	11,000	18,000	17,000	6,300	8,700	2,100	1,600

*Numbers correspond to kilometers upstream from the mouth of the estuary.

ABBREVIATIONS: Phe=phenanthrene; Fla=fluoranthene; Pyr=pyrene; BbF=benzo[b]fluorene; BaA=benz[a]enthracene; Chr=chrysene; BFls=benzofluoranthenes[j,b,k]; BeP=benzo[e]pyrene; BaP=benzo[a]pyrene; IPy=indenopyrene; Bghi=benzo[ghi]perylene

Table 2

Elizabeth River - Fish Data
($\bar{x}$ of three samples, Oct., Nov. and Dec., 1983)

	Kilometers from the Mouth										
	6.5	8.5	10.5	12.5	15	17	19	21.5	23.5	25.5	28
Biomass (Kg)	34	28	21	13	9	7	4	11	8	3	4
No.of Ind.	1,335	1,200	1,125	705	380	320	245	495	430	795	325
No. Hogchoker (1)	50	140	145	240	50	70	25	165	210	40	60
No. Spot (2)	840	800	610	205	240	160	90	230	175	100	100
No. Grey Trout(3)	190	135	170	240	65	55	40	80	70	15	25
No. Croaker (4)	150	50	90	90	50	55	40	70	105	40	55

(1) Trinectes maculatus; (2) Leiostomus xanthurus; (3) Cynoscion regalis; (4) Micropogonias undulatus

Table 3

% of Fish Showing Gross Abnormalities
($\bar{x}$ of three samples Oct., Nov. & Dec., 1983)

	Kilometers from the Mouth										
	6.5	8.5	10.5	12.5	15.0	17	19	21.5	23.5	25.5	28
Fin Erosion											
Hogchoker	0.7	0	0	0.4	1.4	5.5	4.3	11.2	1.9	0	0.5
Toadfish (1)	0	0	11.0	5.0	0	11.5	30.1	28.3	25.0	0	0
Cataracts											
Spot	0	0	0.1	0	3.0	0.8	9.6	6.0	0.2	0.3	0
Gray Trout	0.2	0	0	0.8	1.0	1.8	3.5	14.0	21.0	2.5	7.5
Croaker	3.3	1.4	1.5	2.2	4.5	7.9	15.8	15.9	18.1	2.5	5.8

(1) Opsanus tau

Table 4

Total Resolved Aromatic Hydrocarbons in Oysters (µg/g) dry weight

Station (Km)	Exposure in Weeks 1	2	4	6	9
7	1.9	6.1	-	6.8	13.9
12	5.5	7.4	16.2	8.8	20.5
17	27.0	31.0	57.3	31.8	60.2
19	19.3	25.7	25.8	22.5	36.3
24	3.2	7.8	11.7	7.0	16.5

Table 5

Unresolved Complex Mixture in Oysters (µg/g) dry weight

Station (Km)	Exposure in Weeks 1	2	4	6	9
7	10.1	41.4	-	25.8	91.7
12	21.5	35.3	95.6	40.2	118.9
17	51.3	127.0	223.5	104.0	150.5
19	37.4	103.0	144.5	51.8	159.7
24	6.7	26.5	44.5	16.6	59.4

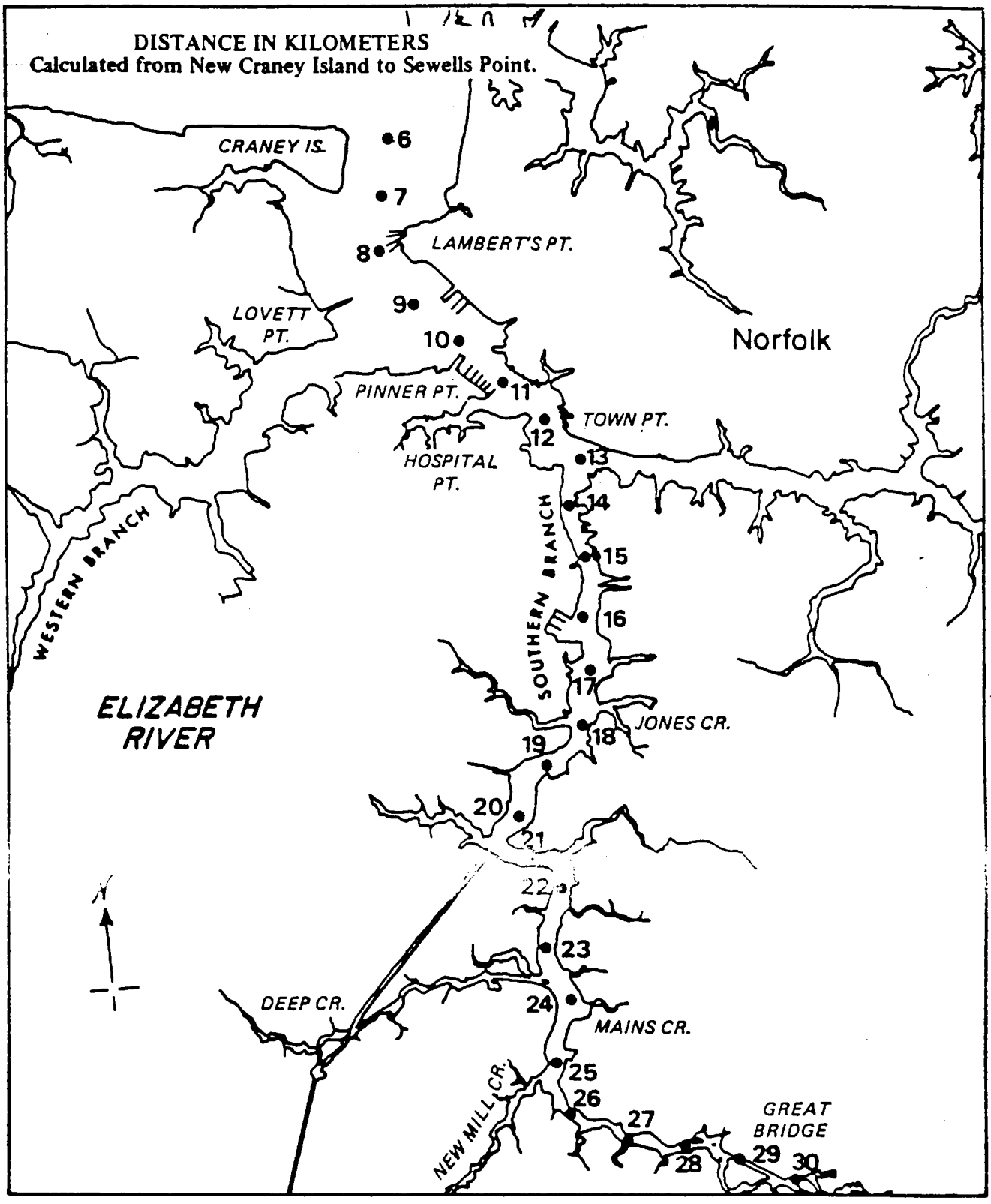
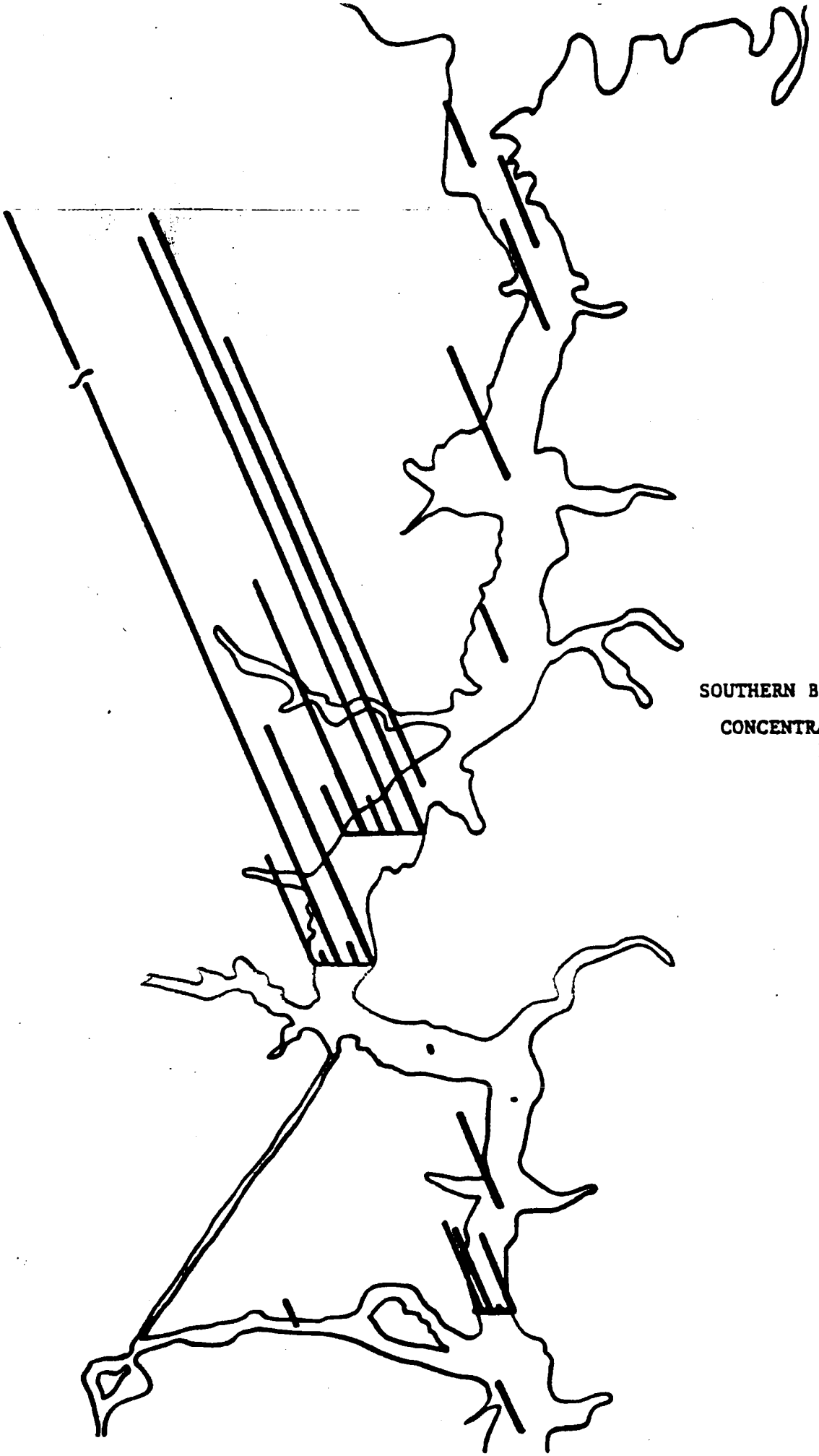

DISTANCE IN KILOMETERS
Calculated from New Craney Island to Sewells Point.
CRANEY IS.
6
7
8
LAMBERT'S PT.
9
LOVETT PT.
10
Norfolk
PINNER PT.
11
TOWN PT.
12
HOSPITAL PT.
13
14
WESTERN BRANCH
SOUTHERN BRANCH
15
16
17
ELIZABETH RIVER
JONES CR.
18
19
20
21
22
23
DEEP CR.
24
MAINS CR.
25
26
NEW MILL CR.
27
GREAT BRIDGE
28
29
30

Figure 2. Surface sediment concentrations (mg/Kg) of benzo(a)pyrene along the Elizabeth River.



SOUTHERN BRANCH ELIZABETH RI

CONCENTRATION BENZO(a)PYRE
1 ppm = 1 cm

Figure 3. Average occurrence of cataracts in croaker and gray trout from stations along the Elizabeth River.

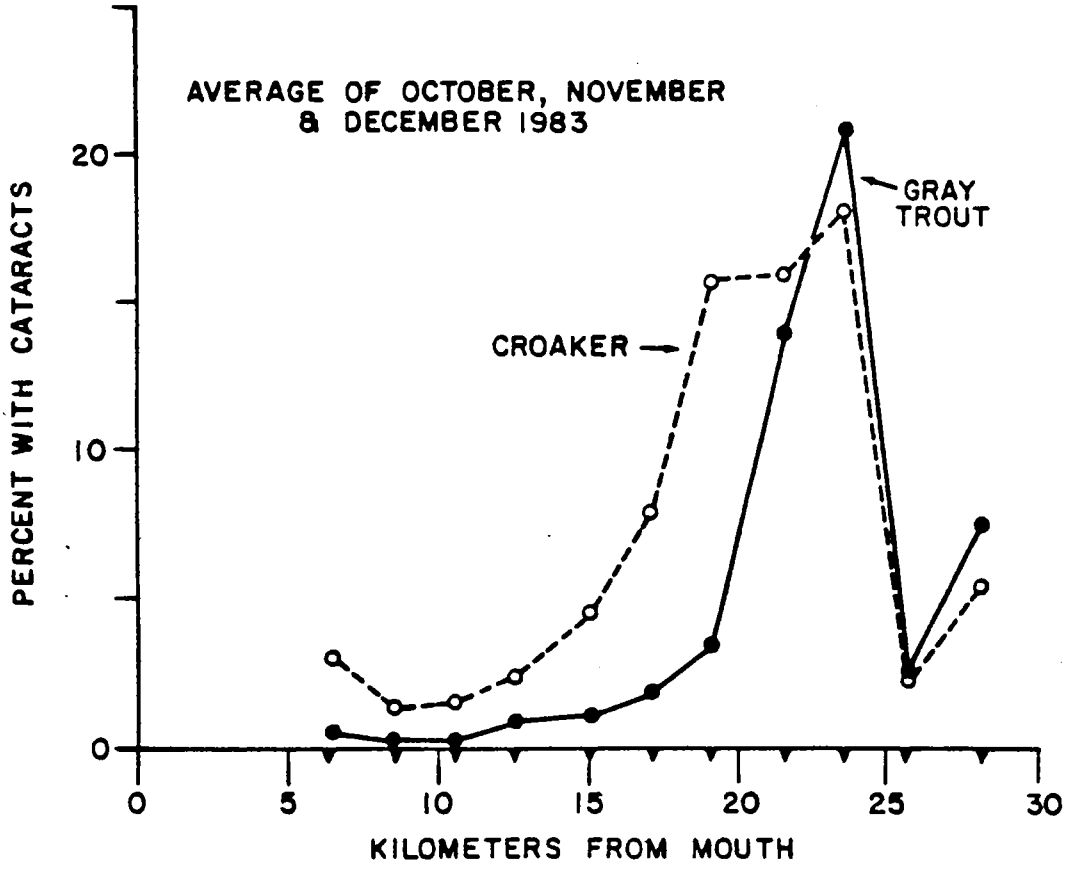

AVERAGE OF OCTOBER, NOVEMBER
& DECEMBER 1983
PERCENT WITH CATARACTS
20
10
0
GRAY
TROUT
CROAKER
0
5
10
15
20
25
30
KILOMETERS FROM MOUTH

Figure 4. Percent occurrence of cataracts for three size classes of gray trout.

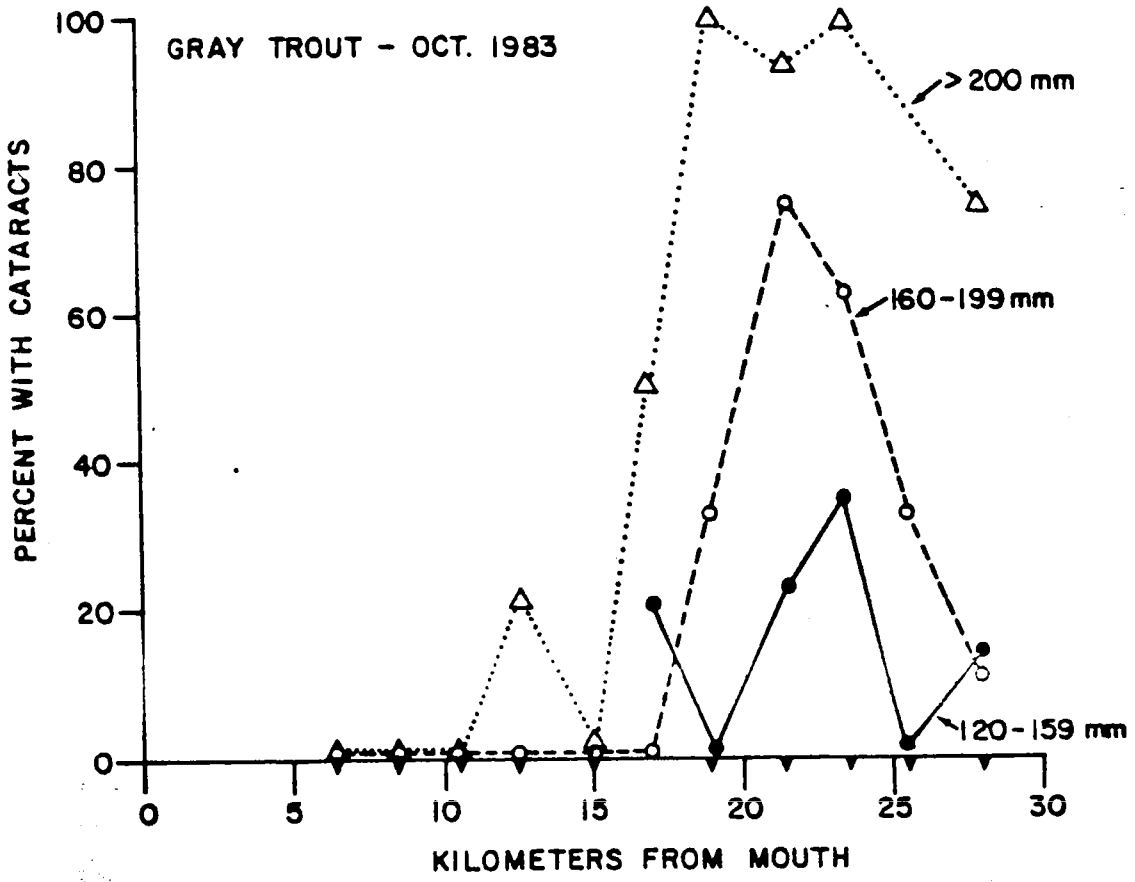

GRAY TROUT - OCT. 1983
PERCENT WITH CATARACTS
100
80
60
40
20
0
0
5
10
15
20
25
30
KILOMETERS FROM MOUTH
> 200 mm
160-199 mm
120-159 mm

Figure 5. PAH uptake by oysters along the Elizabeth River (µg/g-dry weight).

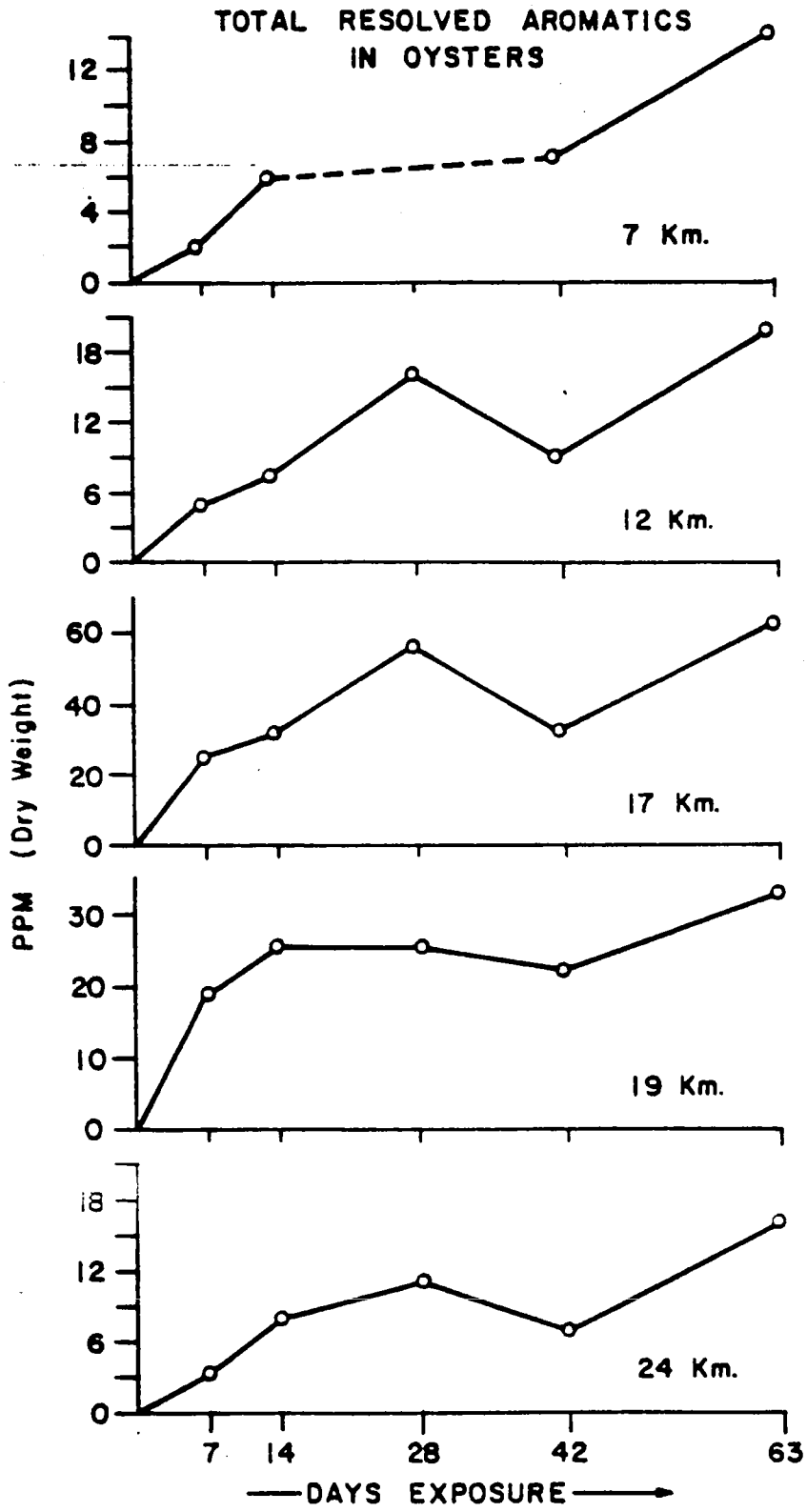
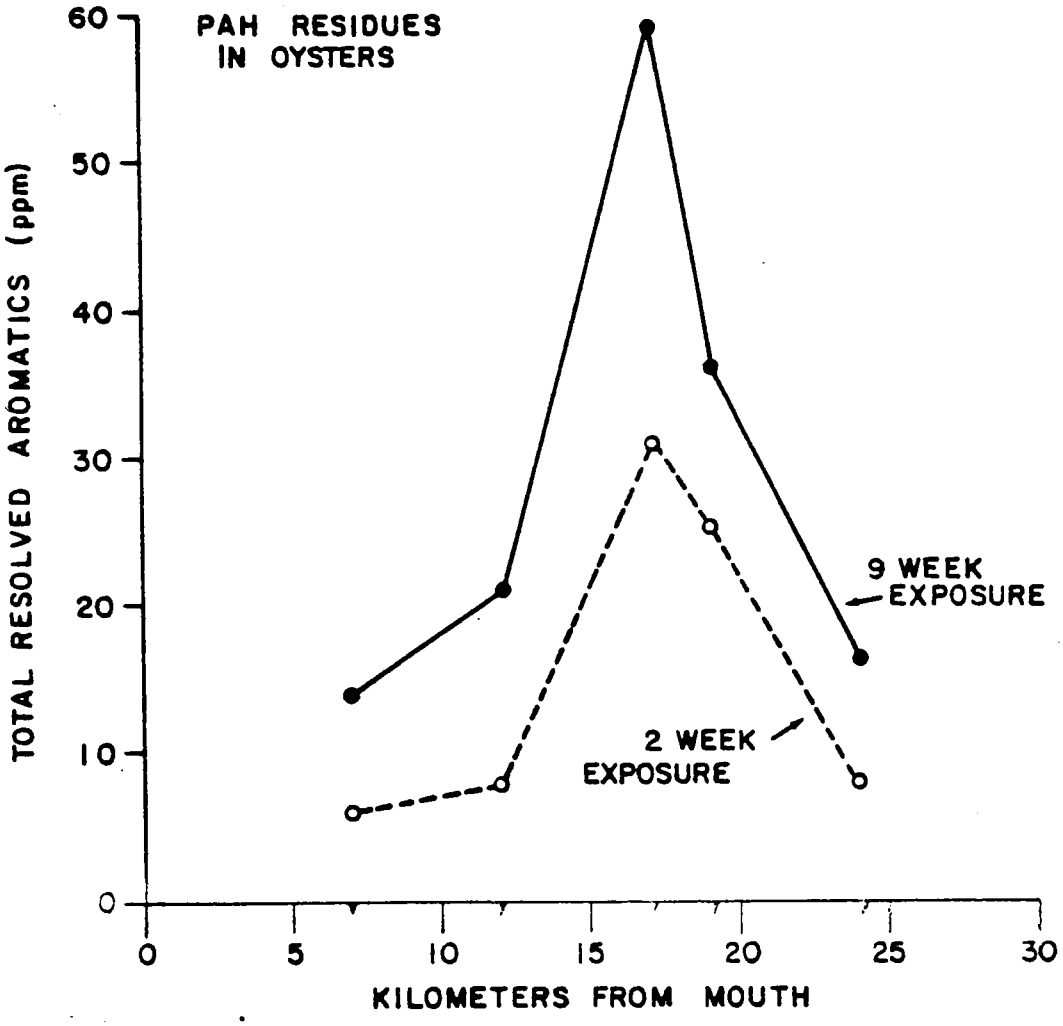

TOTAL RESOLVED AROMATICS
IN OYSTERS
PPM (Dry Weight)
7 Km.
12 Km.
17 Km.
19 Km.
24 Km.
0
4
8
12
0
6
12
18
0
20
40
60
0
10
20
30
0
6
12
18
7
14
28
42
63
DAYS EXPOSURE

Figure 6. Total resolved aromatics in oysters a function of distance from the river mouth (µg/g-dry weight).


PAH RESIDUES
IN OYSTERS
TOTAL RESOLVED AROMATICS (ppm)
60
50
40
30
20
10
0
0
5
10
15
20
25
30
KILOMETERS FROM MOUTH
9 WEEK
EXPOSURE
2 WEEK
EXPOSURE

WILLIAM AND MARY
INSTITUTE OF MARINE SCIENCE
SCHOOL OF MARINE SCIENCE

Gloucester Point, Virginia 23062

Phone (804) 642-2111

April 17, 1985

Mr. Darius Ostrauskas
EPA Region III
Super Fund Branch 3 HW 23
841 Chestnut Building
Philadelphia, Pennsylvania 19107

Dear Mr. Ostrauskas:

Enclosed are the data you request on Atlantic Wood sediments. The summary of surface concentration and concentration with depth are given below.

Atlantic Wood Transect
Surface Cores (0-5 cm)

Concentration of Benzo(a)pyrene (ppb)

C16.1 - 281.9
C17.1 - 318.7
C18.1 - 17,066.2 (Atlantic Wood dock)

Concentration of Benzo(a)pyrene with Depth

0- 5 cm C18.1 - 17,066.2 (ppb)
5-20 cm C18.2 - 50,086.7
20-42 cm C18.3 - 37,681.1

Total Resolved PAHs (ppb)

0- 5 cm	C18.1	1.1×10^6
5-20 cm	C18.2	1.5×10^2
20-42 cm	C18.3	6.6×10^6

Please refer to the enclosed map for station locations and the individual printouts for concentrations of the various compounds at the Atlantic Wood site.

I am also enclosing a copy of a paper which will soon be published containing oyster information in the Elizabeth River. Also there is a slide of what the water looks like in front of Atlantic Wood.

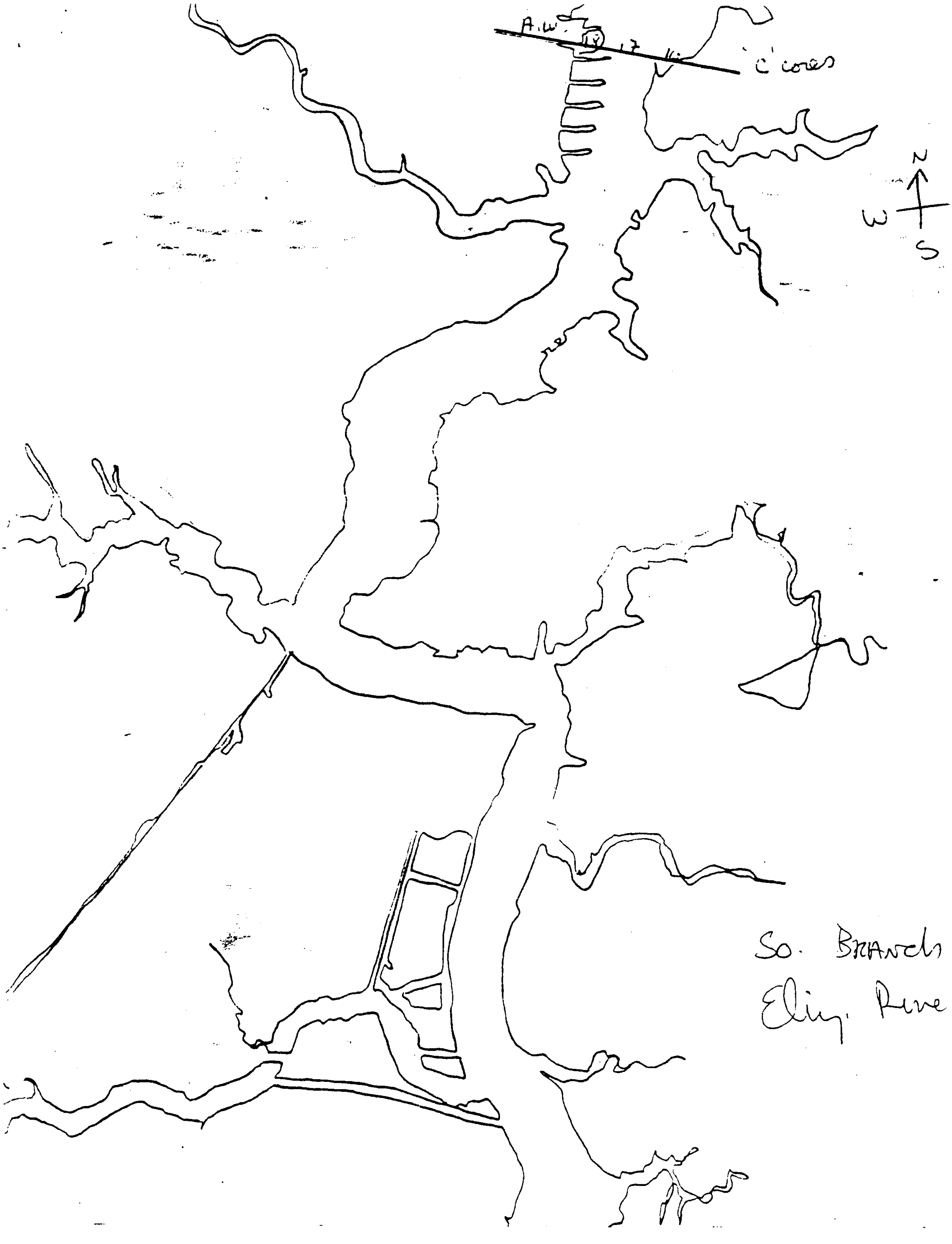
If you have any further questions, please do not hesitate to call.

Sincerely yours,

Robert J. Huggett, Ph.D.
Chairman, Department of
Chemical Oceanography

RJH:ph

Enclosures


A.W.
17
C cores
N
W
S
So. BRANCH
Eliz. River

FILE: C18.1 0-5 cm

SAMPLE: C18.1 G32+BN INJECTED AT 13:42:36 ON JUL 23, 1984 RAW FILE: RW6SF

SAMPLE DRY WT: 9.6 g DETECTION LIMIT: 7 ppb

VOL INJECTED: 1 uL TOTAL VOL: 5 mL VOL BEFORE GPC: 6 mL

INT STANDARD: ISTD

MARKER	RET INDEX	PEAK #	RET TIME
Naphthalene	0	1	4.23
Biphenyl	100	0	7.85
Phenanthrene	200	26	15.07
Pyrene	300	48	20.54
Chrysene	400	69	25.62
Perylene	500	89	30.93
Benzo(ghi)perylene	600	103	34.95

RET INDEX	CONC. (ppb)	POSSIBLE ID
0	325.7	Naphthalene
56.9	5682.5	
103.5	1182.6	Ethylnaphthalene
106.9	4736	C2-Naphthalene
112.3	2338	
116.3	578.8	Acenaphthylene
123.3	60020.1	
131.9	21024.6	C3-Naphthalene
135.7	1049.2	Dibenzofuran
136.9	1247.3	
140.9	1920.9	
145.5	1277.3	C3-Naphthalene
149.5	44805.4	
154.4	10343	
156.4	7335.2	Methylbiphenyl
160.3	5172.7	
163.5	7749.4	
166.4	977	
175	2636.5	
180.1	6253.4	2-Methylfluorene
181.7	2258.6	2-Methylfluorene
184.3	6668.9	
189.8	1854.2	
190.9	2801.5	
192.5	13406.8	Dibenzothiophene
200	168779.	Phenanthrene
202.4	23836.5	Anthracene
208.2	755.5	
212.5	311.3	
215.8	826.1	
221.6	182.3	
225.1	898.5	
226.5	2869.8	

230	755.8	Methyldibenzothiophene
236.1	7728.9	3-Methylphenanthrene
237.7	10505.8	2-Methylphenanthrene
241.8	31473.2	4-H Cyclopenta(def)phenanthrene
244.8	7774.4	Methylphenanthrene
256.5	579.9	
260.7	8011.4	2-Phenylnaphthalene
265.6	1379.5	
270.8	1020	
273.3	1897.9	C2-Phenanthrene
278.9	4604.9	C2-(Phenanthrene/Anthracene)
285.9	140775.	Fluoranthene
294.9	3847.5	
297	946.5	
300	88620.9	Pyrene
303	31038.8	Methyl-phenylnaphthalene
308.9	3448.8	
313.4	6093	Methyl-phenylnaphthalene
320.2	1402.2	
322.1	6046.9	
330.2	21475.8	Benzo(a)fluorene
335.6	19824.7	Benzo(b)fluorene
339.9	997.4	
343.3	2591.8	Methyl(pyrene/fluoranthene)
345.6	1565.3	Methyl(pyrene/fluoranthene)
351.6	929.5	
358.5	613.7	
361.1	2066	
366.3	4847.3	
373.7	28906.8	1,1'-Binaphthyl(ISTD)
377.7	5860.8	Benzo(b)naphtho(2,1-d)thiophene
381	10009.9	Benzo(ehi)fluoranthene
384.9	2723	
391.9	1765.4	Benzonaphthothiophene
397.1	25064.4	Benz(a)anthracene
400	35394.	Chrysene/Triphenylene
404.5	8474.2	
408.3	1301.5	

413.1	2661	Methyl-228
420.2	1021.1	
427.9	1999.5	
430.3	4777.6	Methyl-228
433	2328.9	
437.1	5726.2	
439.3	6770.7	1-Phenylphenanthrene
444.6	2083.3	2,2'-Binaphthyl(ISTD)
448.7	538.7	
452.1	641.3	
455.6	184.3	
459.2	343.7	
467.3	612.7	
474.8	36493.7	Benzofluoranthene
481.3	3549.8	Benz(e)acephenanthrylene
490.9	16350	Benzo(e)pyrene
494.3	17066.2	Benzo(a)pyrene
500	2796.5	Perylene
504.2	404.7	DCB or Cholestadiene
509.9	1679.9	
516.8	5543.5	
526.2	1653.5	
534.6	1039.9	
544.1	205.3	
566.4	599.9	
571.4	626.2	
578.1	2044.5	
583	6710.8	Indeno(1,2,3-cd)pyrene
587.8	2222.3	
595.2	262.6	
597.5	169.6	
600	4506	Benzo(ghi)perylene

SUM OF PEAKS = 1.07808E+06

FILE: C18.1 0-5 cm

SAMPLE: C18.1 G32+BN INJECTED AT 13:42:36 ON JUL 23, 1984 RAW FILE: RW6SF

SAMPLE DRY WT: 9.6 g DETECTION LIMIT: 7 ppb

VOL INJECTED: 1 uL TOTAL VOL: 5 mL VOL BEFORE GPC: 6 mL

INT STANDARD: ISTD

MARKER	RET INDEX	PEAK #	RET TIME
Naphthalene	0	1	4.23
Biphenyl	100	0	7.85
Phenanthrene	200	26	15.07
Pyrene	300	48	20.54
Chrysene	400	69	25.62
Perylene	500	89	30.93
Benzo(ghi)perylene	600	103	34.95

RET INDEX	CONC. (ppb)	POSSIBLE ID
0	325.7	Naphthalene
56.9	5682.5	
103.5	1182.6	Ethylnaphthalene
106.9	4736	C2-Naphthalene
112.3	2338	
116.3	578.8	Acenaphthylene
123.3	60020.1	
131.9	21024.6	C3-Naphthalene
135.7	1049.2	Dibenzofuran
136.9	1247.3	
140.9	1920.9	
145.5	1277.3	C3-Naphthalene
149.5	44805.4	
154.4	10343	
156.4	7335.2	Methylbiphenyl
160.3	5172.7	
163.5	7749.4	
166.4	977	
175	2636.5	
180.1	6253.4	2-Methylfluorene
181.7	2258.6	2-Methylfluorene
184.3	6668.9	
189.8	1854.2	
190.9	2001.5	
192.5	13406.8	Dibenzothiophene
200	168779.	Phenanthrene
202.4	23836.5	Anthracene
208.2	755.5	
212.5	311.3	
215.8	826.1	
221.6	182.3	
225.1	898.5	
226.5	2869.8	

230	755.8	Methyldibenzothiophene
236.1	7728.9	3-Methylphenanthrene
237.7	10505.8	2-Methylphenanthrene
241.8	31473.2	4-H Cyclopenta(def)phenanthrene
244.8	7774.4	Methylphenanthrene
256.5	579.9	
260.7	8011.4	2-Phenylnaphthalene
265.6	1379.5	
270.8	1020	
273.3	1897.9	C2-Phenanthrene
278.9	4604.9	C2-(Phenanthrene/Anthracene)
285.9	140775.	Fluoranthene
294.9	3847.5	
297	946.5	
300	88620.9	Pyrene
303	31038.8	Methyl-phenylnaphthalene
308.9	3448.8	
313.4	6093	Methyl-phenylnaphthalene
320.2	1402.2	
322.1	6046.9	
330.2	21475.8	Benzo(a)fluorene
335.6	19824.7	Benzo(b)fluorene
339.9	997.4	
343.3	2591.8	Methyl(pyrene/fluoranthene)
345.6	1565.3	Methyl(pyrene/fluoranthene)
351.6	929.5	
358.5	613.7	
361.1	2066	
366.3	4847.3	
373.7	28906.8	1,1'-Binaphthyl(ISTD)
377.7	5860.8	Benzo(b)naphtho(2,1-d)thiophene
381	10009.9	Benzo(ghi)fluoranthene
384.9	2723	
391.9	1765.4	Benzonaphthothiophene
397.1	25064.4	Benz(a)anthracene
400	35394.	Chrysene/Triphenylene
404.5	8474.2	
408.3	1301.5	

413.1	2661	Methyl-228
420.2	1021.1	
427.9	1999.5	
430.3	4777.6	Methyl-228
433	2328.9	
437.1	5726.2	
439.3	6770.7	1-Phenylphenanthrene
444.6	2083.3	2,2'-Binaphthyl(ISTD)
448.7	538.7	
452.1	641.3	
455.6	184.3	
459.2	343.7	
467.3	612.7	
474.8	36493.7	Benzofluoranthene
481.3	3549.8	Benz(e)acephenanthrylene
490.9	16350	Benzo(e)pyrene
494.3	17066.2	Benzo(a)pyrene
500	2796.5	Perylene
504.2	404.7	DCB or Cholestadiene
509.9	1679.9	
516.8	5543.5	
526.2	1653.5	
534.6	1039.9	
544.1	205.3	
566.4	599.9	
571.4	626.2	
578.1	2044.5	
583	6710.8	Indeno(1,2,3-cd)pyrene
587.8	2222.3	
595.2	262.6	
597.5	169.6	
600	4506	Benzo(ghi)perylene

SUM OF PEAKS = 1.07808E+06

5 - 20 cm FILE: C18.2 [redacted]

SAMPLE: C18.2 G32+BN INJECTED AT 14:30:48 ON JUL 24, 1984 RAW FILE: RX78F

SAMPLE DRY WT: 9.9 g DETECTION LIMIT: 51 ppb

VOL INJECTED: .5 uL TOTAL VOL: 40 mL VOL BEFORE GPC: 6 mL

INT STANDARD: ISTD

MARKER	RET INDEX	PEAK #	RET TIME
Naphthalene	0	5	4.05
Biphenyl	100	10	7.55
Phenanthrene	200	42	15.12
Pyrene	300	65	20.53
Chrysene	400	86	25.6
Perylene	500	102	30.96
Benzo(ghi)perylene	600	106	35.02

RET INDEX	CONC. (ppb)	POSSIBLE ID
0	1.32963E+06	Naphthalene
4.1	80348.5	Benzothiophene
48.2	1905.7	2-Methylnaphthalene
53.6	717604.	2-Methylnaphthalene
62	386431.	1-Methylnaphthalene
100	155477.	Biphenyl
103.5	92314.	Ethylnaphthalene
106.1	202201.	C2-Naphthalene
109.8	291714.	C2-Naphthalene
114.7	112186.	C2-Naphthalene
117	19310.7	Acenaphthylene
118.8	40924.5	Hexamethybenzene
126.2	809843.	Acenaphthene
127.6	73366.5	4-Methylbiphenyl
130	50939.2	3-Methylbiphenyl
132.2	28360.4	C3-Naphthalene
134.3	638048.	Dibenzofuran
137.5	40897.6	
138.7	52456.	C3-Naphthalene
142.6	30883.6	
143.4	38386.9	C3-Naphthalene
147	36281.6	C3-Naphthalene
151.4	1.00532E+06	Fluorene
154.1	18604.3	
155.7	149472.	Methylbiphenyl
157.5	125429.	
161.1	100521.	Methyl-dibenzofuran
164.3	129732.	
167	39481.	
175	52228.5	
177.5	24115.5	
180	71823.7	2-Methylfluorene
181.6	35040.3	2-Methylfluorene
184.1	77950.	
189.5	20542.5	
190.4	29449.8	
192	178648.	
200	2.43079E+06	Phenanthrene
202.8	1.30502E+06	Anthracene
207.2	28238.1	
211.5	10590.6	

[illegible]	[illegible]	[illegible]
225.6	27601.2	
229.1	10002.8	Methyldibenzothiophene
235.3	85894.7	3-Methylphenanthrene
237	134170.	2-Methylphenanthrene
241.3	248301.	
243	50588.9	4-H Cyclopenta(def)phenanthrene
244.2	93828.3	Methylphenanthrene
252.5	643.1	
255.9	16841.9	
260.1	87165.6	2-Phenylnaphthalene
265.2	11725.6	
270.6	10854.5	
273.2	24509.2	C2-Phenanthrene
278.7	51666.8	C2-(Phenanthrene/Anthracene)
285.8	1.03846E+06	Fluoranthene
294.7	34879.5	
297.1	6885.3	
300	623288.	Pyrene
303	179943.	Methyl-phenylnaphthalene
305.4	35393.1	Methyl-phenylnaphthalene
308.8	24557.1	
313.6	38050.4	Methyl-phenylnaphthalene
320.3	9057.2	
322.3	35810.8	
330.3	124156.	Benzo(a)fluorene
335.6	119886.	Benzo(b)fluorene
339.9	8640.1	
343.4	10543.7	Methyl(pyrene/fluoranthene)
345.7	6333.8	Methyl(pyrene/fluoranthene)
351.7	1706.7	
361.2	13240.4	
366.4	24406.4	
373.7	207041.	1,1'-Binaphthyl(ISTD)
377.9	26521.8	Benzo(b)naphtho(2,1-d)thiophene
381.3	49206.9	Benzo(c)phenanthrene
385.1	15357.4	
392.1	6699	
397.3	143436.	Benz(a)anthracene
400	179198.	Chrysene/Triphenylene
404.6	39323.7	
408.5	4655.6	
413.6	9621.1	Methyl-228
420.6	3042.1	
428	5982.7	
430.7	16939.1	Methyl-228
433.3	7073	
437.1	19992.4	
439.3	22414.8	1-Phenylphenanthrene
445.1	2020.2	2,2'-Binaphthyl(ISTD)
448.9	1409.6	
474.3	111193.	Benzofluoranthene
481	12758.2	Benz(e)acephenanthrylene
491.1	45760.1	Benzo(e)pyrene
493.9	50086.7	Benzo(a)pyrene
500	5008.1	Perylene
509	5620.4	
519.6	10397.9	
583.2	8248.4	Indeno(1,2,3-cd)pyrene
600	11131.9	Benzo(ghi)perylene

SUM OF PEAKS = 1.528896E+07

FILE: C18.3 ~~[illegible]~~ 20-42 cm

SAMPLE: C18.3 G32+BN INJECTED AT 9:27:49 ON JUL 25, 1984 RAW FILE: RY2SF

SAMPLE DRY WT: 11.8 g DETECTION LIMIT: 30 ppb

VOL INJECTED: 1 uL TOTAL VOL: 40 mL VOL BEFORE GPC: 6 mL

INT STANDARD: ISTD

MARKER	RET INDEX	PEAK #	RET TIME
Naphthalene	0	3	4.06
Biphenyl	100	7	7.58
Phenanthrene	200	41	15.05
Pyrene	300	63	20.48
Chrysene	400	82	25.56
Perylene	500	98	30.91
Benzo(ghi)perylene	600	101	34.96

RET INDEX	CONC. (ppb)	POSSIBLE ID
0	376807.	Naphthalene
4.6	32584.2	Benzothiophene
54.5	243767.	2-Methylnaphthalene
62.4	162397.	1-Methylnaphthalene
100	58039.6	Biphenyl
103.4	42864.1	Ethylnaphthalene
106	89691.1	C2-Naphthalene
109.6	142103.	C2-Naphthalene
114.7	45339.5	C2-Naphthalene
117.2	6863.8	Acenaphthylene
118.7	20936.2	Hexamethybenzene
126	406428.	Acenaphthene
127.6	33490.3	4-Methylbiphenyl
130	23499.9	3-Methylbiphenyl
132.3	14494.6	C3-Naphthalene
134.2	280787.	Dibenzofuran
137.5	19610.2	
138.6	27799.9	C3-Naphthalene
142.6	12627.6	
143.5	15502.1	C3-Naphthalene
147	18946.5	C3-Naphthalene
151.2	409245.	Fluorene
154.1	11460.9	
154.9	13770.4	
155.7	61400.6	Methylbiphenyl
157.5	59027.5	
161.2	47875.7	Methyl-dibenzofuran
164.3	62701.4	
167.1	10986.4	
169.9	9322.8	
175.1	24086.5	
177.7	12782.8	
180.2	36034.8	2-Methylfluorene
181.8	16333.2	2-Methylfluorene
184.3	38979.1	
189.8	10574.8	
190.8	14403.1	
192.2	88046.9	
200	1.14745E+06	Phenanthrene

213	1510.3	
215.3	3170.7	
223.1	5476.1	Methyl-dibenzothiophene
224.5	4134.5	
225.9	16188.1	
229.6	7873	Methyldibenzothiophene
235.6	46536.7	3-Methylphenanthrene
237.3	73153.8	2-Methylphenanthrene
241.5	119666.	4-H Cyclopenta(def)phenanthrene
243.2	24127.1	4-H Cyclopenta(def)phenanthrene
244.5	44000.9	Methylphenanthrene
256.8	5496.3	
260.4	37290.3	2-Phenylnaphthalene
263	13814.9	
265.5	6985.2	
270.8	6052.9	
273.5	12456.9	C2-Phenanthrene
278.8	26506.7	C2-(Phenanthrene/Anthracene)
285.8	547831.	Fluoranthene
294.9	17182.5	
300	340926.	Pyrene
303	109225.	Methyl-phenylnaphthalene
309.1	11914.9	
313.7	20680.4	Methyl-phenylnaphthalene
322.3	24675	
330.4	67383.2	Benzo(a)fluorene
335.7	73827.6	Benzo(b)fluorene
339.9	14897.6	
343.5	21876.7	Methyl(pyrene/fluoranthene)
345.8	13580.2	Methyl(pyrene/fluoranthene)
352	815.3	
361.4	5217.5	
366.4	10967.3	
373.8	103066.	1,1'-Binaphthyl(ISTD)
378.1	13889	Benzo(b)naphtho(2,1-d)thiophene
381.3	25352.8	Benzo(c)phenanthrene
385.3	8068.3	
392.3	2714.5	
397.2	74577.4	Benz(a)anthracene
400	104027.	Chrysene/Triphenylene
404.6	21043.2	
408.5	2616.2	
413.6	5386	Methyl-228
420.9	1849.6	
428.2	2011.3	
430.6	9292	Methyl-228
433.3	4312	
437.1	11480.8	
439.5	13726.6	1-Phenylphenanthrene
445.3	1694.9	2,2'-Binaphthyl(ISTD)
449.2	810.7	
474.4	70057.7	Benzofluoranthene
481.1	7172.2	Benz(e)acephenanthrylene
490.5	31527.2	Benzo(e)pyrene
494	37681.1	Benzo(a)pyrene
500	6945.7	Perylene
509.2	3343.2	
583.3	7533.2	Indeno(1,2,3-cd)pyrene
600	10126.4	Benzo(ghi)perylene

SUM OF PEAKS = 6.66466E+06

MEMORANDUM

State Water Control Board

2111 North Hamilton Street P. O. Box 11143 Richmond, VA. 23230

SUBJECT: Elizabeth River

TO: File

FROM: T. L. Switzer TLS

DATE: July 9, 1984

COPIES: BAT, Darius Ostrauskas (EPA)

The purpose of this memo is to provide documentation on the use of the Elizabeth River system as a recreational food source; it is being copied to the EPA via Darius Ostrauskas (EPA-Superfund Division) for consideration toward possible ranking of the Elizabeth River on the Superfund list.

On July 3, 1984 the writer visited Cargill, Inc.; DSC Division to perform a routine inspection of the NPDES permitted cooling water discharge system. This plant is located on Jones Creek, part of the Elizabeth River system (see attached map). While inspecting the outfall location, a number of crab pots were noticed up and down the creek. Mr. Ray Osberg, Plant Superintendent at Cargill, and Mr. Al Wilcox, who will soon take over as Plant Superintendent, stated that they have often seen people fishing and crabbing along that section of the river. This is about 1000 feet from the Southern Branch of the Elizabeth River proper, which has been shown to be heavily contaminated with PNA's and a host of other pollutants.

The writer has on other occasions seen persons fishing and crabbing in the Southern Branch of the Elizabeth River and has seen evidence of crabbing activities (crab pots on shore, untended lines, etc.). There apparently are a significant number of people eating crabs taken from this River.

/dak


Atlantic Wood Industries, Inc
Cargill, Inc.
Old Republic Creosote Site
Old Eppinger & Russell Site
U S NAVAL SHIPYARD
U S NAVAL AMMUNITION DEPOT
Industrial Waste Pond
Mt Calvary Cemetery
Playground
Gosport
Cradock
Newtown
Golf Course
St Pauls Cem
Docks
BRANCH
MIDDLE REACH
SOUTHERN
UPPER REACH
JORDAN BRIDGE (TOLL)
Tollgate
Athletic Field
Library
Buell
Milldam
Portlock
Julian
Sewage Disposal Ponds
Industrial Waste Ponds
Broadmoor
Gilmerton Bridge
Substation
WESTERN
PORTSMOUTH
Pumping Sta
CHESAP

Town Pt
Berkley Bridge
EASTERN
Parkview
USCG Base
Newtown
Golf Course
BRANCH
USCG Sta
Athletic Field
NAVAL SHIPYARD
Gosport
JORDAN BRIDGE
(TOLL)
U S NAVAL PIER
Avalon
MIDDLE
REACH
CHESAPEA
WESTERN
Industrial Waste Pond
Substation
SOUTHERN
Buell
Milldam
Portlock
Playground
Sewage Disposal Ponds
Industrial Waste Ponds
Gilmerton Bridge
PORTSMOUTH
Pumping Sta

Other information concerning the wetland resources depicted on this document may be available. For information contact

WETLAND LEGEN

U – Primarily represents upland areas, but m
unclassified wetlands such as man-modified
photo-identifiable areas and/or unintentional

ECOLOGICAL SYSTEM

Ecological Subsystem

E – ESTUARINE

1 – Subtidal

CLASS	RB – ROCK BOTTOM	UB – UNCONSOLIDATED BOTTOM	AB – AQUATIC BED	RF – REEF	OW – OPEN WATER/ Unknown Bottom
Subclass	1 Bedrock 2 Boulder	1 Cobble/Gravel 2 Sand 3 Mud 4 Organic	1 Submergent Algal 2 Submergent Vascular 4 Floating-leaved 5 Floating 6 Unknown Submergent 7 Unknown Surface	2 Mollusc 3 Worm	

2 – Intertidal

CLASS	AB – AQUATIC BED	RF – REEF	FL – FLAT	SB – STREAMBED	EM – EMERGENT	SS – SCRUB/SHRUB
Subclass	1 Submergent Algal 2 Submergent Vascular 6 Unknown Submergent 7 Unknown Surface	2 Mollusc 3 Worm	1 Cobble/Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated Pioneer 6 Vegetated Non-pioneer	1 Cobble/Gravel 2 Sand 3 Mud 4 Organic	1 Persistent 2 Nonpersistent 3 Narrow-leaved Nonpersistent 4 Broad-leaved Nonpersistent 5 Narrow-leaved Persistent 6 Broad-leaved Persistent	1 Broad-leaved 3 Broad-leaved 4 Needle-leave 5 Dead 6 Deciduous 7 Evergreen

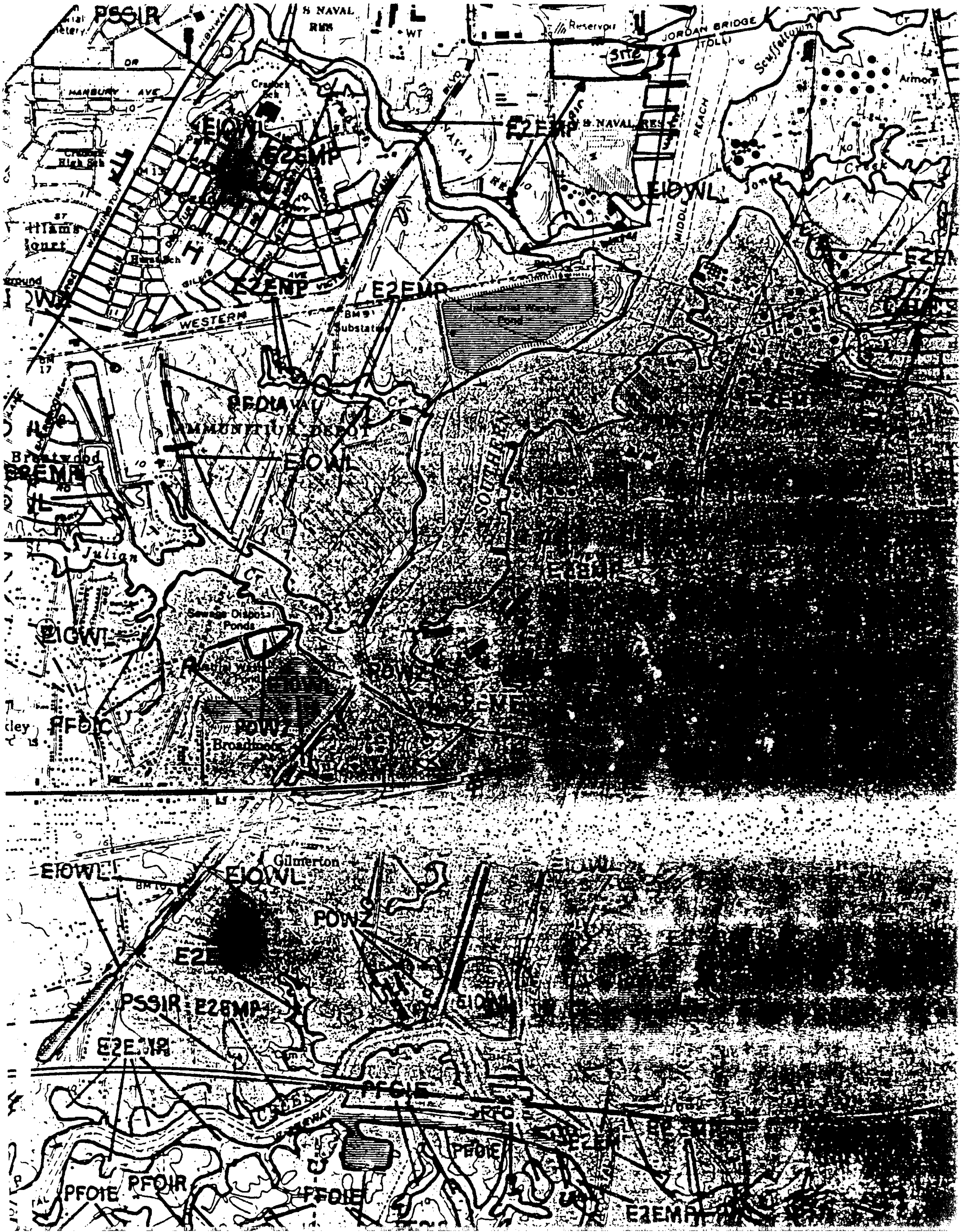
OLOGICAL SYSTEM

› Subsystem

P – PALUSTRINE

CLASS	RB – ROCK BOTTOM	UB – UNCONSOLIDATED BOTTOM	AB – AQUATIC BED	FL – FLAT	ML – MOSS/ LICHEN	EM – EMERGENT	SS – SCRUB/SHRUB	FO – FORESTED	OW – OPEN WATER/ Unknown Bottom
Subclass	1 Bedrock 2 Boulder	1 Cobble/Gravel 2 Sand 3 Mud 4 Organic	1 Submergent Algal 2 Submergent Vascular 3 Submergent Moss 4 Floating-leaved 5 Floating 6 Unknown Submergent 7 Unknown Surface	1 Cobble/Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated Pioneer 6 Vegetated Non-pioneer	1 Moss 2 Lichen	1 Persistent 2 Nonpersistent 3 Narrow-leaved Nonpersistent 4 Broad-leaved Nonpersistent 5 Narrow-leaved Persistent 6 Broad-leaved Persistent	1 Broad-leaved Deciduous 2 Needle-leaved Deciduous 3 Broad-leaved Evergreen 4 Needle-leaved Evergreen 5 Dead 6 Deciduous	1 Broad-leaved Deciduous 2 Needle-leaved Deciduous 3 Broad-leaved Evergreen 4 Needle-leaved Evergreen 5 Dead	

CLASS	RB – ROCK BOTTOM	UB – UNCONSOLIDATED BOTTOM
Subclass	1 Bedrock 2 Boulder	1 Cobble/Gravel 2 Sand 3 Mud



PSSIR
NAVAL
Reservoir
JORDAN BRIDGE
(TOLL)
Armory
Creek
HANBURY AVE
E1OWL
E2EMP
WASHINGTON
WESTERN
Substation
MIDDLE
REACH
SOUTHERN
E1OWL
Julian
Cr
Sewage Disposal
Ponds
PFO1C
E1OWL
Gilmerton
E1OWL
POWZ
PSSIR
E2EMP
PFO1E
PFO1R

RECORD OF COMMUNICATION

☒ PHONE CALL ☐ DISCUSSION ☐ FIELD TRIP ☐ CONFERENCE

☐ OTHER (SPECIFY) _____

(Record of items checked above)

TO: File

FROM: Darius Ostrauskas

DATE 4/4/85

TIME 3:00 PM

SUBJECT
Telecon with Dr. Robert Huggett, VA Institute Marine Science

SUMMARY OF COMMUNICATION

Dr. Huggett said there are oyster beds at the confluence of Western Branch and South Branch of the Elizabeth River. He said his analysis indicate the oysters here are contaminated with constituents of creosote. These beds are located about 4 miles downstream of Atlantic Wood.

CONCLUSIONS, ACTION TAKEN OR REQUIRED

INFORMATION
TO: _____

APPENDIX D

Ref. 73

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

SUBJECT: Atlantic Wood - Storage Tanks DATE: 10/22/85

FROM: Darius Ostrauskas

TO: File

Today I spoke Ken Cosgriff, Manager of Atlantic Wood Industries of Portsmouth, VA. Mr Cosgriff said that the four old waste storage tanks next to Elm Ave. held creosote, but no pentachlorophenol. He said that a second tanks had been dismantled on September 1, 1985 and that the contents had been used in their process just as the previous tanks contents had. He said the material was a [illegible] of less than 5%. He estimated that the contents of these tanks, prior to dismantling, had not been used for 10 or more years. Apparently, the VA SWCB has requested the dismantling of the tanks. Mr Cosgriff said the tanks have bottoms made of metal ~~asbestos~~ which is then in direct contact with underlying soil & there is no liner between the tanks and the ground

RECORD OF COMMUNICATION

☒ PHONE CALL ☐ DISCUSSION ☐ FIELD TRIP ☐ CONFERENCE
☐ OTHER (SPECIFY) _____
(Record of item checked above)

TO: File

FROM: Darius Ostrauskas

DATE 4/5/85

TIME 9:45 AM

SUBJECT
Telecon with Terry Switzer, VA SWCB Engineer

SUMMARY OF COMMUNICATION

Today I spoke with Terry regarding the four (now three) large storage tanks adjacent to the storm sewer running next to Atlantic Wood. Terry said that until the spring 1985, when A.W. dismantled one tanks and allegedly used part of the contents in their process, that no material in the tanks had been used since at least July of 1980, when Terry joined VA SWCB. He said it was his understanding that the material in the tanks was creosote, which, due to a long period of storage, had heavy fractions settle out and some lighter fractions volatilize. These tanks were actively used for creosote storage in earlier years of operation. He estimated that for the last dozen years A.W. has used their current storage tanks for creosote which are located right next to the process area.

CONCLUSIONS, ACTION TAKEN OR REQUIRED

A memo dated 12/4/84 from T.L. Switzer stated 350,000 gallons of creosote (and overlying water) were in these tanks on that date. This material had been sitting there for at least 5 years. This quantity should be included in waste quantity for HRS purposes due to evidence of tank leakage.

INFORMATION
TO: _____

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

SUBJECT: Atlantic Wood HRS - Tides DATE: 3/29/85

FROM: Dennis Ostrander, EPA

TO: File

Today I spoke with Terry Switzer of the VA State Water Control Board regarding the above. He said that Atlantic Wood had informed him that the material in the tanks of concern was now at a volume of 210,000 gallons (after removal of 140,000 gals with the dismantling of one tank, this follow allegedly being recycled into plant operations) He further said that, according to his calculations, tidal influence upstream of the site would occur at an estimated distance of up to 6660 ft. The mouth of Jones Creek is well within this distance as is Paradise Creeks. These calculations are based on a mean current of 18.5 ft/min and a tidal cycle of 6 hours. See related documentation. Terry also mentioned that soils where the dismantled tanks had stood were about 1 ft deeper than surrounding soils and were visibly stained with

Ref. 5

EPA

TELEPHONE DOCUMENTATION

BAT FILE #_____

COPIES TO: CWSPM

EPM

SUBJECT: Atlantic Wood Industries, Inc.
(Facility Name)

WRITTEN BY: T. L. Switzer DATE: December 4, 1984

DISCUSSION: In response to an earlier request by the writer to Charlie Kerr on November 7, 1984, and a subsequent request by the writer to Ken Cosgriff on November 20, 1984, for information concerning the amount of material (sludges, liquid, etc.) currently contained within the four large storage tanks along Elm Avenue at the subject facility in Portsmouth, Charlie Kerr phoned on November 26, 1984 and reported that measurements had been made and indicated a total volume of about 350,000 gallons of material within the tanks.

APPENDIX E

COMMONWEALTH of VIRGINIA

Department of Health
Richmond, Va. 23219

JAMES B. KENLEY, M.D.
COMMISSIONER

FEB 4 1985

C. N. Kerr
Chief Engineer
Atlantic Wood Industries
P.O. Box 1608
Savannah, GA 31498

Dear Mr. Kerr:

On January 16, 1985, the State Health Commissioner signed the Notice of Termination of Interim Status for Atlantic Wood Industries, Portsmouth, Virginia, EPA ID #VAD990710410. This constituted the final administrative action under Section 11.03 of the Virginia Hazardous Waste Management Regulations (VHWMR). By this action, the above facility is prohibited from operating as a hazardous waste management facility.

On September 25, 1984, the facility was visited by Wade E. Lanford, a representative from the Bureau of Hazardous Waste Management. Since no hazardous waste has been treated, stored or disposed of at this facility since November 19, 1980, closure is not required. Therefore, in accordance with Section 9.08.03(h) of VHWMR, you are hereby notified that financial assurance for closure of the facility no longer is required.

If you decide in the future to operate a hazardous waste management facility at this site, you should submit Part A and Part B of the permit application and receive a final permit before any facility construction begins. (See Section 11.02.05 of the VHWMR.)

If you have any questions, please contact Marjorie Melton at (804) 225-2667.

Sincerely,

W. Gulevich

Wladimir Gulevich, Ph.D., P.E., Director
Bureau of Hazardous Waste Management

WGG/MLM:1499/dle

NOTICE OF TERMINATION OF INTERIM STATUS

Name and Address of Applicant:

Atlantic Wood Industries
P.O. Box 1608
Savannah, GA 31498

Name and Address of Facility:

Atlantic Wood Industries
3550 Elm Street
Portsmouth, VA 23704

EPA I. D. Number: VAD990710410

Description of Facility and Action: The above facility has, since November 19, 1980, operated a hazardous waste management facility subject to regulations promulgated under the Resource Conservation and Recovery Act. This facility qualified for interim status for storage, which is conferred by the Act and allows a facility to operate until final disposition of its permit application. On August 6, 1984, the Bureau of Hazardous Waste Management requested from this facility its complete permit application. By letter of September 11, 1984, the facility indicated that it would not be submitting the permit application. The Bureau published a notice of termination of interim status and provided the opportunity for hearing. The public comment period began on December 3, 1984 and ended on January 3, 1985. During that period, no comments or requests for hearing were received.

The action finalized by this notice is the termination of interim status for this facility by authority of Section 11.00 of the Virginia Hazardous Waste Management Regulations (VHWMR). Upon termination of interim status, the facility is prohibited from operating as a hazardous waste management facility. In response to information submitted on August 17, 1984 indicating that hazardous waste had never been stored at the facility, closure specified in Section 9.07 of the VHWMR will not be required.

William F. Gilley, P.E., Director
Division of Solid and Hazardous
Waste Management

Date 1/16/85

James B. Kenley, M.D.
State Health Commissioner

COMMONWEALTH of VIRGINIA

Department of Health
Richmond, Va. 23219

JAMES B. KENLEY, M.D.
COMMISSIONER

JAN 23 1985

CERTIFIED-RETURN
RECEIPT REQUESTED

C. N. Kerr
Chief Engineer
Atlantic Wood Industries
P.O. Box 1608
Savannah, GA 31498

Dear Mr. Kerr:

By letter dated November 27, 1984, you were notified that the Bureau was proposing to terminate the interim status of your facility located in Portsmouth, Virginia (VAD990710410). This action was taken in response to your August 17, 1984 letter stating that you would not be seeking a permit.

On December 3, 1984, a public notice of intent to terminate interim status for this facility under Virginia Hazardous Waste Management Regulations (VHWMR) appeared in the Times Herald newspaper in Newport News, Virginia. No pertinent comments or requests for a hearing were received during the public comment period which ended January 3, 1985.

Enclosed is the Notice of Termination of Interim Status for the facility cited above. This notification constitutes final action under Section 11.00 of the VHWMR.

If you have questions regarding this notice, please contact Marjorie L. Melton at (804) 225-2667.

Sincerely,

William F. Gilley, P.E., Director
Division of Solid and Hazardous
Waste Management

WFG/MLM:1499/smm

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

SUBJECT: Atlantic Wood NPDES Status DATE: 4/4/85

FROM: Dainis Ostrumskas, EPA

TO: File

Surface runoff on portions of the site is collected in a drainage ditch which eventually discharges into an outfall which also receives water from a storm sewer running along the boundry of Atlantic Wood's property. The surface runoff discharge is permitted under NPDES, which establishes levels of 1) oil and grease and 2) phenols not to be exceeded. Required monitoring of this discharge is conducted in the ditch above the outfall ie at a point unaffected by the storm sewer discharge. EPA sampling on July 17, 1984 identified numerous substances in the storm sewer outfall not monitored under NPDES e.g. benzene, ethylbenzene and over a dozen polynuclear aromatic compounds.

SWCB/1-80

COMMONWEALTH of VIRGINIA

STATE WATER CONTROL BOARD
2111 Hamilton Street

R. V. Davis
Executive Secretary

Post Office Box 11143
Richmond, Virginia 23230
(804) 257-0056

Permit No.	VA0004189
Effective Date	May 30, 1974
Reissuance Date	September 30, 1980
Expiration Date	September 30, 1985

AUTHORIZATION TO DISCHARGE UNDER THE

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

AND

THE VIRGINIA STATE WATER CONTROL LAW

1. In compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 et seq., the "Act"), and pursuant to Section 62.1-44.2 et seq, of the Code of Virginia, of 1950, as amended, and regulations adopted pursuant thereto,

   Atlantic Wood Industries, Incorporated

   is authorized to discharge from a facility located at 3950 Elm Avenue, Portsmouth, Virginia
   to receiving waters named Paradise Creek and Southern Branch of the Elizabeth River; James River (Lower) Basin; Section 1d; Class II (a)
   in accordance with the effluent limitations, monitoring requirements, and other conditions set forth in Parts I, II, and III of this permit.

2. Facility or plant operations and treatment and disposal of all wastes shall be in accordance with the application dated February 28, 1979 filed with the State Water Control Board and in conformity with the plans, specifications and oth supporting data submitted to the Board. The facilities shall be operated in accordance with the approval of the State Water Control Board by memorandum number 7189-S.

3. The approval of plans and specifications does not relieve the permittee of the responsibility of operating the facility in a reliable and consistent manner to meet the facility performance requirements in the permit. If facility deficiencie design and/or operational, are identified in the future which could affect the facility performance or reliability, it is the responsibility of the permittee to correct such deficiencies.

Acti
Executive Secretary, State Water Control

10-3-80
Date

PART I

PERMIT NO. VA0004189

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s) serial number(s) 001, 002

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATIONS kg/day		DISCHARGE LIMITATIONS Other Units (Specify)		MONITORING REQUIREMENTS Measurement Frequency	MONITORING REQUIREMENTS Sample Type
	Monthly Avg.	Daily Max.	Monthly Avg.	Daily Max.		
Flow-M^3/Day (MGD)			NL*	NL*	1/DIS-M**	estimate
Oil and Grease			10 mg/l	15 mg/l	1/DIS-M**	grab
Phenols			1 mg/l	2 mg/l	1/DIS-M**	grab

* No limit, however, reporting is required

** One sample per discharge month

2. The discharge shall have a pH value between 6.0 and 8.5 at all times and shall be monitored 1/discharge month by a grab sample.

3. There shall be no discharge of floating solids or visible foam in other than trace amounts.

4. Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): farthermost end (from plant site) of the drainage ditches above tidal influence

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s) serial number(s) 003

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATIONS kg/day		DISCHARGE LIMITATIONS Other Units (Specify)		MONITORING REQUIREMENTS Measurement Frequency	MONITORING REQUIREMENTS Sample Type
	Monthly Avg.	Daily Max.	Monthly Avg.	Daily Max.		
Flow-M^3/Day (MGD)			NL*	NL*	1/DIS-M**	estimate
Oil and Grease			10 mg/l	15 mg/l	1/DIS-M**	grab
Phenols			1 mg/l	2 mg/l	1/DIS-M**	grab

* No limit, however, reporting is required

** One sample per discharge month

2. The discharge shall have a pH value between 6.0 and 8.5 at all times and shall be monitored 1/discharge month by a grab sample.

3. There shall be no discharge of floating solids or visible foam in other than trace amounts.

4. Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): furthermost end of drainage ditch prior to entering storm sewer (Northwest corner of plant property)

5. Other Requirements or Special Conditions

A. Any and all products, materials, industrial wastes, and other wastes resulting from the purchase, sale, mining, extraction, transport, preparation, and/or storage of raw or intermediate materials, final product, by-product or wastes, shall be handled, disposed of, and/or stored in such a manner so as not to permit discharge of such products, materials, industrial wastes, and/or other wastes to State waters, except as expressly authorized herein.

B. The permittee shall fully implement a plan to prevent or minimize the potential for release of toxic or hazardous pollutants to State waters, within 1 year after approval of such plan by the State Water Control Board.

C. This permit shall be modified, or alternatively, revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under sections 301(b)(2)(C), and (D), 305(b)(2), and 307 (a)(2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:

(1) Contains different conditions or is otherwise more stringent than any effluent limitation in the permit;

(2) Controls any pollutant not limited in the permit.

The permit as modified or reisused under this paragraph shall also contain any other requirements of the Act then applicable.

Immediately after EPA's promulgation of applicable standards or limitations, a draft permit incorporating the new requirements shall be sent to the permittee.

APPENDIX F

NUS CORPORATION
A Halliburton Company

R-585-4-3-33
A FINAL PRELIMINARY ASSESSMENT FOR
ATLANTIC WOOD INDUSTRIES, INC.
PREPARED UNDER

TDD NO. F3-8302-65
EPA NO. VAD 990710410
CONTRACT NO. 68-01-6699

PROJECT FOR PERFORMANCE OF REMEDIAL RESPONSE ACTIVITIES AT UNCONTROLLED HAZARDOUS SUBSTANCE FACILITIES—ZONE 1

NUS CORPORATION
SUPERFUND DIVISION

1.0 INTRODUCTION

1.1 Authorization

NUS Corporation performed this work under Environmental Protection Agency Contract No. 68-01-6699. This specific report was prepared in accordance with Technical Directive Document No. F3-8302-65 for the Atlantic Wood Industries, Inc. located in Portsmouth, Virginia.

1.2 Scope Of Work

NUS Corporation, Region III Field Investigation Team was tasked to perform a low priority Preliminary Assessment of Atlantic Wood Industries waste disposal pit. Herein are the results and considerations pursuant to this investigation.

1.3 Summary

David Hassrick and Terrence Shannon of FIT Region III conducted a Preliminary Assessment on March 31, 1983 of the closed waste disposal pit at Atlantic Wood Industries. The waste pit operated for several years prior to 1982 when it was closed. A total of 20,000 cubic feet of creosote contaminated wood chips were disposed of in the waste pit. In early 1982, after a Virginia Department of Health, Division of Solid and Hazardous Waste Management inspection, the waste pit was filled and graded. The area is now used for storage and scrap disposal.

No releases to the environment were observed. The facility is a wood treatment plant. Much of the facility is stained or coated with creosote from the operation of the plant. Any surface run-off is picked up, treated, and released under a NPDES permit. To determine if any contamination has entered groundwater at this site, would require a carefully installed monitoring well system.

2.0 THE SITE

2.1 Location

The site is located next to the pole storage area at Atlantic Wood Industries. Atlantic Wood Industries is located at 3550 Elm Street in Portsmouth, Virginia. The facility is bordered on the north and south by the Portsmouth U.S.N. Shipyard and the Portsmouth U.S.N. Reserve, respectively. The Southern Branch of the Elizabeth River borders the facility to the east.

2.2 Site Layout

The site averages 60 feet in width and 250 feet in length, paralleling the pole storage area. It is covered with sandy fill and graded. Some scrap metal and wood are littered around the area.

2.3 Ownership History

The site was owned by Atlantic Wood Industries the entire time it was in operation.

2.4 Site Use History

The waste pit was dug and used for the disposal of bottom ends from the wood treatment cylinders. It was in use for several years, the exact dates are uncertain, and closed and filled early in 1982.

2.5 Permit and Regulatory Action History

The site was under no permits during its operation. On December 17, 1981, W.E. Landford, of the Virginia Department of Health, Division of Solid and Hazardous Waste Management, inspected the site and recommended that the site be closed, according to Charles Kerr, Environmental Engineer of Atlantic Wood Industries.

2.6 Remedial Action To Date

In early 1982, Atlantic Wood Industries filled in the waste disposal pit and graded it for use as equipment storage.

4.0 WASTE TYPES AND QUANTITIES

According to the plant manager, 20,000 cubic feet of creosote contaminated wood chips were disposed of in this pit. No other types of waste were disposed of there.

APPENDIX G

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

SUBJECT: Atlantic Wood - Water Supply Sources **DATE:** 10/28/85

FROM: Darius Ostrauskas

TO: FILE

Today I spoke with Dan Horne, Assistant Regional Director of the VA Division of Water Program regarding sources of water used for drinking within a 3 mile radius of the site. He said that all residents and workers within a 3 mile radius in Portsmouth would get their drinking water from the City of Portsmouth, which gets its supply from lakes 25 miles west. Residents and workers of ~~the City of Norfolk~~ D.O. Chesapeake within 3 mi ra would get their water from either the City of Norfolk or the City of Chesapeake, each of which obtain their water from sources well outside the 3 mile radius of the site. Dan said he knew of no private wells within 3 miles of the site.

Dan also said that he had seen people "tonging" for oysters and crabbing on the South Branch of the Elizabeth within 2 miles downstream of the site and within 1.5 D.O. miles upstream of the site.

NUS CORPORATION — **TELECON NOTE**

CONTROL NO:	DATE:	TIME:
	February 19, 1985	10:20

DISTRIBUTION:

BETWEEN:	OF:	PHONE:
Mr Wolfski	Portsmouth Water Company	(804) 393-8524

AND:

Chuck Meyer (NUS)

DISCUSSION:

The Portsmouth Water Company uses 4 lakes and 3 wells in Suffolk county for there source. The lakes are Kilby, Meade, Cahoon and Speaghts Run the wells are deep wells and are also located in Suffolk. The Portsmouth Water Company services parts of Suffolk and Chesapeake along with all of the Portsmouth area servicing over 100,000 persons. There are 3 transmission lines which run 19 miles into portsmouth and 3 more transmission lines which run to the north and down to Portsmout.

ACTION ITEMS:

NUS CORPORATION — **TELECON NOTE**

CONTROL NO:	DATE:	TIME:
	February 21, 1985	1:45

DISTRIBUTION:

BETWEEN:	OF:	PHONE:
Mr Gene Sedula	State Water Control Board	(804) 499-8742

AND:

Chuck Meyer (NUS)

DISCUSSION:

The discussion was about water use in a 3 mile radius of the site. The only use for groundwater in the area is for industrial purposes. Public water services all of Portsmouth Chesapeake and Norfolk. The public water supply is serviced by Portsmouth Public Water Company which receives its water from Sulfolk County 17 miles away. Norfolk also uses surface and groundwater from Sulfolk County for its water supply. Chesapeake has an emergency well which is located in Bowers Hill approximately 2 miles away from the site. Outlying areas of the cities maybe using shallow groundwater for ~~its~~ there supplies there wells would be located from 50 to 100 feet deep with the water table being 5' feet below the surface. The geology of the area is faleuvial deposits and marsh material from the surface to 20 feet where there is a clay unit which seporates the upper aquifer from the Yorktown Formation which is charactorized by silty sands and marine deposits.

ACTION ITEMS:

APPENDIX H

Local Climatological Data

Annual Summary With Comparative Data

1983

NORFOLK, VIRGINIA

Narrative Climatological Summary

The city of Norfolk, Virginia, is located at Latitude 36° 51' North and Longitude 76° 17' West. It is almost surrounded by water, with Chesapeake Bay immediately to the north, Hampton Roads to the west, and the Atlantic Ocean only 18 miles to the east. It is traversed by numerous rivers and waterways and its average elevation above mean sea level is 13 feet. There are no nearby hilly areas and the land is low and level throughout the City. The climate, therefore, is necessarily a modification of the more desirable marine variety. The City's geographic position with respect to the principal storm tracks is especially favorable, being south of the average path of storms originating in the higher latitudes and north of the usual track of hurricanes and other tropical storms. These features combine to place Norfolk in one of the favored climatic regions of the world.

The winters are mild, while the autumn and spring seasons usually are delightful. Summers, though warm and long, frequently are tempered by cool periods, often associated with northeasterly winds off the Atlantic. Temperatures of 100° or higher are of very infrequent occurrence. Cold waves seldom penetrate to this area and during the period of continuous official record now available, a temperature of zero has never been recorded in Norfolk. Occasional winters pass without a measurable amount of snowfall. Most of Norfolk's snow generally occurs in light falls, which usually melts and disappears within 24 hours. Thus, from a climatological standpoint, Norfolk's weather is well suited for most outdoor activities at all seasons of the year.

From an agricultural standpoint, the Norfolk area, with its long frost-free period and prolonged growing season, averaging 244 days, is exceptionally well favored. The average date of the last freezing temperature in the spring is March 22, while the average date of the first in autumn is November 21. The average annual amount of rainfall is about 45 inches and considerably more than one-half of it falls in well distributed amounts during the crop growing season, April to October, inclusive, a fact of great importance to agricultural interests, which together with the light, warm, sandy soil of this section, makes it an area of unusual productive capacity, yielding bountiful supplies of various truck crops.

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE / NATIONAL CLIMATIC DATA CENTER ASHEVILLE, N.C.

Meteorological Data For The Current Year

Station: NORFOLK, VIRGINIA (#13737) INTERNATIONAL AIRPORT Standard time used: EASTERN Latitude: 36° 54' N Longitude: 76° 12' W Elevation (ground): 24 feet Year: 1983

Month	Temperature °F: Averages: Daily maximum	Daily minimum	Monthly	Extremes: Highest	Date	Lowest	Date	Degree days Base 65 °F: Heating	Cooling	Precipitation in inches: Water equivalent: Total	Greatest in 24 hrs.	Date	Snow, ice pellets: Total	Greatest in 24 hrs.	Date	Relative humidity, pct: Hour 01 (Local time)	Hour 07 (Local time)	Hour 13 (Local time)	Hour 19 (Local time)	Wind: Resultant: Direction	Speed m.p.h.	Average speed m.p.h.	Fastest mile: Speed m.p.h.	Direction	Date	Percent of possible sunshine	Average sky cover tenths, sunrise to sunset	Number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ¼ mile or less	Temperature °F: Maximum (b): 90° and above	32° and below	Minimum: 32° and below	0° and below	Average station pressure mb: Elev. 30 feet m.s.l.
JAN	46.3	34.1	40.2	62	30	20	19	762	0	2.21	0.66	27-28	T	T	3	70	71	57	65	35	4.8	10.5	26	34	12		5.5	12	5	14	11	0	0	3	0	2	13	0	1015.3
FEB	47.8	33.7	40.8	69	22	24	12	674	0	6.23	2.71	10-11	3.0	1.9	6	73	74	60	70	36	6.8	13.2	36	06	11		6.0	8	7	13	9	1	0	0	3	0	0	12	0	1015.9
MAR	58.9	43.1	51.0	79	*	34	14	426	0	4.55	1.29	17-18	T	T	31	70	73	55	65	35	3.2	14.5	36	04	24		6.9	7	6	18	13	0	0	3	1	0	0	0	0	1009.5
APR	65.3	46.1	55.7	87	28	33	18	295	21	6.13	1.96	23-24	T	T	19	73	72	47	59	23	3.0	12.2	30	29	17		6.0	9	7	14	14	0	0	*	*	0	0	0	0	1011.9
MAY	75.0	56.5	65.8	89	15	44	18	85	115	3.52	1.26	20	0.0	0.0		79	77	50	61	19	4.7	12.0	29	23	15		5.9	10	5	16	7	0	0	3	0	0	0	0	0	1015.6
JUN	81.8	64.1	73.0	92	28	54	2	3	250	3.84	1.71	20-21	0.0	0.0		85	82	57	64	10	1.8	8.9	27	35	8		5.3	9	12	9	8	0	3	2	2	0	0	0	0	1015.9
JUL	90.1	70.4	80.3	99	16	60	11	0	481	0.77	0.37	5	0.0	0.0		79	74	47	57	28	1.3	7.8	25	22	19		4.8	12	13	6	5	0	4	0	17	0	0	0	0	1015.6
AUG	88.0	70.0	79.0	100	22	59	16	0	440	3.07	1.23	28	0.0	0.0		80	82	54	66	16	1.1	8.3	23	23	23		5.6	6	17	8	8	0	8	1	11	0	0	0	0	1016.3
SEP	80.8	64.7	72.8	99	11	50	25	27	265	4.52	2.64	13-14	0.0	0.0		78	74	54	65	04	2.0	9.4	24	01	29		4.9	13	6	11	8	0	1	0	6	0	0	0	0	1018.3
OCT	70.2	55.2	62.7	86	5	40	29	126	67	5.29	1.94	24-25	0.0	0.0		80	79	60	74	06	3.4	9.5	21	06	30		6.7	8	3	20	11	0	3	1	0	0	0	0	0	1020.3
NOV	62.9	42.3	52.6	78	24	33	18	370	4	3.24	1.34	24-25	0.0	0.0		74	77	51	66	29	3.5	9.7	23	30	25		5.4	12	6	12	9	0	0	1	0	0	0	0	0	1014.9
DEC	49.7	33.5	41.6	69	6	7	25	718	0	6.10	2.76	17-18	T	T	30	71	71	58	64	33	1.9	10.8	28	30	24		6.7	7	7	17	17	0	2	1	0	*	15	0	1020.0
YEAR	68.1	51.1	59.6	100	AUG 22	7	DEC 25	3986	1638	49.47	2.76	DEC 12-13	3.0	1.9	FEB 6	76	76	54	65	34	0.9	10.5	16	04	MAR 24		5.8	113	99	158	115	1	31	14	36	6	80	0	1016.0

Normals, Means, And Extremes

Month	Temperatures °F: Normal: Daily maximum	Daily minimum	Monthly	Extremes: Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F: Heating	Cooling	Precipitation in inches: Water equivalent: Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs.	Year	Snow, ice pellets: Maximum monthly	Year	Maximum in 24 hrs.	Year	Relative humidity pct.: Hour 01 (Local time)	Hour 07 (Local time)	Hour 13 (Local time)	Hour 19 (Local time)	Wind: Mean speed m.p.h.	Prevailing direction through 1963	Fastest mile: Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover, tenths, sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility ¼ mile or less	Temperatures °F: Max. (b): 90° and above	32° and below	Min.: 32° and below	0° and below	Average station pressure mb: Elev. 30 feet m.s.l.
(a)				35		35					35		35		35		35		35		35	35	35	35	35	15	11	11		21	35	35	35	35	35	35	35	35	35	35	35	11
J	38.1	31.7	34.9	78	1970	5	1977	778	0	3.72	6.47	1979	1.05	1981	3.80	1967	14.2	1966	9.1	1973	72	74	59	67	11.5	SW	39	23	1978	56	6.2	9	7	15	10	1	*	2	0	3	17	0	1017.9
F	39.9	32.3	41.1	81	1976	8	1965	669	0	3.28	6.23	1983	0.86	1950	2.71	1983	18.9	1980	12.4	1980	72	74	56	66	11.9	NNE	44	36	1973	59	6.1	9	5	14	10	1	1	3	0	1	15	0	1017.9
M	51.5	39.4	48.5	85	1968	18	1980	512	0	3.86	7.80	1978	1.34	1967	3.18	1958	13.7	1980	9.9	1980	71	73	54	62	12.4	SW	46	22	1973	63	6.1	9	7	15	11	*	2	2	0	*	6	0	1015.6
A	68.2	48.1	58.2	97	1960	28	1982	219	15	2.87	7.00	1979	0.99	1976	2.76	1979	1.2	1964	1.2	1964	73	73	50	60	11.8	SW	39	06	1978	66	5.8	9	9	12	10	*	3	1	*	0	*	0	1015.4
M	75.7	57.2	66.4	97	1956	36	1966	53	96	3.75	10.12	1979	1.48	1965	3.41	1980	0.0		0.0		81	77	56	67	10.3	SW	38	02	1979	65	6.1	8	10	13	10	0	5	2	1	0	0	0	1014.5
J	83.2	65.3	74.3	101	1969	45	1967	0	282	3.45	9.72	1963	0.37	1958	6.85	1963	0.0		0.0		83	79	57	67	9.5	SW	46	30	1977	68	5.8	8	11	11	9	0	6	1	6	0	0	0	1015.2
J	86.9	69.9	78.4	103	1952	54	1979	0	415	5.15	13.73	1975	0.77	1983	5.64	1969	0.0		0.0		85	82	59	70	8.8	SW	46	34	1973	65	5.9	8	12	11	11	0	8	1	11	0	0	0	1015.6
A	85.7	69.6	77.7	104	1980	49	1982	0	394	5.33	11.19	1967	0.74	1975	11.40	1964	0.0		0.0		86	84	61	74	8.8	SW	46	35	1979	65	5.7	8	12	11	10	0	7	1	9	0	0	0	1016.9
S	80.2	64.2	72.2	99	1983	45	1967	9	225	4.35	13.80	1979	0.36	1958	6.79	1959	0.0		0.0		84	84	61	75	9.5	NE	30	06	1979	64	5.7	9	10	11	8	0	3	1	3	0	0	0	1017.0
O	69.8	52.8	61.3	95	1954	27	1976	146	31	3.41	10.12	1971	0.93	1967	4.38	1971	0.0		0.0		82	83	60	75	10.3	NE	48	04	1982	60	5.4	12	7	12	8	0	1	2	*	0	0	0	1018.4
N	60.8	43.0	51.9	86	1974	20	1950	393	0	2.88	7.01	1951	0.49	1965	3.35	1952	0.6	1950	0.6	1950	76	79	56	69	10.6	SW	32	21	1973	59	5.4	11	8	11	8	0	1	2	0	0	3	0	1018.5
D	51.9	35.0	43.5	80	1978	7	1983	667	0	3.17	6.10	1983	0.98	1979	2.76	1983	14.7	1958	11.4	1958	73	75	59	68	11.0	SW	36	36	1982	57	6.0	9	8	14	9	*	*	2	0	1	14	0	1018.7
YR	68.2	50.7	59.5	104	AUG 1980	5	JAN 1977	3446	1458	45.22	13.80	SEP 1979	0.36	SEP 1958	11.40	AUG 1964	18.9	FEB 1980	12.4	FEB 1980	78	78	57	68	10.5	SW	48	04	OCT 1982	63	5.9	109	106	150	115	2	37	21	31	5	55	0	1016.8

NOTE: NORMAL COOLING DEGREE DATA PUBLISHED IN THE 1982 ANNUAL WERE FOR THE 1951-1980 PERIOD.

NORMALS, MEANS, AND EXTREMES TABLE NOTE(S):

1. Percent of possible sunshine is through 1980.

(a) Length of record, years, through the current year unless otherwise noted, based on January data.
(b) 70° and above at Alaskan stations.
* Less than one half.
T Trace.
BLANK entries denote missing or unreported data.

NORMALS - Based on record for the 1951-1980 period.
MEANS - Length of record in (a) is for complete data years.
EXTREMES - Length of record in (a) may be for other than complete or consecutive data years. Date is the most recent in cases of multiple occurrence.
WIND DIRECTION - Numerals indicate tens of degrees clockwise from true north. 00 indicates calm.
FASTEST MILE WIND - Speed is fastest observed 1-minute value when direction is in tens of degrees.

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows:

Temperature
Highest: 105 in Aug. 1918.
Lowest: 2 in Feb. 1895.

Precipitation
Maximum monthly: 15.61 in Aug. 1942.
Minimum monthly: 0.04 in Oct. 1874.

Fastest Mile Wind
Highest: 80mph W in Jun. 1975.

Snowfall
Maximum in 24 hours: 17.7 in Dec. 1892.

APPENDIX I

Ref. 17

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region III - 6th & Walnut Sts.
Philadelphia, Pa. 19106

SUBJECT: Atlantic Wood HRS - Population DATE: 3/29/85

FROM: Darius Ostrauskas

TO: File

Today I spoke with Rob Robinson of the Office of City Planning for the City of Portsmouth regarding information for the above site. He indicated that according to 1980 U.S. Census figures, an estimated 77,000 people reside in Portsmouth within a 4 mile radius of the site. He also indicated that, according to Norfolk Naval Ship Yard publication NNSY P-12330-1 (dated 3-84) and Office of City Planning data, that an estimated 14,000 people reside within $\frac{1}{2}$ mile of the site. An estimated 95-99% of these people work in the Norfolk Naval Shipyard. Mr. Robinson can be reached at 804-393-88

APPENDIX J

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

SUBJECT: Atlantic Wood - Endangered Species DATE: 10/31/85

FROM: Darius Ostrauskes

TO: FILE

Today I spoke with Judy Jacobs (3-922-4197) of the U.S. Fish + Wildlife Service. She said that eagles have been known to nest 10 miles west of the site. However, she would not consider areas within 2 miles of the site to be critical habitat for eagles or any other endangered species.

APPENDIX K

PROJECT NAME: Atlantic Wood Ind. EPA SITE NO.: _____
TDD NO: F3-8405-40 REGION: F, + III

QUALITY ASSURANCE REVIEW OF ORGANIC ANALYSIS LAB DATA PACKAGE

Case No.: 2991
Contract No.: 68-01-6764
Contract Laboratory: Encotec
Applicable IFB No.: WA83-A063
Reviewer: Rock J. Vitale
Review Date: 3/11/85

Applicable Sample No's.: C9153, C9154, C9155, C9156, C9157, C9158, C9159

The organic analytical data for this case has been reviewed. The quality assurance evaluation is summarized in the following table:

Reviewer's Evaluation*	Fraction		
	VOLATILES	ACIDS	BASE/ NEUTRALS
Acceptable			
Acceptable with exception(s)	✓#1, #2	✓#2	✓#1, #2
Questionable			
Unacceptable			

* Definitions of the evaluation score categories are listed on next page.

This evaluation was based upon an analysis of the review items indicated below:

- ● DATA COMPLETENESS
- ● BLANK ANALYSIS RESULTS
- ● SURROGATE SPIKE RESULTS
- ● MATRIX SPIKE RESULTS
- ● DUPLICATE ANALYSIS RESULTS
- n/a ○ EVALUATION OF CONFIRMATIONS
- ● QUANTITATIVE CALCULATIONS
- ≠ ● TARGET COMPOUND MATCHING QUALITY
- ○ TENTATIVELY IDENTIFIED COMPOUNDS
- ± ● CHROMATOGRAPHIC SENSITIVITY CHECKS
- ≠ ● DFTPP AND BFB SPECTRUM TUNE RESULTS
- ≠ ● STANDARDS
- ≠ ● CALIBRATION CHECK STANDARDS
- ms ○ INTERNAL STANDARDS PERFORMANCE

Data review forms are attached for each of the review items indicated above.

≠ No errors noted, no form attached.

◒ Spot Check performed.

Comments: #1 Please see blank analysis documentation
#2 Holding times were exceeded
#3 Quantitation error noted for C9154

DATA EVALUATION SCORE CATEGORIES

ACCEPTABLE: Data is within established control limits, or the data which is outside established control limits does not affect the validity of the analytical results.

ACCEPTABLE WITH EXCEPTION(S): Data is not completely within established control limits. The deficiences are identified and specific data is still valid, given certain qualifications which are listed below.

QUESTIONABLE: Data is not within established control limits. The deficiences bring the validity of the entire data set into question. However, the data validity is neither proved nor disproved by the available information.

UNACCEPTABLE: Data is not within established control limits. The deficiences imply the results are not meaningful.

DATA COMPLETENESS	CONC./MATRIX	LO/AQ	LO/AQ	LO/SOIL	LO/AQ	LO/SOIL	LO/AQ	LO/SOIL					
FRACTION	TRAFFIC REPORT # C91	53	54	55	56	57	58	59	Prep.				
	LAB I.D. # C91	53VOA	54VOA	55VOA	56VOA	57VOA	58VOA	59VOA					
VOA I	RUN DATE/TIME	✓							→				
	TARGET COMPOUND TAB.	✓							→				
	TARGET COMPOUND D.L.	✓							→				
	TENT. I.D. COMPOUND TAB.	✓							→				
	SURROGATE RECOVERY	✓							→				
	GC SCREEN TABULATION	✓							→				
	GC/MS CHROMATOGRAMS	✓							→				
	TARGET CMPD. QUAN. LIST	✓							→				
	TARGET CMPD. SPECTRA	✓							→				
	TENT. I.D. CMPD. Q.L.	✓							→				
	TENT. CMPD. LIB. SRCH.	✓							→				
	CHRO./SENS. CHECKS	✓							→				
	BFB/DFTPP TUNE DATA	✓							→				
	I.S AREAS CHARTS	MS							→				
	I.S. REL. RESP. FORM	MS							→				
	RF & AMTS.: CALIB. CHK.	✓							→				
	RF & AMTS.: 3-PT CALIB.	✓							→				
	Chromatograms: Calib. Chk.	✓							→				
	Chromatograms: 3-Pt. Calib.	✓							→				
	LINEARITY: 3-PT. CALIB	✓							→				
	RF COMPARISON	✓							→				
	SAMPLE/FIELD BLANK						✓	✓					
	METHOD/INSTR. BLANK								✓				
	LAB DUPLICATE	✓				✓							
	FIELD DUP/REP												
	MAT. SPK./M. STD.	✓				✓							

COMMENTS:

DATA COMPLETENESS	CONC./MATRIX	L/AQ	L/AQ	MED/SOL	L/AQ	MED/SOL	L/AQ	L/SOL	
FRACTION	TRAFFIC REPORT # C91	53	54	55	56	57	58	59	Prep.
	LAB I.D. # C91	53BNA	54BNA	55BNA	56BNA	57	58BNA	59BNA	
BNA :	RUN DATE/TIME	✓							→
	TARGET COMPOUND TAB.	✓							→
	TARGET COMPOUND D.L.	✓							→
	TENT. I.D. COMPOUND TAB.	✓							→
	SURROGATE RECOVERY	✓							→
	GC SCREEN TABULATION	✓							→
	GC/MS CHROMATOGRAMS	✓							→
	TARGET CMPD. QUAN. LIST	✓							→
	TARGET CMPD. SPECTRA	✓							→
	TENT. I.D. CMPD. Q.L.	✓							→
	TENT. CMPD. LIB. SRCH.	✓							→
	CHRO./SENS. CHECKS	✓							→
	~~BFB~~/DFTPP TUNE DATA	✓							→
	I.S AREAS CHARTS	MS							→
	I.S. REL. RESP. FORM	MS							→
	RF & AMTS. : CALIB. CHK.	✓							→
	RF & AMTS. : 3-PT CALIB.	✓							→
	Chromatograms: Calib. Chk.	✓							→
	Chromatograms: 3-Pt. Calib.	✓							→
	LINEARITY : 3-PT. CALIB	✓							→
	RF COMPARISON	✓							→
	SAMPLE/FIELD BLANK						✓	✓	
	METHOD/INSTR. BLANK								✓
	LAB DUPLICATE	✓		✓					
	FIELD DUP/REP								
	MAT. SPK./M. STD.	✓		✓					

COMMENTS :

KEY TO DATA COMPLETENESS FORM

Abbreviation Used on Form	Description of Checklist Item
Conc./Matrix	Concentration category submitted in analysis request (low, med, hi); and matrix (sol., aq.)
Fraction	Fill in acid, base/neutral, acid/base/neutral, or volatiles analysis
Run Date/Time	Instrument run date (to be used for correlating calibration)
Target Cmpd. Tab.	Tabulated results for target compounds
Target Cmpd. D.L.	Detection limits for target compounds (actual/level indicated by screen
Tent. I.D. Cmpd. Tab.	Tabulated results for tentatively identified compounds
Surr. Rec.	Surrogate recoveries results
GC Screen Tab.	Tabulated GC screen results indicating required level of followup
GC/MS Chromatograms	Chromatograms of GC/MS analysis runs
Target Cmpd. Quan. List	Target compounds quantitation list, showing areas, ret. times
Target Cmpd. Spectra	Enhanced and unenhanced spectra of target compound hits
Tent. I.D. Cmpd. Q.L.	Quantitation list for tentatively identified compounds
Tent. Cmpd. Lib. Srch.	Spectra and library match spectra of tentatively identified compounds
Chro./Sens. Checks	EICP's and R.R.F.'s for chromatographic sensitivity checks
BFB/DFTPP Tune Data	Spectra intensity lists, and criteria comparison forms for BFB, DFTPP
I.S. Areas Charts	Internal standards area control charts and description of remedial action
I.S. Rel. Resp. Form	Internal standards relative response listings for each sample run
RF and amts.: Calib. Chk.	Tabulated response factors and amount injected for all cmpds. in calibration check
RF and amts.: 3-Pt. Calib.	Tabulated response factors and amount injected for all cmpds. in 3-point calibration
Chromatograms: Calib. Chk.	Chromatograms for calibration check standard
Chromatograms: 3-Pt. Calib.	Chromatograms for 3-point multilevel calibration standards.
Linearity: 3-Pt. Calib.	Tabulated correlation coefficient or relative standard deviation for calibration
RF Comparison	Tabulated comparison of calibration Response Factor with check standard
Sample/Field Blank	Equipment rinse or reagent water blank shipped with samples from field
Method/Instr. Blank	Method or instrument blank which is prepared at lab
Lab Duplicate	Sample which was split by lab for duplicate analysis
Field Dup/Rep	Sample which was split or collected twice in the field
Mat. Spk./M. Std.	Matrix spike or method standard (blind, or done by lab)
Pest. Tab.	Tabulated results for pesticides
Pest. D.L. Tab.	Tabulated detection limits for pesticides
Pest. Chro.	Chromatograms for pesticide screening
2nd Col. Conf.	Confirmation of pesticide results by using a second GC column and temperature
GC/MS Conf.	Confirmation of pesticide results by GC/MS analysis
Pest. Dup., Spk. Blk.	Pesticide duplicate, spike, and blank
Pest. Std. Chro.	Chromatogram of pesticide standard
Pest. Std. I.D.	Pesticide standard identification form
TCDD	2,3,7,8-tetrachlorodibenzodioxin
TCDD Tab., D.L., EICP, Blk.	TCDD tabulated results, detection limits, extracted ion current profile, blank

KEY TO SYMBOLS USED IN DATA COMPLETENESS TABLE

Symbol	Meaning	Symbol	Meaning
✓	Data item present	I	Incomplete data item
NA	Data item not applicable or not required	NC	Data item not clearly explained (units of conc., etc)
P	Data item within established control limits		
F	Data item outside established control limits	* or [number]	See footnote
MS	Missing item	XX/XX/XX XX:XX	Date/Time of run (calibration, etc.)

RUN CHRONICLE

FRACTION: VOA			FRACTION: BNA			FRACTION:		
RUN ORDER	RUN ID / DESCRIPTION	DATE / TIME	RUN ORDER	RUN ID / DESCRIPTION	DATE / TIME	RUN ORDER	RUN ID / DESCRIPTION	DATE / TIME
	C9153	8/24 13:28	✓	C9153	11/8 10:43		-82 days	
	C9154 ✓	8/24 14:05	✓	C9154	9/25 15:21		-39 days.	
	C9155 ✓	8/30 14:09	✓	C9155	11/7/85 16:08		-141 days.	
	C9156 ✓	8/24 14:44	✓	C9156	11/8 11:35		-82 days	
	C9157 ✓	8/30 14:50	✓	C9157	11/6 22:46		-80 days.	
	C9158 ✓	8/2 12:48	✓	C9158	9/2 10:51		-36 days.	
	C9159 ✓	8/30 12:47	✓	C9159	9/22 13:12		-26 days	
	MBLK ✓	8/24 12:07	✓	MBLK	9/22 10:03			
	MBLK ✓	8/30 12:10	✓	MBLK	9/22 11:38			
	MS 9153 ✓	8/24 15:30	✓	MBLK med	11/7 18:32			
	MSD 9153 ✓	8/24 16:07	✓	MS 9153	9/25 16:07			
	MS C9157 ✓	8/30 15:30	✓	MSD 9153	9/25 16:55			
	MSD C9157 ✓	8/30 16:09	✓	MS 9155	11/7 17:00			
			✓	MSD 9155	11/7 17:47			

BLANK ANALYSIS RESULTS FOR TARGET COMPOUNDS

FRACTION	TYPE	CONC	MATRIX	SAMPLE #	SOURCE OF H_2O	CONTAMINANTS (CONCENTRATION / DETECTION LIMIT)
VOA	field	low	AQ	C9158 C9158VOA	NUS	$MeCl_2$ (4ug/L/5)#1 Chloroform (0.12ug/L/5)#2
BNA	field	low	AQ	C9158 C9158BNA	NUS.	Bis(2ehp) (2.8ug/L/10)#2 Di-n-butylphthalate (1.1ug/L/10)#2 Diethylphthalate (0.85ug/L/10)#2
VOA	field	low	Soil	C9159 C9159BNA	NUS	$MeCl_2$ (77ug/L/5)#1 Acetone (13ug/L/5)#1 Toluene (22ug/L/5)#1
BNA	field	low	Soil	C9159 C9159BNA	NUS	N.D.
VOA	lab	low	AQ	VOA BLK 824	Encotec	$MeCl_2$ (2.4ug/L/5)#1 Acetone (45ug/L/5)#1 Styrene (0.38ug/L/5)#2
BNA	lab	low	AQ	2991 WMB KBNA	Encotec.	N.D.
VOA	lab	low	Soil	VOA BLK 830B	Encotec	$MeCl_2$ (9.3ug/L/5)#1 Acetone (12.5ug/L/5)#1
BNA	lab	low	Soil	2991 MBK BNA	Encotec.	Aniline (170ug/300)#2
BNA	lab	med	Soil	2939 BLK MES	Encotec	Phenanthrene (43.9ug/Kg/20,000)#2 Pyrene (49ug/Kg/20,000)#2 Diethylphthalate (0.42ug/L/10)#2

LABORATORY REPORTED FIELD BLANK DATA IS COMPARED WITH THE SAMPLE DATA IN A TABULATION FORM WITHIN THE SAMPLE ANALYTICAL DATA SUMMARY. TENTATIVELY IDENTIFIED COMPOUNDS IN BLANKS ARE LISTED ON A SEPARATE FOF

COMMENTS:

(1) RESULT REPORTED BY LABORATORY AND CONFIRMED BY REVIEWER.

(2) RESULT INFERRED FROM QUANTITATION LIST, DIAGNOSTICS, CHROMATOGRAM AND/OR SPECTRA.

REAGENT BLANK SUMMARY

CASE NO. 2991 | CONTRACTOR Encotec | CONTRACT NO. 68-01-6764
LOW LEVEL ✓ | MED. LEVEL | HIGH LEVEL
WATER ✓ | SOIL/SED. | OTHER (Specify)
QC REPORT NO. | | UNITS (Circle) ug/kg ug/l

FRACTION	CAS NUMBER	COMPOUND	CONCENTRATION	CONTRACT DETECTION LIMITS	COMMENTS
VOLATILES:	123-91-1	1,4-Dioxane	76	N/A	Std (Solvent) artifact
	75-09-2	Methylene Chloride	2	5	
File I.D.	67-64-1	Acetone	45	10	<5xCRQL
V0A0LKB24					
Instrument I.D. 001					
SEMI-VOLATILES:	N/A	UNKNOWN	55	N/A	
File I.D. 2991LUMAKSNA					
Instrument I.D. 001					
PESTICIDES:					
File I.D.					
Instrument I.D.					

FORM IV

REAGENT BLANK SUMMARY

CASE NO. 2991
LOW LEVEL ✓
WATER
QC REPORT NO.

CONTRACTOR ENCOTEC
MED. LEVEL
SOIL/SED. ✓

CONTRACT NO. 68-01-6764
HIGH LEVEL
OTHER (Specify)
UNITS (Circle) ug/Kg (ug/L)

FORM IV

FRACTION	CAS NUMBER	COMPOUND	CONCENTRATION	CONTRACT DETECTION LIMITS	COMMENTS
VOLATILES:	75-09-2	Methylene Chloride	9	5	
	67-64-1	Acetone	7	10	
File I.D.	123-91-1	1,4-DIOXANE	19	N/A	Std(Solvent) Artifact
~~VBBLK8308~~					
Instrument I.D.					
001					
SEMI-VOLATILES:	62-533	ANILINE	170	330	
	N/A	UNKNOWN	500	N/A	Method Artifacts
File I.D.	N/A	UNKNOWN	400		
2991SMBKENA	N/A	UNKNOWN	1,000		
	N/A	UNKNOWN	1,000		
Instrument I.D.	127-18-4	~~UNKNOWN~~ Tetrachloroethene	400		
001	N/A	UNKNOWN	300		
	N/A	UNKNOWN	8,000		
	N/A	UNKNOWN	8,000		
PESTICIDES:					
File I.D.					
Instrument I.D.					

REAGENT BLANK SUMMARY

CASE NO. 2991
LOW LEVEL
WATER
QC REPORT NO.

CONTRACTOR ENCOTEC
MED. LEVEL ✓
SOIL/SED. ✓

CONTRACT NO. 68-01-6764
HIGH LEVEL
OTHER (Specify)
UNITS (Circle) (ug/Kg) ug/l

FRACTION	CAS NUMBER	COMPOUND	CONCENTRATION	CONTRACT DETECTION LIMITS	COMMENTS
VOLATILES:					
File I.D.					
Instrument I.D.					
SEMI-VOLATILES:					
File I.D.					
2939BLKMES	N/A	UNKNOWN	36,000	N/A	
Instrument I.D.					
001					
PESTICIDES:					
File I.D.					
Instrument I.D.					

FORM IV

Exhibit B
Page 14 of 42

WATER SEMIVOLATILE RECOVERY SUMMARY

CASE NO. 2991
LOW LEVEL X
WATER X
QC REPORT NO.

CONTRACTOR ENCOTEC
MED. LEVEL

CONTRACT NO. 68-01-6764
HIGH LEVEL
OTHER (Specify)

[-------Volatile -------][----------Semi-Volatile----------][Pesticide]--[Dioxin]

SMO Traffic Report No.	D_8 Toluene (86-119)	BFB (85-121)	D_4-1,2-Dichloroethane (77-120)	D_5-Nitrobenzene (41-120)	2-Fluorobiphenyl (44-119)	D_{14}-p-Terphenyl (33-128)	D_5-Phenol (15-96)	2-Fluorophenol (23-107)	2,4,6-Tribromophenol (20-105)	Dibutyl-Chlorendate (67-116)**	1,2,3,4-TCDD (23-148
Meth Blk	94	90	98	92	98	104	54	82	91	—	—
C9153	113	109	95	58	72	66	19	40	49	—	—
C9153MS	97	93	110	74	77	148*	54	103	105	—	—
C9153MSD	102	98	99	88	68	147*	42	88	88	—	—
C9154	108	98	113	67	58	104	34	70	104	—	—
C9156	103	96	113	41	45	43	18	35	39	—	—
C9158	103	97	107	94	81	116	53	75	88	—	—

* Asterisked values are outside of QC limits.
** Advisory Limit

Comments:
* High recovery of dyp-Terphenyl for C9153 MS, MSD due to reduced response of internal std dioctylphenol

Volatiles: 0 out of 21; outside of QC limits
Semi-Volatiles: 2 out of 42; outside of QC limits

CASE NO. 2991 CONTRACTOR ENCOTEC CONTRACT NO. 68-01-6764
LOW LEVEL X MED. LEVEL HIGH LEVEL
QC REPORT NO. OTHER (Specify)

[-------Volatile -------][----------Semi-Volatile----------][Pesticide]--[Dioxin]

SHO Traffic Report No.	D_8 Toluene (69-127)	BFB (61-122)	D_4-1,2-Dichloroethane (64-129)	D_5-Nitrobenzene (24-115)	2-Fluorobiphenyl (37-120)	D_{14}-p-Terphenyl (28-133)	D_5-Phenol (20-106)	2-Fluorophenol (24-111)	2,4,6-Tribromophenol (11-102)	Dibutyl Chlorendate (0-205)**	1,2,3,4-TCDD (18-128)*
Method	113	110	95	90	92	114	92	105	79	—	—
C9155	108	113	100	—	—	—	—	—	—	—	—
C9157	101	85	91	—	—	—	—	—	—	—	—
C9157MS	100	84	89	—	—	—	—	—	—	—	—
C9157MSD	101	98	88	—	—	—	—	—	—	—	—
C9159	118	118	101	74	82	97	78	83	89	—	—

* Asterisked values are outside of QC limit.
** Advisory Limits

Comments:
C9155 B/N/A RUN AS MEDIUM LEVEL
C9157 B/N/A RUN AS MEDIUM LEVEL

Volatiles: $\frac{0}{}$ out of $\frac{18}{}$; outside of QC limits
Semi-Volitales: $\frac{0}{}$ out of $\frac{12}{}$; outside of QC limits
Pesticides: — out of —; outside of QC limits

SOIL SURROGATE RECOVERY SUMMARY

CASE NO. 2991 CONTRACTOR ENCOTEC CONTRACT NO. 68-01-6764
LOW LEVEL MED. LEVEL ✓ HIGH LEVEL
QC REPORT NO. OTHER (Specify)

[-------Volatile -------][----------Semi-Volatile----------][Pesticide]--[Dioxin]

SMO Traffic Report No.	D_8 Toluene (69-127)	BFB (61-122)	D_4-1,2-Dichloroethane (64-129)	D_5-Nitrobenzene (24-115)	2-Fluorobiphenyl (37-120)	D_{14}-p-Terphenyl (28-133)	D_5-Phenol (20-106)	2-Fluorophenol (24-111)	2,4,6-Tribromophenol (11-102)	Dibutyl Chlorendate (0-205)**	1,2,3,4-TCDD (18-128)*
~~Method~~	—	—	—	28	40	42	28	66	18	—	—
C9155	—	—	—	26	46	44	53	93	54	—	—
C9155MS	—	—	—	41	54	53	84	101	66	—	—
C9155MSD	—	—	—	33	45	44	73	88	57	—	—
C9157	—	—	—	38	40	35	64	77	49		

* Asterisked values are outside of QC limit.
** Advisory Limits

Comments:

Volatiles: — out of —; outside of QC limits
Semi-Volitales: 01 out of 30; outside of QC limits

FORM V

MATRIX SPIKE DUPLICATE/RECOVERY

CASE NO. 2991 | CONTRACTOR ENCOTEC | CONTRACT NO. 68-01-6764

LOW LEVEL X | MED. LEVEL | HIGH LEVEL

WATER X | SOIL/SED. | OTHER (Specify)

QC REPORT NO. | UNITS (Circle) ug/kg (ug/l)

FRACTION	COMPOUND	CONC. SPIKE ADDED	CONC. MS	% REC.	CONC. MSD	% REC	RPD	QC %RECOVERY LIMITS* RPD	WATER	SOIL	COMMENTS
VOA SMO # C9153	1,1-Dichloroethylene	50	44	88	46	92	4.4	<15%	61-145	59-172	
	Trichloroethylene	50	45	90	49	98	8.6	<15%	71-120	62-137	
	Chlorobenzene	50	44	88	52	104	17*	<15%	75-130	60-133	
	Toluene	50	46	92	48	96	4.2	<15%	76-125	59-139	
	Benzene	50	47	94	51	102	8.2	<15%	76-127	66-142	
B/N SMO # C9153	1,2,4-Trichlorobenzene	50	40	80	35	70	13	<30%	39-98	38-107	
	Acenaphthene	50	42	82	51	102	22	<30%	46-118	31-137	
	2,4-Dinitrotoluene	50	45	90	56	112*	22	<30%	24-96	28-89	
	Di-N-Butylphthalate	50	37	74	55	110	39	<30%	11-117	29-135	
	Pyrene	50	37	74	15	30	85*	<30%	26-127	35-142	
	N-Nitrosodi-N-Propylamine	50	13	26*	17	34*	27	<30%	41-116	41-126	
	1,4-Dichlorobenzene	50	38	76	32	64	17	<30%	36-97	28-104	
ACID SMO # C9153	Pentachlorophenol	100	169	169*	156	156*	8	<40%	9-103	17-109	
	Phenol	100	57	57	51	51*	11	<40%	12-89	26-90	
	2-Chlorophenol	50	48	96	46	92	4	<40%	27-123	25-102	
	P-Chlor-M-Cresol	50	36	72	35	70	3	<40%	23-97	26-103	
	4-Nitrophenol	200	83	42	90	45	7	<40%	10-80	11-114	
PEST SMO # —	Lindane							<40%	56-123	46-127	
	Heptachlor							<40%	40-131	35-130	
	Aldrin							<40%	40-120	34-132	
	Dieldrin							<40%	52-126	31-134	
	Endrin							<40%	56-121	42-139	
	P,P-DDT							<40%	38-127	23-134	

*Asterisked values are outside QC limits.

RPD:
- VOAs 1 out of 5; outside QC limits
- B/N 1 out of 7; outside QC limits
- ACID 0 out of 5; outside QC limits
- PEST — out of —; outside QC limits

RECOVERY:
- VOAs 0 out of 10; outside of QC limits
- B/N 3 out of 14; outside of QC limits
- ACID 2 out of 10; outside of QC limits
- PEST — out of —; outside of QC limits

FORM V

MATRIX SPIKE DUPLICATE/RECOVERY

CASE NO. 2991 | CONTRACTOR ENCOTEC | CONTRACT NO. 68-01-6764
LOW LEVEL ✓ | MED. LEVEL | HIGH LEVEL
WATER | SOIL/SED. X | OTHER (Specify)
QC REPORT NO. | | UNITS (Circle) (ug/kg) ug/

FRACTION	COMPOUND	CONC. SPIKE ADDED	CONC. MS	% REC.	CONC. MSD	% REC	RPD	QC %RECOVERY LIMITS* RPD	WATER	SOIL	COMMENTS
VOA SMO # C9157	1,1-Dichloroethylene	50	33	66	36	72	8.7	<15%	61-145	59-177	
	Trichloroethylene	50	44	88	46	92	4.4	<15%	71-120	62-137	
	Chlorobenzene	50	47	94	51	102	8.1	<15%	75-130	60-133	
	Toluene	50	40	80	40	80	0	<15%	76-125	59-139	
	Benzene	50	49	98	48	96	2.0	<15%	76-127	66-142	
B/N SMO # —	1,2,4-Trichlorobenzene							<60%	39- 98	38-107	
	Acenaphthene							<60%	46-118	31-137	
	2,4-Dinitrotoluene							<60%	24- 96	28- 89	
	Di-N-Butylphthalate							<60%	11-117	29-135	
	Pyrene							<60%	26-127	35-142	
	N-Nitrosodi-N-Propylamine							<60%	41-116	41-126	
	1,4-Dichlorobenzene							<60%	36- 97	28-104	
ACID SMO # —	Pentachlorophenol							<40%	9-103	17-109	
	Phenol							<40%	12- 89	26- 90	
	2-Chlorophenol							<40%	27-123	25-102	
	P-Chlor-M-Cresol							<40%	23- 97	26-103	
	4-Nitrophenol							<40%	10- 80	11-114	
PEST SMO # —	Lindane							<40%	56-123	46-127	
	Heptachlor							<40%	40-131	35-130	
	Aldrin							<40%	40-120	34-132	
	Dieldrin							<40%	52-126	31-134	
	Endrin							<40%	56-121	42-139	
	P,P-DDT							<40%	38-127	23-134	

*Asterisked values are outside QC limits.

RPD: VOAs 0 out of 5 ; outside QC limits
B/N — out of — ; outside QC limits
ACID — out of — ; outside QC limits
PEST — out of — ; outside QC limits

RECOVERY: VOAs 0 out of 10 ; outside of QC limits
B/N — out of — ; outside of QC limits
ACID — out of — ; outside of QC limits
PEST — out of — ; outside of QC limits

FORM 3

MATRIX SPIKE DUPLICATE/RECOVERY

CASE NO. 2991
LOW LEVEL
WATER
QC REPORT NO.

CONTRACTOR ENCOTEC
MED. LEVEL ✓
SOIL/SED. ✓

CONTRACT NO. 68-01-6764
HIGH LEVEL
OTHER (Specify)
UNITS (Circle) (ug/kg), ug/L

FRACTION	COMPOUND	CONC. SPIKE ADDED	CONC. MS	% REC.	CONC. MSD	% REC	RPD	QC RECOVERY LIMITS* RPD	WATER	SOIL	COMMENTS
VOA SMO # —	1,1-Dichloroethylene							<15%	61-145	59-172	
	Trichloroethylene							<15%	71-120	62-137	
	Chlorobenzene							<15%	75-130	60-133	
	Toluene							<15%	76-125	59-139	
	Benzene							<15%	76-127	66-142	
B/N SMO # C9155	1,2,4-Trichlorobenzene	100	87	87	75	75	15	<30%	39- 98	38-107	
	Acenaphthene	100	145	145*	141	141*	3	<30%	46-118	31-137	
	2,4-Dinitrotoluene	100	101	101	90	90	12	<30%	24- 96	28- 89	
	Di-N-Butylphthalate	100	101	101	97	97	4	<30%	11-117	29-130	
	Pyrene	100	170	170*	170	170*	0	<30%	26-127	35-142	
	N-Nitrosodi-N-Propylamine	100	87	87	76	76	13	<30%	41-116	41-126	
	1,4-Dichlorobenzene	100	107	107*	96	96	11	<30%	36- 97	28-104	
ACID SMO # C9155	Pentachlorophenol	100	59	59	67	67	13	<40%	9-103	17-109	
	Phenol	100	78	78	70	70	11	<40%	12- 89	26- 90	
	2-Chlorophenol	100	89	89	77	77	14	<40%	27-123	25-102	
	P-Chlor-M-Cresol	100	81	81	69	69	16	<40%	23- 97	26-103	
	4-Nitrophenol	100	34	34	30	30	12	<40%	10- 80	11-114	
PEST SMO # —	Lindane							<40%	56-123	46-127	
	Heptachlor							<40%	40-131	35-130	
	Aldrin							<40%	40-120	34-132	
	Dieldrin							<40%	52-126	31-134	
	Endrin							<40%	56-121	42-139	
	P,P-DDT							<40%	38-127	23-134	

*Asterisked values are outside QC limits.

RPD: VOAs — out of —; outside QC limits
B/N 0 out of 7; outside QC limits
ACID 0 out of 5; outside QC limits
PEST — out of —; outside QC limits

RECOVERY: VOAs — out of —; outside of QC limits
B/N 5 out of 14; outside of QC limits
ACID 0 out of 10; outside of QC limits
PEST — out of —; outside of QC limits

QUANTITATIVE CALCULATIONS

CALCULATION ERRORS AND CORRECTED RESULTS ARE LISTED BELOW:

#	SCAN	TIME	REF	RRT	METH	AREA	AMOUNT	%TOT	RF(100)/RF	ug/L
[illegible]	[illegible]	[illegible]	24	0.944	A BB	1647.	1.205 NG/UL	0.15		
[illegible]	631	[illegible]	24	1.241 1164	A BB	9586.	8.240 NG/UL	1.05		
[illegible]	390	[illegible]	[illegible]	0.985	A BV	30384.	33.667 NG/UL	4.27	1.108	51
[illegible]	757	[illegible]	25	1.038	A BB	1350.	4.957 NG/UL	0.63		
[illegible]	[illegible]	14:59	[illegible]	1.216	A BB	416.	0.543 NG/UL	0.07		
[illegible]	1054	17:11	[illegible]	[illegible] 1391	A BB	53700.	29.409 NG/UL	3.73	1.021	30 40
[illegible]	1084	[illegible]	26	[illegible]	A BV	29133.	20.432 NG/UL	2.59	1.057	22 29
[illegible]	[illegible]	[illegible]	[illegible]	[illegible] 10.245	BB	1165.	[illegible] NG/UL	[illegible]		
[illegible]	1117	[illegible]	[illegible]	[illegible] 10.274	[illegible]	[illegible]2.	[illegible] NG/UL	[illegible]		
[illegible]	1130			0.890	[illegible]	[illegible]	[illegible]	[illegible]		
	1181			0.072		[illegible]	[illegible]		1.052	10K
	40					675				
	1308			1.010		[illegible]			0.941	2K
	1327			✓		[illegible]			0.892	2K
	1325			✓					0.905	31
	1625			✓					0.948	15
	1912			✓					0.851	4K

100BNA925

Acenaphthene 20.432 x 1.057 ÷ 0.73 = 29.0 ug/L calc. reported 22

Acenaphthylene 29.409 x 1.021 ÷ 0.73 = 41.0 ug/L calc reported 3[illegible]

PROJECT NAME: Atlantic Wood
TDD NO: F3-8405-40

EPA SITE NO.:
REGION: III

QUALITY ASSURANCE REVIEW OF INORGANIC ANALYTICAL DATA PACKAGE

Case No.: 2991
Contract No.: 68-01-6850
Contract Laboratory: RADIAN
Applicable IFB No.: WA-83-A196
Reviewer: Dknobite
Review Date: 8-29-84

Applicable Sample Nos.:
MC3660 — [illegible] 16

The inorganic analytical data for this case has been reviewed. The quality assurance evaluation is summarized in the following table:

Reviewer's Evaluation*	Fraction			
	TASK I ICP or AA METALS	TASK II FURNACE AA METALS	TASK III COLD VAPOR AA MERCURY	TASK III CYANIDE
Acceptable			X	X
Acceptable with exception(s)	X (1)	X (2)		
Questionable				
Unacceptable				

* Definitions of the evaluation score categories are listed on next page.

This evaluation was based upon an analysis of the review items indicated below:

- ● DATA COMPLETENESS
- ● BLANK ANALYSIS RESULTS
- ● MATRIX SPIKE RESULTS
- ● DUPLICATE ANALYSIS RESULTS
- ○ STANDARD ADDITIONS RESULTS
- ● QUANTITATIVE CALCULATIONS
- ● INITIAL CALIBRATION VERIFICATION
- ● CONTINUING CALIBRATION VERIFICATION
- ● INTERFERENCE QC RESULTS
- ● DETECTION LIMITS RESULTS
- ● INSTRUMENT SENSITIVITY REPORTS

Data review forms are attached for each of the review items indicated above.

∓ No errors noted, no form attached.

◒ Spot Check performed.

Comments:

(1) BLANK RESULTS - As Ba Be Cd Co, Pb, Mn Se Sn

(2) DUPLICATE ANALYSIS RESULTS - Pb

DATA EVALUATION SCORE CATEGORIES

ACCEPTABLE: Data is within established control limits, or the data which is outside established control limits does not affect the validity of the analytical results.

ACCEPTABLE WITH EXCEPTION(S): Data is not completely within established control limits. The deficiences are identified and specific data is still valid, given certain qualifications which are listed below.

QUESTIONABLE: Data is not within established control limits. The deficiences bring the validity of the entire data set into question. However, the data validity is neither proved nor disproved by the available information.

UNACCEPTABLE: Data is not within established control limits. The deficiences imply the results are not meaningful.

DATA COMPLETENESS	CONC./ MATRIX	LO AQ	LO AQ	LO SOL	LO AQ	LO SOL	LO AQ	LO SOL								
	TRAFFIC REPORT #	MC 3660	MC 3661	MC 3662	MC 3663	MC 3664	MC 3665	MC 3666								
	LAB I.D. #	8407 04901	8407 04902	8407 04903	8407 04904	8407 04905	8407 04906	8407 04907								
FIELD QC	BLANK						✓	✓								
	DUPLICATE															
	SPIKE															
TASK I: ICAP OR AA: METALS	RAW DATA	✓	✓	✓	✓	✓	✓	✓								
	TAB. RESULTS	✓	✓	✓	✓	✓	✓	✓								
	TAB. D.L.'s	✓	✓	✓	✓	✓	✓	✓								
	QA FORM	✓	✓	✓	✓	✓	✓	✓								
	ICAP INTER. QC	✓	✓	✓	✓	✓	✓	✓								
	INSTR. SENS.	✓	✓	✓	✓	✓	✓	✓								
TASK II: FURNACE AA: METALS	RAW DATA	✓	✓	✓	✓	✓	✓	✓								
	TAB. RESULTS	✓	✓	✓	✓	✓	✓	✓								
	TAB. D.L.'s	✓	✓	✓	✓	✓	✓	✓								
	QA FORM	✓	✓	✓	✓	✓	✓	✓								
	INSTR. SENS.	✓	✓	✓	✓	✓	✓	✓								
TASK II: COLD VAPOR AA: MERCURY	RAW DATA	✓	✓	✓	✓	✓	✓	✓								
	TAB. RESULTS	✓	✓	✓	✓	✓	✓	✓								
	TAB. D.L.'s	✓	✓	✓	✓	✓	✓	✓								
	QA FORM	✓	✓	✓	✓	✓	✓	✓								
	INSTR. SENS.	✓	✓	✓	✓	✓	✓	✓								
TASK III: CYANIDE	RAW DATA	✓	✓	✓	✓	✓	✓	✓								
	TAB. RESULTS	✓	✓	✓	✓	✓	✓	✓								
	TAB. D.L.'s	✓	✓	✓	✓	✓	✓	✓								
	QA FORM.	✓	✓	✓	✓	✓	✓	✓								
	INSTR. SENS.	✓	✓	✓	✓	✓	✓	✓								
OTHER (SPECIFY):	RAW DATA															
	TAB. RESULTS															
	TAB. D.L.'s															
	QA FORM															
	INSTR. SENS.															
OTHER (SPECIFY):	RAW DATA															
	TAB. RUSULTS															
	TAB. D.L.'s															
	QA FORM															
	INSTR. SENS.															

COMMENTS: _____

BLANK ANALYSIS RESULTS

TASK	TYPE	CONC	MATRIX	SAMPLE #	SOURCE OF H_2O	CONTAMINANTS (CONCENTRATION / DETECTION LIMI
INOR. I, II, III	FIELD LO		AQ	MC3665	FISHER	Ba : 17 Pb : 28 Cd : 27 Se : 10 Fe : 140 Sn : 48 } µg/L
INOR. I, II, III	FIELD LO		SOL	MC3666	FISHER	Ba : 11 µg/L
INOR. I, II, III	LAB PREP		AQ	—	RADIAN	As : 3 Cu : 2 Sr : 3 Ba : 1 Fe : 61 Sn : 23 Be : 2.0 Pb : 12 V : 10 Cr : 2 Mn : 2 } µg/L
INOR I, II, III	LAB PREP		SOL	—	RADIAN	As : 3 Fe : 14 Sn : 27 Ba : 8 Pb : 10 Cd : 14 Se : 3 } µg/L

LABORATORY REPORTED FIELD BLANK DATA IS COMPARED WITH THE SAMPLE DATA IN A TABULATION FORM WITHI SAMPLE ANALYTICAL DATA SUMMARY.

COMMENTS:

(1) RESULT REPORTED BY LABORATORY AND CONFIRMED BY REVIEWER.

(2) RESULT INFERRED FROM RAW DATA

BASED UPON THE ABOVE LISTED CONTAMINANT LEVELS THE FOLLOWING DATA POINTS MAY BE QUESTIONABLE (5X RULE APPLIED):

As : MC3660, MC3661	Be : MC3660, MC3663
Ba : MC3660, MC3661, MC3663	Mn : MC3660, MC3661
Cd : MC3660, MC3661 MC3662, MC3663, MC3664	Se : MC3660, MC3661 MC3663, MC3664
Fe : MC3660, MC3661, MC3663, MC3665	
Pb : MC3663, MC3665	Sn : MC3665, MC3662, MC3664

LAB

Duplicate Analysis Results

The applicable duplicate pairs are:

sample no.	MC3660	MC3662				
Field duplicate						
Lab duplicate	✓	✓				
sample level	LO	LO				
sample matrix	AQ	SOL				
TASK	I, II, III	I, II, III				

The relative percent difference (RPD) for each parameter group was evaluated. The duplicate analysis RPD acceptance criteria should be:

MATRIX	maximum acceptable Percent Difference
AQ	± 20
SOL	± 40

The RPD's exceeding the maximum acceptable percent difference were:

MATRIX	Compound	Actual RPD	Comparison Sample	Comparison conc.	Comparison conc.
AQ	Antimony	67	MC3660	6	3 *
	Arsenic	28		3	4 *
	Beryllium	40		2	3 *
	Cadmium	120		1	4 *
	Copper	59		37	68
↓	Zinc	32	↓	29	21
SOL	Cadmium	60	MC3662	1.3	0.7
	Copper	81		19	8.0
↓	Lead	160	↓	36	110

Comments: * High RPD common at or near detection limit

FIELD

Duplicate Analysis Results

The applicable duplicate pairs are:

sample no.						
Field duplicate						
Lab duplicate						
sample level						
sample matrix						
TASK						

The relative percent difference (RPD) for each parameter group was evaluated. The duplicate analysis RPD acceptance criteria should be:

MATRIX	maximum acceptable Percent Difference
	NA

The RPD's exceeding the maximum acceptable percent difference were:

MATRIX	Compound	Actual RPD	Comparison

Comments: _____

MATRIX SPIKE RECOVERIES

Sample No.	MC3661	MC3664				
Field Spike						
Lab Spike	✓	✓				
Matrix	AQ	SOL				
Conc. Level	LO	LO				
Method Std.						
TASK	I, II, III	I, II, III				

All matrix spike recoveries were within the established control ranges specified in; IFB WA8J-A196, Exhibit E, Table 2. ___ Yes X No

Exception(s):

Parameter	Accepted Range (%)	Actual % Rec.	Sample Number	Org. Result	Spike Added	Spike Result	Units
CN	80-120	122	MC3661	<.01	.10	.122	µg/mL

Comments: _____

STANDARD ADDITION RESULTS

Documentation indicates a standard addition correction was performed on all spiked samples for parameters having recoveries outside of control limits: Yes__X__ No_____

For the parameters having poor recoveries in the spiked sample(s), standard additions were also performed on all other samples where the following conditions were met:

(1) The sample matrix was similar to the matrix of the sample which was spiked; and

(2) The parameters in question were detected with postive results.

Yes___ No____ NOT REQUIRED BY CONTRACT

The parameters with poor spike recoveries are listed below, along with the type of standard addition performed(none, 1, 2, or 3 point). The results for these parameters in other samples which have a similar matrix are also listed below:

sample	description of matrix	parameter	recovery	type of std. add.
		N/A		

Comments: _____

Initial Calibration Verification and Continuing Calibration Verification

Documentation indicates calibrations were performed and checked every ten samples: Yes X No

Exceptions: _____

Calibrations and verifications were all within the control limits specified in

WA-83-A196 : Yes ___ No

Outliers are listed below:

Parameter	Acceptable Range (%)	Calibration Identifier	% of True Value	Comments
Antimony	85-115	Continuing	82	
Arsenic	86-114	Continuing	115	

Interference QC Results

Documentation indicates interference QC samples were run before and after every ten samples: Yes ___ No

Exceptions: RUN AT START and FINISH OF SHIFT AS REQUIRED BY CONTRACT

Interference QC results were all within the control limits specified in

_____ : EPA CRL III GUIDELINES 85-115 % Yes X No

Exceptions:

Parameter	Acceptable Range (%)	Calibration Identifier	% of True Value	Comments

Detection Limits Results

Detection limits were reported for all samples analyzed: Yes X No ___

Exceptions: _____

Detection limits were less than or equal to the required detection limits specified in WA-83-A196. Yes X No ___

Exceptions: _____

Instrument Sensitivity Reports

Instrument sensitivity reports were documented for all parameters:

Yes X No ___

Comments: _____

Other Remarks Concerning this Case:

There are currently no established control ranges for ICP interference check standards. However, although not a contractual requirement, 85% - 115% is used here as a tentative guideline for evaluation. Outliers of this tentative control range, if any, are tabulated on the bottom of the preceeding page.

QUANTITATIVE CALCULATIONS

CALCULATION ERRORS AND CORRECTED RESULTS ARE LISTED BELOW:

Parameter	Sample	Reported	Corrected	Units	
As	MC3662	16	11.4	mg/kg	*
	MC3662D	9.1	9.3		
	MC3664	10	11.4		
Pb	MC3663	21	33	µg/L	
	MC3662	36	59.5	mg/kg	**
	MC3662D	110	132		
	MC3664	45	69		
Sn	MC3660	22	ND B	µg/L	
	MC3661	24	ND B	µg/L	
	MC3662	6.3	3.45	mg/kg	
	MC3663	33	ND B	µg/L	*
	MC3664	5.6	3.0	mg/kg	
	MC3665	91	48C	µg/L	

* Contract lab incorrectly performed blank corrections on diluted samples. Blank value should be subtracted after multiplying readout concentration by dilution factor. Corrected results were resubmitted by lab after notification of error

** As above. However, 2nd submission of results also in error.

Corrections made on Sample data Summary

[signature] 7/

APPENDIX L

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: ENCOTEC
Sample ID No: C 9153VCA
Matrix: WATER
Release Authorized By: [signature]

Case No: 2991
QC Report No:
Contract No.: 68-01-6704
Date Sample Received: 7/11/84

VOLATILES

CONCENTRATION: (LOW) MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: N/A
DATE ANALYZED: 7/24/84
PERCENT MOISTURE: N/A
CONC./DILUTION FACTOR: 1:1

CAS #		ug/l or ug/kg (circle one)
107-02-8	acrolein	100 U
107-13-1	acrylonitrile	100 U
71-43-2	benzene	5 U
56-23-5	carbon tetrachloride	5 U
108-90-7	chlorobenzene	5 U
107-06-2	1,2-dichloroethane	5 U
71-55-6	1,1,1-trichloroethane	5 U
75-34-3	1,1-dichloroethane	5 U
79-00-5	1,1,2-trichloroethane	10 U
79-34-5	1,1,2,2-tetrachloroethane	10 U
75-00-3	chloroethane	10 U
110-75-8	2-chloroethylvinyl ether	10 U
67-66-3	chloroform	1 K
75-35-4	1,1-dichloroethene	5 U
156-60-5	trans-1,2-dichloroethene	5 U
78-87-5	1,2-dichloropropane	10 U
10061-02-6	trans-1,3-dichloropropene	5 U
10061-01-05	cis-1,3-dichloropropene	5 U
100-41-4	ethylbenzene	5 U
75-09-2	methylene chloride	2 K
74-87-3	chloromethane	10 U
74-83-9	bromomethane	10 U
75-25-2	bromoform	10 U
75-27-4	bromodichloromethane	5 U
75-69-4	fluorotrichloromethane	—
75-71-8	dichlorodifluoromethane	—
124-48-1	chlorodibromomethane	5 U
127-18-4	tetrachloroethene	5 U
108-88-3	toluene	5 U
79-01-6	trichloroethene	5 U
75-01-4	vinyl chloride	10 U
67-64-1	acetone	5 U
78-93-3	2-butanone	5 U
75-15-0	carbondisulfide	1 U
519-78-6	2-hexanone	5 U
108-10-1	4-methyl-2-pentanone	5 U
100-42-5	styrene	5 U
108-05-4	vinyl acetate	5 U
133-[illegible]0-7	total xylenes	5 U

PESTICIDES

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: N/A
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(89P)	309-00-2	aldrin	
(90P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α-endosulfan	
(96P)	115-29-7	β-endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α-BHC	
(103P)	319-85-7	β-BHC	
(104P)	319-86-8	δ-BHC	
(105P)	58-89-9	γ-BHC (lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: N/A
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	

ORGANICS ANALYSIS DATA SHEET

...tory Name:	ENCOTEC	Case No:	2991
...ample ID No:	RC9153ENA	QC Report No:	
...ple Matrix:	WATER	Contract No.:	68-01-6764
...a Release Authorized By:	[signature]	Date Sample Received:	7/11/84

SEMIVOLATILE COMPOUNDS

CONCENTRATION: (LOW) MEDIUM HIGH (circle one)

DATE EXTRACTED/PREPARED: 7/20/84

DATE ANALYZED: 11/8/84

PERCENT MOISTURE: N/A

PP #	CAS #		(ug/l) or ug/kg (circle one)
21A)	88-06-2	2,4,6-trichlorophenol	20 U
(22A)	59-50-7	p-chloro-m-cresol	20 U
24A)	95-57-8	2-chlorophenol	20 U
31A)	120-83-2	2,4-dichlorophenol	20 U
34A)	105-67-9	2,4-dimethylphenol	20 U
57A)	.8-75-5	2-nitrophenol	40 U
58A)	100-02-7	4-nitrophenol	100 U
59A)	51-28-5	2,4-dinitrophenol	100 U
60A)	534-52-1	4,6-dinitro-2-methylphenol	40 U
64A)	87-86-5	pentachlorophenol	20 U
65A)	108-95-2	phenol	20 U
	65-85-0	benzoic acid	200 U
	95-48-7	2-methylphenol	10 U
	108-39-4	4-methylphenol	10 U
	95-95-4	2,4,5-trichlorophenol	200 U
1B)	83-32-9	acenaphthene	20 U
5B)	92-87-5	benzidine	20 U
8B)	120-82-1	1,2,4-trichlorobenzene	20 U
9B)	118-74-1	hexachlorobenzene	20 U
12B)	67-72-1	hexachloroethane	20 U
18B)	111-44-4	bis(2-chloroethyl)ether	20 U
20B)	91-58-7	2-chloronaphthalene	20 U
25B)	95-50-1	1,2-dichlorobenzene	20 U
26B)	541-73-1	1,3-dichlorobenzene	20 U
27B)	106-46-7	1,4-dichlorobenzene	20 U
28B)	9 -94-1	3,3'-dichlorobenzidine	40 U
35B)	12 -14-2	2,4-dinitrotoluene	40 U
36B)	606-20-2	2,6-dinitrotoluene	40 U
37B)	122-66-7	1,2-diphenylhydrazine	40 U
39B)	206-44-0	fluoranthene	20 U
40B)	7005-72-3	4-chlorophenyl phenyl ether	20 U
41B)	101-55-3	4-bromophenyl phenyl ether	20 U
42B)	39638-32-9	bis(2-chloroisopropyl) ether	40 U
43B)	111-91-1	bis(2-chloroethoxy) methane	40 U

PP #	CAS #		(ug/l) or ug/kg (circle one)
(52B)	87-68-3	hexachlorobutadiene	[illegible]
(53B)	77-47-4	hexachlorocyclopentadiene	[illegible]
(54B)	78-59-1	isophorone	[illegible]
(55B)	91-20-3	naphthalene	[illegible]
(56B)	98-95-3	nitrobenzene	[illegible]
(62B)	86-30-6	N-nitrosodiphenylamine	[illegible]
(63B)	621-64-7	N-nitrosodipropylamine	[illegible]
(66B)	117-81-7	bis(2-ethylhexyl) phthalate	4 K
(67B)	85-68-7	benzyl butyl phthalate	[illegible]
(68B)	84-74-2	di-n-butyl phthalate	2 K
(69B)	117-84-0	di-n-octyl phthalate	[illegible]
(70B)	84-66-2	diethyl phthalate	4 K
(71B)	131-11-3	dimethyl phthalate	[illegible]
(72B)	56-55-3	benzo(a)anthracene	[illegible]
(73B)	50-32-8	benzo(a)pyrene	[illegible]
(74B)	205-99-2	benzo(b)fluoranthene	[illegible]
(75B)	207-08-9	benzo(k)fluoranthene	[illegible]
(76B)	218-01-9	chrysene	[illegible]
(77B)	208-96-8	acenaphthylene	[illegible]
(78B)	120-12-7	anthracene	[illegible]
(79B)	191-24-2	benzo(ghi)perylene	[illegible]
(80B)	86-73-7	fluorene	[illegible]
(81B)	85-01-8	phenanthrene	[illegible]
(82B)	53-70-3	dibenzo(a,h)anthracene	[illegible]
(83B)	193-39-5	indeno(1,2,3-cd)pyrene	[illegible]
(84B)	129-00-0	pyrene	[illegible]
	62-53-3	aniline	[illegible]
	100-51-6	benzyl alcohol	[illegible]
	106-47-8	4-chloroaniline	[illegible]
	132-64-9	dibenzofuran	[illegible]
	91-57-6	2-methylnaphthalene	[illegible]
	88-74-4	2-nitroaniline	[illegible]
	99-09-2	3-nitroaniline	[illegible]
	100-01-6	4-nitroaniline	[illegible]

LC 9157

ORGANICS ANALYSIS DATA SHEET

...tory Name: ENCOTEC
...mple ID No: C 9154 VSA
... Matrix: WATER
Release Authorized By: [signature]

Case No: 2991
QC Report No:
Contract No: 68-01-6764
Date Sample Received: 7/11/84

VOLATILES

...CENTRATION: (LOW) MEDIUM HIGH (circle one)
...E EXTRACTED/PREPARED: N/A
...E ANALYZED: 8/24/84
...CENT MOISTURE: N/A
...C./DILUTION FACTOR: 1:1

CAS #		(ug/l) or ug/kg (circle one)
107-02-8	acrolein	100 u
107-13-1	acrylonitrile	100 u
71-43-2	benzene	3 K
56-23-5	carbon tetrachloride	5 u
108-90-7	chlorobenzene	5 u
107-06-2	1,2-dichloroethane	5 u
71-55-6	1,1,1-trichloroethane	5 u
75-34-3	1,1-dichloroethane	5 u
79-00-5	1,1,2-trichloroethane	10 u
79-34-5	1,1,2,2-tetrachloroethane	10 u
75-00-3	chloroethane	10 u
110-75-8	2-chloroethylvinyl ether	10 u
67-66-3	chloroform	5 u
75-35-4	1,1-dichloroethene	5 u
156-60-5	trans-1,2-dichloroethene	5 u
78-87-5	1,2-dichloropropane	10 u
10061-02-6	trans-1,3-dichloropropene	5 u
10061-01-05	cis-1,3-dichloropropene	5 u
100-41-4	ethylbenzene	5 u
75-09-2	methylene chloride	4 K
74-87-3	chloromethane	10 u
74-83-9	bromomethane	10 u
75-25-2	bromoform	10 u
75-27-4	bromodichloromethane	5 u
75-69-4	fluorotrichloromethane	—
75-71-8	dichlorodifluoromethane	—
124-48-1	chlorodibromomethane	5 u
127-18-4	tetrachloroethene	5 u
108-88-3	toluene	5 u
79-01-6	trichloroethene	5 u
75-01-4	vinyl chloride	10 u
67-64-1	acetone	5 u
78-93-3	2-butanone	5 u
75-15-0	carbondisulfide	1 u
519-78-6	2-hexanone	5 u
108-10-1	4-methyl-2-pentanone	5 u
100-42-5	styrene	5 u
108-05-4	vinyl acetate	5 u
[illegible]	[illegible]	5 u

PESTICIDES

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: N/A
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(89P)	309-00-2	aldrin	
(90P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α-endosulfan	
(96P)	115-29-7	β-endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α-BHC	
(103P)	319-85-7	β-BHC	
(104P)	319-86-8	δ-BHC	
(105P)	58-89-9	γ-BHC (lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: N/A
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: ENCOTEC
Lab Sample ID No: C91546NA
Sample Matrix: WATER
Data Release Authorized By:
Case No: 2991
QC Report No:
Contract No: 68-01-6764
Date Sample Received: 7/11/84

SEMIVOLATILE COMPOUNDS

CONCENTRATION: (LOW) MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: 7/20/84
DATE ANALYZED: 9/25/84
PERCENT MOISTURE: N/A

PP #	CAS #		ug/l or ug/kg (circle one)
(21A)	88-06-2	2,4,6-trichlorophenol	10 U
(22A)	59-50-7	p-chloro-m-cresol	10 U
(24A)	95-57-8	2-chlorophenol	10 U
(31A)	120-83-2	2,4-dichlorophenol	10 U
(34A)	105-67-9	2,4-dimethylphenol	51
(37A)	88-75-5	2-nitrophenol	20 U
(38A)	100-02-7	4-nitrophenol	50 U
(49A)	51-28-5	2,4-dinitrophenol	50 U
(50A)	534-52-1	4,6-dinitro-2-methylphenol	20 U
(64A)	87-86-5	pentachlorophenol	10 U
(65A)	108-95-2	phenol	10 U
	65-85-0	benzoic acid	100 U
	95-48-7	2-methylphenol	5 U
	108-39-4	4-methylphenol	5 U
	95-95-4	2,4,5-trichlorophenol	100 U
(1B)	83-32-9	acenaphthene	22
(2B)	92-87-5	benzidine	40 U
(3B)	120-82-1	1,2,4-trichlorobenzene	10 U
(4B)	118-74-1	hexachlorobenzene	10 U
(5B)	67-72-1	hexachloroethane	10 U
(6B)	111-44-4	bis(2-chloroethyl)ether	10 U
(7B)	91-58-7	2-chloronaphthalene	10 U
(8B)	95-50-1	1,2-dichlorobenzene	10 U
(9B)	541-73-1	1,3-dichlorobenzene	10 U
(10B)	106-46-7	1,4-dichlorobenzene	10 U
(11B)	91-94-1	3,3'-dichlorobenzidine	20 U
(12B)	121-14-2	2,4-dinitrotoluene	20 U
(13B)	606-20-2	2,6-dinitrotoluene	20 U
(14B)	122-66-7	1,2-diphenylhydrazine	20 U
(15B)	206-44-0	fluoranthene	31
(16B)	7005-72-3	4-chlorophenyl phenyl ether	10 U
(17B)	101-55-3	4-bromophenyl phenyl ether	10 U
(18B)	39638-32-9	bis(2-chloroisopropyl) ether	20 U
(19B)	111-91-1	bis(2-chloroethoxy) methane	20 U

PP #	CAS #		ug/l or ug/kg (circle one)
(52B)	87-68-3	hexachlorobutadiene	10 U
(53B)	77-47-4	hexachlorocyclopentadiene	10 U
(54B)	78-59-1	isophorone	10 U
(55B)	91-20-3	naphthalene	10 U
(56B)	98-95-3	nitrobenzene	10 U
(57B)	86-30-6	N-nitrosodiphenylamine	10 U
(63B)	621-64-7	N-nitrosodipropylamine	10 U
(66B)	117-81-7	bis(2-ethylhexyl) phthalate	4K
(67B)	85-68-7	benzyl butyl phthalate	10 U
(68B)	84-74-2	di-n-butyl phthalate	2K
(69B)	117-84-0	di-n-octyl phthalate	10 U
(70B)	84-66-2	diethyl phthalate	10 U
(71B)	131-11-3	dimethyl phthalate	10 U
(72B)	56-55-3	benzo(a)anthracene	10 U
(73B)	50-32-8	benzo(a)pyrene	20 U
(74B)	205-99-2	benzo(b)fluoranthene	20 U
(75B)	207-08-9	benzo(k)fluoranthene	20 U
(76B)	218-01-9	chrysene	10 U
(77B)	208-96-8	acenaphthylene	30
(78B)	120-12-7	anthracene	2K
(79B)	191-24-2	benzo(ghi)perylene	20 U
(80B)	86-73-7	fluorene	10 U
(81B)	85-01-8	phenanthrene	10 U
(82B)	53-70-3	dibenzo(a,h)anthracene	20 U
(83B)	193-39-5	indeno(1,2,3-cd)pyrene	20 U
(84B)	129-00-0	pyrene	15
	62-53-3	aniline	5 U ~~2~~
	100-51-6	benzyl alcohol	20 U
	106-47-8	4-chloroaniline	50 U
	132-64-9	dibenzofuran	10 U
	91-57-6	2-methylnaphthalene	20 U
	88-74-4	2-nitroaniline	100 U
	99-09-2	3-nitroaniline	100 U
	100-01-6	4-nitroaniline	100 U

C9155

ORGANICS ANALYSIS DATA SHEET

oratory Name: ENCOTEC
Sample ID No: C9155V0A
ple Matrix: SOIL
Release Authorized By: [signature]

Case No: 2991
QC Report No:
Contract No: 68-01-6764
Date Sample Received: 7/11/84

VOLATILES

ONCENTRATION: (LOW) MEDIUM HIGH (circle one)
ATE EXTRACTED/PREPARED: N/A
ATE ANALYZED: 8/3/84
ERCENT MOISTURE: 15
ONC./DILUTION FACTOR: 1

P #	CAS #		ug/l or ug/kg (circle one)
(1V)	107-02-8	acrolein	100 U
(2V)	107-13-1	acrylonitrile	100 U
(3V)	71-43-2	benzene	2K
(4V)	56-23-5	carbon tetrachloride	5 U
(5V)	108-90-7	chlorobenzene	5 U
(6V)	107-06-2	1,2-dichloroethane	5 U
(7V)	71-55-6	1,1,1-trichloroethane	5 U
(8V)	75-34-3	1,1-dichloroethane	5 U
(9V)	79-00-5	1,1,2-trichloroethane	10 U
(10V)	79-34-5	1,1,2,2-tetrachloroethane	10 U
(11V)	75-00-3	chloroethane	10 U
(12V)	110-75-8	2-chloroethylvinyl ether	10 U
(13V)	67-66-3	chloroform	5 U
(14V)	75-35-4	1,1-dichloroethene	5 U
(15V)	156-60-5	trans-1,2-dichloroethene	5 U
(16V)	78-87-5	1,2-dichloropropane	10 U
(17V)	10061-02-6	trans-1,3-dichloropropene	5 U
	10061-01-05	cis-1,3-dichloropropene	5 U
(18V)	100-41-4	ethylbenzene	730
(19V)	75-09-2	methylene chloride	16
(20V)	74-87-3	chloromethane	10 U
(21V)	74-83-9	bromomethane	10 U
(22V)	75-25-2	bromoform	10 U
(23V)	75-27-4	bromodichloromethane	5 U
(24V)	75-69-4	fluorotrichloromethane	—
(25V)	75-71-8	dichlorodifluoromethane	—
(26V)	124-48-1	chlorodibromomethane	5 U
(27V)	127-18-4	tetrachloroethene	5 U
(28V)	108-88-3	toluene	200
(29V)	79-01-6	trichloroethene	5 U
(30V)	75-01-4	vinyl chloride	10 U
	67-64-1	acetone	25
	78-93-3	2-butanone	5 U
	75-15-0	carbondisulfide	1 U
	591-78-6	2-hexanone	5 U
	108-10-1	4-methyl-2-pentanone	5 U
	100-42-5	styrene	320
	108-05-4	vinyl acetate	5 U

PESTICIDES

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: N/A
DATE ANALYZED: N/A
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(89P)	309-00-2	aldrin	
(90P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α -endosulfan	
(96P)	115-29-7	β -endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α -BHC	
(103P)	319-85-7	β -BHC	
(104P)	319-86-8	δ -BHC	
(105P)	58-89-9	γ -BHC (Lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: N/A
DATE ANALYZED: N/A
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: ENCOTEC
Case No: 2991
Lab Sample ID No: C91EGBNA
QC Report No:
Sample Matrix: SOIL
Contract No.: 68-01-6764
Data Release Authorized By: [signature]
Date Sample Received: 7/11/84

SEMIVOLATILE COMPOUNDS

CONCENTRATION: LOW (MEDIUM) HIGH (circle one)
DATE EXTRACTED/PREPARED: 11/7/84
DATE ANALYZED: 11/7/84
PERCENT MOISTURE: 15

PP #	CAS #		ug/l or ug/kg (circle one)
(21A)	88-06-2	2,4,6- trichlorophenol	24,000 U
(22A)	59-50-7	p-chloro-m-cresol	24,000 U
(24A)	95-57-8	2- chlorophenol	24,000 U
(31A)	120-83-2	2,4-dichlorophenol	24,000 U
(34A)	105-67-9	2,4-dimethylphenol	24,000 U
(37A)	88-75-5	2- nitrophenol	48,000 U
(38A)	100-02-7	4-nitrophenol	110,000 U
(39A)	51-28-5	2,4-dinitrophenol	110,000 U
(40A)	534-52-1	4,6-dinitro-2-methylphenol	48,000 U
(64A)	87-86-5	pentachlorophenol	24,000 U
(65A)	108-95-2	phenol	24,000 U
	65-85-0	benzoic acid	220,000 U
	95-48-7	2-methylphenol	24,000 U
	108-39-4	4-methylphenol	24,000 U
	95-95-4	2,4,5-trichlorophenol	220,000 U
(1B)	83-32-9	acenaphthene	110,000
(2B)	92-87-5	benzidine	94,000 U
(3B)	120-82-1	1,2,4-trichlorobenzene	24,000 U
(4B)	118-74-1	hexachlorobenzene	24,000 U
(5B)	67-72-1	hexachloroethane	24,000 U
(8B)	111-44-4	bis(2-chloroethyl)ether	24,000 U
(10B)	91-58-7	2-chloronaphthalene	24,000 U
(11B)	95-50-1	1,2-dichlorobenzene	24,000 U
(12B)	541-73-1	1,3-dichlorobenzene	24,000 U
(13B)	106-46-7	1,4-dichlorobenzene	24,000 U
(14B)	91-94-1	3,3'-dichlorobenzidine	48,000 U
(15B)	121-14-2	2,4-dinitrotoluene	48,000 U
(16B)	606-20-2	2,6-dinitrotoluene	48,000 U
(17B)	122-66-7	1,2-diphenylhydrazine	48,000 U
(19B)	206-44-0	fluoranthene	160,000
(20B)	7005-72-3	4-chlorophenyl phenyl ether	24,000 U
(21B)	101-55-3	4-bromophenyl phenyl ether	24,000 U
(22B)	39638-32-9	bis (2-chloroisopropyl) ether	24,000 U
(23B)	111-91-1	bis (2-chloroethoxy) methane	24,000 U

PP #	CAS #		ug/l or ug/kg (circle one)
(52B)	87-68-3	hexachlorobutadiene	24,000 U
(53B)	77-47-4	hexachlorocyclopentadiene	84,000
(54B)	78-59-1	isophorone	24,000 U
(55B)	91-20-3	naphthalene	80,000
(56B)	98-95-3	nitrobenzene	24,000 U
(62B)	86-30-6	N-nitrosodiphenylamine	24,000 U
(63B)	621-64-7	N-nitrosodipropylamine	24,000 U
(66B)	117-81-7	bis (2-ethylhexyl) phthalate	24,000 U
(67B)	85-68-7	benzyl butyl phthalate	24,000 U
(68B)	84-74-2	di-n-butyl phthalate	24,000 U
(69B)	117-84-0	di-n-octyl phthalate	24,000 U
(70B)	84-66-2	diethyl phthalate	24,000 U
(71B)	131-11-3	dimethyl phthalate	24,000 U
(72B)	56-55-3	benzo(a)anthracene	24,000 K
(73B)	50-32-8	benzo(a)pyrene	12,000 K
(74B)	205-99-2	benzo(b)fluoranthene	48,000 U
(75B)	207-08-9	benzo(k)fluoranthene	20,000 K
(76B)	218-01-9	chrysene	23,000 K
(77B)	208-96-8	acenaphthylene	5,000 K
(78B)	120-12-7	anthracene	50,000
(79B)	191-24-2	benzo(ghi)perylene	48,000 U
(80B)	86-73-7	fluorene	96,000
(81B)	85-01-8	phenanthrene	320,000
(82B)	53-70-3	dibenzo(a,h)anthracene	48,000 U
(83B)	193-39-5	indeno(1,2,3-cd)pyrene	48,000 U
(84B)	129-00-0	pyrene	99,000
	62-53-3	aniline	24,000 U
	100-51-6	benzyl alcohol	48,000 U
	106-47-8	4-chloroaniline	110,000 U
	132-64-9	dibenzofuran	74,000
	91-57-6	2-methylnaphthalene	110,000
	88-74-4	2-nitroaniline	220,000 U
	99-09-2	3-nitroaniline	220,000 U
	100-01-6	4-nitroaniline	220,000 U

ORGANICS ANALYSIS DATA SHEET

atory Name: ENCOTEC
ample ID No: C9156VOA
e Matrix: WATER
Release Authorized By: [signature]

Case No: 2991
QC Report No:
Contract No: 68-01-6764
Date Sample Received: 7/11/84

VOLATILES

NCENTRATION: (LOW) MEDIUM HIGH (circle one)
TE EXTRACTED/PREPARED: N/A
TE ANALYZED: 8/2/84
RCENT MOISTURE: N/A
NC./DILUTION FACTOR: 1:1

CAS #		ug/l or ug/kg (circle one)
107-02-8	acrolein	100 U
107-13-1	acrylonitrile	100 U
71-43-2	benzene	38
56-23-5	carbon tetrachloride	5 U
108-90-7	chlorobenzene	5 U
107-06-2	1,2-dichloroethane	5 U
71-55-6	1,1,1-trichloroethane	5 U
75-34-3	1,1-dichloroethane	5 U
79-00-5	1,1,2-trichloroethane	10 U
79-34-5	1,1,2,2-tetrachloroethane	10 U
75-00-3	chloroethane	10 U
110-75-8	2-chloroethylvinyl ether	10 U
67-66-3	chloroform	5 U
75-35-4	1,1-dichloroethene	5 U
156-60-5	trans-1,2-dichloroethene	5 U
78-87-5	1,2-dichloropropane	10 U
10061-02-6	trans-1,3-dichloropropene	5 U
10061-01-05	cis-1,3-dichloropropene	5 U
100-41-4	ethylbenzene	8
75-09-2	methylene chloride	1 K
74-87-3	chloromethane	10 U
74-83-9	bromomethane	10 U
75-25-2	bromoform	10 U
75-27-4	bromodichloromethane	5 U
75-69-4	fluorotrichloromethane	—
75-71-8	dichlorodifluoromethane	—
124-48-1	chlorodibromomethane	5 U
127-18-4	tetrachloroethene	5 U
108-88-3	toluene	40
79-01-6	trichloroethene	5 U
75-01-4	vinyl chloride	10 U
67-64-1	acetone	5 U
78-93-3	2-butanone	5 U
75-15-0	carbon disulfide	1 U
519-78-6	2-hexanone	5 U
108-10-1	4-methyl-2-pentanone	5 U
100-42-5	styrene	5 U
108-05-4	vinyl acetate	5 U
1330-20-7	total xylenes	75

PESTICIDES

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: N/A
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(89P)	309-00-2	aldrin	
(90P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α-endosulfan	
(96P)	115-29-7	β-endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α-BHC	
(103P)	319-85-7	β-BHC	
(104P)	319-86-8	δ-BHC	
(105P)	58-89-9	γ-BHC (lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: N/A
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	

ORGANICS ANALYSIS DATA SHEET

Laboratory Name:	ENCOTEC	Case No:	2991
Lab Sample ID No:	1229156 BNA	QC Report No:	
Sample Matrix:	Water	Contract No:	68-01-6764
Data Release Authorized By:	[signature]	Date Sample Received:	7/11/84

SEMIVOLATILE COMPOUNDS

CONCENTRATION: (LOW) MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: 7/20/84
DATE ANALYZED: 11/8/84
PERCENT MOISTURE: N/A

PP #	CAS #		(ug/l) or ug/Kg (circle one)
(21A)	88-06-2	2,4,6-[illegible]	10
(22A)	59-50-7	p-chloro-m-cresol	10 U
(24A)	95-57-8	2-chlorophenol	10 U
(31A)	120-83-2	2,4-dichlorophenol	10 U
(34A)	105-67-9	2,4-dimethylphenol	10 U
(57A)	88-75-5	2-nitrophenol	20 U
(58A)	100-02-7	4-nitrophenol	50 U
(59A)	51-28-5	2,4-dinitrophenol	50 U
(60A)	534-52-1	4,6-dinitro-2-methylphenol	20 U
(64A)	87-86-5	pentachlorophenol	10 U
(65A)	108-95-2	phenol	10 U
	65-85-0	benzoic acid	100 U
	95-48-7	2-methylphenol	5 U
	106-44-5	4-methylphenol	5 U
	95-95-4	2,4,5-trichlorophenol	100 U
(1B)	83-32-9	acenaphthene	10 U
(5B)	92-87-5	benzidine	40 U
(8B)	120-82-1	1,2,4-trichlorobenzene	10 U
(9B)	118-74-1	hexachlorobenzene	10 U
(12B)	67-72-1	hexachloroethane	10 U
(18B)	111-44-4	bis(2-chloroethyl)ether	10 U
(20B)	91-58-7	2-chloronaphthalene	10 U
(25B)	95-50-1	1,2-dichlorobenzene	10 U
(26B)	541-73-1	1,3-dichlorobenzene	10 U
(27B)	106-46-7	1,4-dichlorobenzene	10 U
(28B)	91-94-1	3,3'-dichlorobenzidine	20 U
(35B)	121-14-2	2,4-dinitrotoluene	20 U
(36B)	606-20-2	2,6-dinitrotoluene	20 U
(37B)	122-66-7	1,2-diphenylhydrazine	20 U
(39B)	206-44-0	fluoranthene	10 U
(40B)	7005-72-3	4-chlorophenyl phenyl ether	10 U
(41B)	101-55-3	4-bromophenyl phenyl ether	10 U
(42B)	39638-32-9	bis(2-chloroisopropyl) ether	20 U
(43B)	111-91-1	bis(2-chloroethoxy) methane	20 U

PP #	CAS #		(ug/l) or ug/Kg (circle one)
(52B)	87-68-3	hexachlorobutadiene	10
(53B)	77-47-4	hexachlorocyclopentadiene	10
(54B)	78-59-1	isophorone	1
(55B)	91-20-3	naphthalene	1
(56B)	98-95-3	nitrobenzene	1
(62B)	86-30-6	N-nitrosodiphenylamine	1
(63B)	621-64-7	N-nitrosodipropylamine	1
(66B)	117-81-7	bis (2-ethylhexyl) phthalate	17
(67B)	85-68-7	benzyl butyl phthalate	1
(68B)	84-74-2	di-n-butyl phthalate	3K
(69B)	117-84-0	di-n-octyl phthalate	1
(70B)	84-66-2	diethyl phthalate	2K
(71B)	131-11-3	dimethyl phthalate	1
(72B)	56-55-3	benzo(a)anthracene	1
(73B)	50-32-8	benzo(a)pyrene	2
(74B)	205-99-2	benzo(b)fluoranthene	2
(75B)	207-08-9	benzo(k)fluoranthene	2
(76B)	218-01-9	chrysene	1
(77B)	208-96-8	acenaphthylene	1
(78B)	120-12-7	anthracene	1
(79B)	191-24-2	benzo(ghi)perylene	2
(80B)	86-73-7	fluorene	1
(81B)	85-01-8	phenanthrene	1
(82B)	53-70-3	dibenzo(a,h)anthracene	2
(83B)	193-39-5	indeno(1,2,3-cd)pyrene	2
(84B)	129-00-0	pyrene	1
	62-53-3	aniline	[illegible]
	100-51-6	benzyl alcohol	2
	106-47-8	4-chloroaniline	[illegible]
	132-64-9	dibenzofuran	1
	91-57-6	2-methylnaphthalene	2
	88-74-4	2-nitroaniline	1
	99-09-2	3-nitroaniline	1
	100-01-6	4-nitroaniline	1

ORGANICS ANALYSIS DATA SHEET

atory Name: ENCOTEC
ample ID No: C9157 VOA
e Matrix: SOIL
Release Authorized By: [signature]

Case No: 2991
QC Report No:
Contract No: 68-01-6764
Date Sample Received: 7/11/84

VOLATILES

NCENTRATION: (LOW) MEDIUM HIGH (circle one)
TE EXTRACTED/PREPARED: N/A
TE ANALYZED: 8/30/84
RCENT MOISTURE: 27
NC./DILUTION FACTOR: 1:5

	CAS #		ug/l or ug/kg (circle one)
	107-02-8	acrolein	500u
	107-13-1	acrylonitrile	500u
	71-43-2	benzene	89
	56-23-5	carbon tetrachloride	25u
	108-90-7	chlorobenzene	25u
)	107-06-2	1,2-dichloroethane	25u
)	71-55-6	1,1,1-trichloroethane	25u
)	75-34-3	1,1-dichloroethane	25u
)	79-00-5	1,1,2-trichloroethane	25u
)	79-34-5	1,1,2,2-tetrachloroethane	50u
)	75-00-3	chloroethane	50u
)	110-75-8	2-chloroethylvinyl ether	50u
)	67-66-3	chloroform	25u
)	75-35-4	1,1-dichloroethene	25u
)	156-60-5	trans-1,2-dichloroethene	25u
)	78-87-5	1,2-dichloropropane	50u
)	10061-02-6	trans-1,3-dichloropropene	25u
	10061-01-05	cis-1,3-dichloropropene	25u
)	100-41-4	ethylbenzene	1,200
)	75-09-2	methylene chloride	48
)	74-87-3	chloromethane	50
)	74-83-9	bromomethane	50u
)	75-25-2	bromoform	50u
)	75-27-4	bromodichloromethane	25u
)	75-69-4	fluorotrichloromethane	—
)	75-71-8	dichlorodifluoromethane	—
)	124-48-1	chlorodibromomethane	25u
)	127-18-4	tetrachloroethene	25u
)	108-88-3	toluene	480
)	71-01-6	trichloroethene	25u
)	75-01-4	vinyl chloride	50u
	67-64-1	acetone	150
	78-93-3	2-butanone	25u
	75-15-0	carbon disulfide	5u
	591-78-6	2-hexanone	25u
	108-10-1	4-methyl-2-pentanone	25u
	100-42-5	styrene	190
	108-05-4	vinyl acetate	25u
	1330-20-7	total xylenes	2,300

PESTICIDES

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(89P)	309-00-2	aldrin	
(90P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α-endosulfan	
(96P)	115-29-7	β-endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α-BHC	
(103P)	319-85-7	β-BHC	
(104P)	319-86-8	δ-BHC	
(105P)	58-89-9	γ-BHC (lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED:
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: ENCOTEC
Lab Sample ID No: C91573BNA
Sample Matrix: SOIL
Data Release Authorized By:

Case No: 2991
QC Report No:
Contract No: 68-01-6764
Date Sample Received: 7/11/84

SEMIVOLATILE COMPOUNDS

CONCENTRATION: LOW (MEDIUM) HIGH (circle one)
DATE EXTRACTED/PREPARED: 11/7/84
DATE ANALYZED: 11/6/84
PERCENT MOISTURE: 27

EPP #	CAS #		ug/l or ug/kg (circle one)
(21A)	88-06-2	2,4,6-trichlorophenol	27,000 U
(22A)	59-50-7	p-chloro-m-cresol	27,000 U
(24A)	95-57-8	2-chlorophenol	27,000 U
(31A)	120-83-2	2,4-dichlorophenol	27,000 U
(34A)	105-67-9	2,4-dimethylphenol	27,000 U
(37A)	88-75-5	2-nitrophenol	55,000 U
(38A)	100-02-7	4-nitrophenol	140,000 U
(39A)	51-28-5	2,4-dinitrophenol	140,000 U
(40A)	534-52-1	4,6-dinitro-2-methylphenol	55,000 U
(64A)	87-86-5	pentachlorophenol	27,000 U
(65A)	108-95-2	phenol	27,000 U
	65-85-0	benzoic acid	270,000 U
	95-48-7	2-methylphenol	27,000 U
	108-39-4	4-methylphenol	27,000 U
	95-95-4	2,4,5-trichlorophenol	270,000 U
(1B)	83-32-9	acenaphthene	460,000
(2B)	92-87-5	benzidine	110,000 U
(3B)	120-82-1	1,2,4-trichlorobenzene	27,000 U
(4B)	118-74-1	hexachlorobenzene	27,000 U
(5B)	67-72-1	hexachloroethane	27,000 U
(6B)	111-44-4	bis(2-chloroethyl)ether	27,000 U
(8B)	91-58-7	2-chloronaphthalene	27,000 U
(9B)	95-50-1	1,2-dichlorobenzene	27,000 U
(10B)	541-73-1	1,3-dichlorobenzene	27,000 U
(11B)	106-46-7	1,4-dichlorobenzene	55,000 U
(12B)	91-94-1	3,3'-dichlorobenzidine	55,000 U
(13B)	121-14-2	2,4-dinitrotoluene	55,000 U
(14B)	606-20-2	2,6-dinitrotoluene	55,000 U
(17B)	122-66-7	1,2-diphenylhydrazine	55,000 U
(18B)	206-44-0	fluoranthene	650,000
(19B)	7005-72-3	4-chlorophenyl phenyl ether	27,000 U
(20B)	101-55-3	4-bromophenyl phenyl ether	27,000 U
(21B)	39638-32-9	bis(2-chloroisopropyl) ether	55,000 U
(22B)	111-91-1	bis(2-chloroethoxy) methane	55,000 U

EPP #	CAS #		ug/l or ug/kg (circle one)
(23B)	87-68-3	hexachlorobutadiene	27,000 U
(24B)	77-47-4	hexachlorocyclopentadiene	27,000 U
(25B)	78-59-1	isophorene	27,000 U
(26B)	91-20-3	naphthalene	370,000
(27B)	98-95-3	nitrobenzene	27,000 U
(28B)	86-30-6	N-nitrosodiphenylamine	27,000 U
(29B)	621-64-7	N-nitrosodipropylamine	27,000 U
(65B)	117-81-7	bis(2-ethylhexyl) phthalate	27,000 U
(67B)	85-68-7	benzyl butyl phthalate	27,000 U
(68B)	84-74-2	di-n-butyl phthalate	27,000 U
(69B)	117-84-0	di-n-octyl phthalate	27,000 U
(70B)	84-66-2	diethyl phthalate	27,000 U
(71B)	131-11-3	dimethyl phthalate	27,000 U
(72B)	56-55-3	benzo(a)anthracene	10,000
(73B)	50-32-8	benzo(a)pyrene	69,000
(74B)	205-99-2	benzo(b)fluoranthene	69,000
(75B)	207-08-9	benzo(k)fluoranthene	69,000
(76B)	218-01-9	chrysene	160,000
(77B)	208-96-8	acenaphthylene	10,000 K
(78B)	120-12-7	anthracene	140,000
(79B)	191-24-2	benzo(ghi)perylene	23,000
(80B)	86-73-7	fluorene	420,000
(81B)	85-01-8	phenanthrene	970,000
(82B)	53-70-3	dibenzo(a,h)anthracene	55,000 U
(83B)	193-39-5	indeno(1,2,3-cd)pyrene	27,000
(84B)	129-00-0	pyrene	480,000
	62-53-3	aniline	27,000 U
	100-51-6	benzyl alcohol	55,000 U
	106-47-8	4-chloroaniline	140,000 U
	132-64-9	dibenzofuran	300,000
	91-57-6	2-methylnaphthalene	140,000
	88-74-4	2-nitroaniline	270,000 U
	99-09-2	3-nitroaniline	270,000 U
	100-01-6	4-nitroaniline	270,000 U

ORGANICS ANALYSIS DATA SHEET

atory Name: ENCOTEC
ample ID No: C 9158 VOA
e Matrix: WATER
Release Authorized By: [signature]

Case No: 7991
QC Report No:
Contract No: 68-01-6764
Date Sample Received: 7/11/84

VOLATILES

NCENTRATION: (LOW) MEDIUM HIGH (circle one)
TE EXTRACTED/PREPARED: N/A
TE ANALYZED: 9/24/84
RCENT MOISTURE: N/A
NC./DILUTION FACTOR: 1:1

CAS #		ug/l or ug/kg (circle one)
107-02-8	acrolein	100 U
107-13-1	acrylonitrile	100 U
71-43-2	benzene	5 U
56-23-5	carbon tetrachloride	5 U
108-90-7	chlorobenzene	5 U
107-06-2	1,2-dichloroethane	5 U
71-55-6	1,1,1-trichloroethane	5 U
75-34-3	1,1-dichloroethane	5 U
79-00-5	1,1,2-trichloroethane	10 U
79-34-5	1,1,2,2-tetrachloroethane	10 U
75-00-3	chloroethane	10 U
110-75-8	2-chloroethylvinyl ether	10 U
67-66-3	chloroform	5 U
75-35-4	1,1-dichloroethene	5 U
156-60-5	trans-1,2-dichloroethene	5 U
78-87-5	1,2-dichloropropane	10 U
10061-02-6	trans-1,3-dichloropropene	5 U
10061-01-05	cis-1,3-dichloropropene	5 U
100-41-4	ethylbenzene	5 U
75-09-2	methylene chloride	4 K
74-87-3	chloromethane	10 U
74-83-9	bromomethane	10 U
75-25-2	bromoform	10 U
75-27-4	bromodichloromethane	5 U
75-69-4	fluorotrichloromethane	—
75-71-8	dichlorodifluoromethane	—
124-48-1	chlorodibromomethane	5 U
127-18-4	tetrachloroethene	5 U
108-88-3	toluene	5 U
79-01-6	trichloroethene	5 U
75-01-4	vinyl chloride	10 U
67-64-1	acetone	5 U
78-93-3	2-butanone	5 U
75-15-0	carbon disulfide	1 U
591-78-6	2-hexanone	5 U
108-10-1	4-methyl-2-pentanone	5 U
100-42-5	styrene	5 U
108-05-4	vinyl acetate	5 U
1330-20-7	total xylenes	5 U

PESTICIDES

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: N/A
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(89P)	309-00-2	aldrin	
(90P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α-endosulfan	
(96P)	115-29-7	β-endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α-BHC	
(103P)	319-85-7	β-BHC	
(104P)	319-86-8	δ-BHC	
(105P)	58-89-9	γ-BHC (lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: N/A
DATE ANALYZED:
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	

C7150

ORGANICS ANALYSIS DATA SHEET

Laboratory Name:	ENSECO	Case No:	2991
Sample ID No:	C9158BNA	QC Report No:	
Sample Matrix:	WATER	Contract No:	68-01-6764
Release Authorized By:	[signature]	Date Sample Received:	7/11/84

SEMIVOLATILE COMPOUNDS

CONCENTRATION: (LOW) MEDIUM HIGH (circle one)

DATE EXTRACTED/PREPARED: 7/20/84

DATE ANALYZED: 9/22/84

PERCENT MOISTURE: N/A

PP #	CAS #		(ug/l) or ug/kg (circle one)
)	88-06-2	2,4,6-trichlorophenol	10 U
)	59-50-7	p-chloro-m-cresol	10 U
)	95-57-8	2-chlorophenol	10 U
)	120-83-2	2,4-dichlorophenol	10 U
)	105-67-9	2,4-dimethylphenol	10 U
)	88-75-5	2-nitrophenol	20 U
)	100-02-7	4-nitrophenol	50 U
)	51-28-5	2,4-dinitrophenol	50 U
)	534-52-1	4,6-dinitro-2-methylphenol	50 U
)	87-86-5	pentachlorophenol	10 U
)	108-95-2	phenol	10 U
	65-85-0	benzoic acid	100 U
	95-48-7	2-methylphenol	5 U
	106-44-5	4-methylphenol	5 U
	95-95-4	2,4,5-trichlorophenol	100 U
	83-32-9	acenaphthene	10 U
	92-87-5	benzidine	40 U
	120-82-1	1,2,4-trichlorobenzene	10 U
	118-74-1	hexachlorobenzene	10 U
)	67-72-1	hexachloroethane	10 U
)	111-44-4	bis(2-chloroethyl)ether	10 U
)	91-58-7	2-chloronaphthalene	10 U
)	95-50-1	1,2-dichlorobenzene	10 U
)	541-73-1	1,3-dichlorobenzene	10 U
)	106-46-7	1,4-dichlorobenzene	10 U
)	91-94-1	3,3'-dichlorobenzidine	20 U
)	121-14-2	2,4-dinitrotoluene	20 U
)	606-20-2	2,6-dinitrotoluene	20 U
)	122-66-7	1,2-diphenylhydrazine	20 U
)	206-44-0	fluoranthene	10 U
)	7005-72-3	4-chlorophenyl phenyl ether	10 U
)	101-55-3	4-bromophenyl phenyl ether	10 U
)	39638-32-9	bis (2-chloroisopropyl) ether	20 U
[illegible]	[illegible]	[illegible]	[illegible]

PP #	CAS #		(ug/l) or ug/kg (circle one)
(52B)	87-68-3	hexachlorobutadiene	10 U
(53B)	77-47-4	hexachlorocyclopentadiene	10 U
(54B)	78-59-1	isophorone	10 U
(55B)	91-20-3	naphthalene	10 U
(56B)	98-95-3	nitrobenzene	10 U
(62B)	86-30-6	N-nitrosodiphenylamine	10 U
(63B)	621-64-7	N-nitrosodipropylamine	10 U
(66B)	117-81-7	bis (2-ethylhexyl) phthalate	10 U
(67B)	85-68-7	benzyl butyl phthalate	10 U
(68B)	84-74-2	di-n-butyl phthalate	10 U
(69B)	117-84-0	di-n-octyl phthalate	10 U
(70B)	84-66-2	diethyl phthalate	10 U
(71B)	131-11-3	dimethyl phthalate	10 U
(72B)	56-55-3	benzo(a)anthracene	10 U
(73B)	50-32-8	benzo(a)pyrene	20 U
(74B)	205-99-2	benzo(b)fluoranthene	20 U
(75B)	207-08-9	benzo(k)fluoranthene	20 U
(76B)	218-01-9	chrysene	10 U
(77B)	208-96-8	acenaphthylene	10 U
(78B)	120-12-7	anthracene	10 U
(79B)	191-24-2	benzo(ghi)perylene	20 U
(80B)	86-73-7	fluorene	10 U
(81B)	85-01-8	phenanthrene	10 U
(82B)	53-70-3	dibenzo(a,h)anthracene	20 U
(83B)	193-39-5	indeno(1,2,3-cd)pyrene	20 U
(84B)	129-00-0	pyrene	10 U
	62-53-3	aniline	5 U
	100-51-6	benzyl alcohol	20 U
	106-47-8	4-chloroaniline	50 U
	132-64-9	dibenzofuran	10 U
	91-57-6	2-methylnaphthalene	20 U
	88-74-4	2-nitroaniline	100 U
	99-09-2	3-nitroaniline	100 U
	[illegible]	[illegible]	[illegible]

ORGANICS ANALYSIS DATA SHEET

ratory Name: ENCOTEC
mple ID No: C 9159 V0A
e Matrix: SOIL
Release Authorized By: [illegible]

Case No: 2991
QC Report No:
Contract No: 68-01-6764
Date Sample Received: 7/11/84

VOLATILES

NCENTRATION: LOW MEDIUM HIGH (circle one)
TE EXTRACTED/PREPARED: N/A
TE ANALYZED: 8/30/84
CENT MOISTURE: N/A
NC./DILUTION FACTOR: 1:1

CAS #		ug/l or ug/kg (circle one)
107-02-8	acrolein	100 U
107-13-1	acrylonitrile	100 U
71-43-2	benzene	5 U
56-23-5	carbon tetrachloride	5 U
108-90-7	chlorobenzene	5 U
107-06-2	1,2-dichloroethane	5 U
71-55-6	1,1,1-trichloroethane	5 U
75-34-3	1,1-dichloroethane	5 U
79-00-5	1,1,2-trichloroethane	10 U
79-34-5	1,1,2,2-tetrachloroethane	10 U
75-00-3	chloroethane	10 U
110-75-8	2-chloroethylvinyl ether	10 U
67-66-3	chloroform	5 U
75-35-4	1,1-dichloroethene	5 U
156-60-5	trans-1,2-dichloroethene	5 U
78-87-5	1,2-dichloropropane	10 U
10061-02-6	trans-1,3-dichloropropene	5 U
10061-01-5	cis-1,3-dichloropropene	5 U
100-41-4	ethylbenzene	5 U
75-09-2	methylene chloride	7 J
74-87-3	chloromethane	10 U
74-83-9	bromomethane	10 U
75-25-2	bromoform	10 U
75-27-4	bromodichloromethane	5 U
75-69-4	trichlorofluoromethane	—
75-71-8	dichlorodifluoromethane	—
124-48-1	chlorodibromomethane	5 U
127-18-4	tetrachloroethene	5 U
108-88-3	toluene	7 J
79-01-6	trichloroethene	5 U
75-01-4	vinyl chloride	10 U
67-64-1	acetone	13
78-93-3	2-butanone	5 U
75-15-0	carbon disulfide	1 U
591-78-6	2-hexanone	5 U
108-10-1	4-methyl-2-pentanone	5 U
100-42-5	styrene	5 U
108-05-4	vinyl acetate	5 U
1330-20-7	total xylenes	5 U

PESTICIDES

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: N/A
DATE ANALYZED: N/A
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(93P)	309-00-2	aldrin	
(10P)	60-57-1	dieldrin	
(91P)	57-74-9	chlordane	
(92P)	50-29-3	4,4'-DDT	
(93P)	72-55-9	4,4'-DDE	
(94P)	72-54-8	4,4'-DDD	
(95P)	115-29-7	α -endosulfan	
(96P)	115-29-7	β -endosulfan	
(97P)	1031-07-8	endosulfan sulfate	
(98P)	72-20-8	endrin	
(99P)	7421-93-4	endrin aldehyde	
(100P)	76-44-8	heptachlor	
(101P)	1024-57-3	heptachlor epoxide	
(102P)	319-84-6	α -BHC	
(103P)	319-85-7	β -BHC	
(104P)	319-86-8	δ -BHC	
(105P)	58-89-9	γ -BHC (lindane)	
(106P)	53469-21-9	PCB-1242	
(107P)	11097-69-1	PCB-1254	
(108P)	11104-28-2	PCB-1221	
(109P)	11141-16-5	PCB-1232	
(110P)	12672-29-6	PCB-1248	
(111P)	11096-82-5	PCB-1260	
(112P)	12674-11-2	PCB-1016	
(113P)	8001-35-2	toxaphene	

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: N/A
DATE ANALYZED: N/A
PERCENT MOISTURE:
CONC./DILUTION FACTOR:

PP #	CAS #		ug/l or ug/kg (circle one)
(129P)	1746-01-6	2,3,7,8-tetrachlorodibenzo-p-dioxin	

c9159

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: ENCOTEC
Lab Sample ID No: c9159 BNA
Sample Matrix: WATER
Data Release Authorized By: [signature]

Case No: 2991
QC Report No:
Contract No.: 68-01-6764
Date Sample Received: 7/11/84

SEMIVOLATILE COMPOUNDS

CONCENTRATION: (LOW) MEDIUM HIGH (circle one)
DATE EXTRACTED/PREPARED: 7/17/84
DATE ANALYZED: 9/22/84
PERCENT MOISTURE: N/A

PP #	CAS #		ug/l or ug/kg (circle one)
21A)	88-06-2	2,4,6-trichlorophenol	330u
22A)	59-50-7	p-chloro-m-cresol	330u
24A)	95-57-8	2-chlorophenol	330u
31A)	120-83-2	2,4-dichlorophenol	330u
34A)	105-67-9	2,4-dimethylphenol	330u
37A)	88-75-5	2-nitrophenol	660u
38A)	100-02-7	4-nitrophenol	1650u
39A)	51-28-5	2,4-dinitrophenol	1650u
40A)	534-52-1	4,6-dinitro-2-methylphenol	660u
54A)	87-86-5	pentachlorophenol	330u
55A)	108-95-2	phenol	330u
	65-85-0	benzoic acid	3300u
	95-48-7	2-methylphenol	330u
	108-39-4	4-methylphenol	330u
	95-95-4	2,4,5-trichlorophenol	3300u
5B)	83-32-9	acenaphthene	330u
9B)	92-87-5	benzidine	1300u
10B)	120-82-1	1,2,4-trichlorobenzene	330u
11B)	118-74-1	hexachlorobenzene	330u
12B)	67-72-1	hexachloroethane	330u
13B)	111-44-4	bis(2-chloroethyl)ether	330u
14B)	91-58-7	2-chloronaphthalene	330u
15B)	95-50-1	1,2-dichlorobenzene	330u
16B)	541-73-1	1,3-dichlorobenzene	330u
17B)	106-46-7	1,4-dichlorobenzene	330u
18B)	91-94-1	3,3'-dichlorobenzidine	660u
20B)	121-14-2	2,4-dinitrotoluene	660u
21B)	606-20-2	2,6-dinitrotoluene	660u
22B)	122-66-7	1,2-diphenylhydrazine	660u
23B)	206-44-0	fluoranthene	330u
24B)	7005-72-3	4-chlorophenyl phenyl ether	330u
25B)	101-55-3	4-bromophenyl phenyl ether	330u
26B)	39638-32-9	bis (2-chloroisopropyl) ether	660u
27B)	111-91-1	bis (2-chloroethoxy) methane	330u

PP #	CAS #		ug/l or ug/kg (circle one)
(32B)	87-68-3	hexachlorobutadiene	330u
(33B)	77-47-4	hexachlorocyclopentadiene	330u
(34B)	78-59-1	isophorone	330u
(35B)	91-20-3	naphthalene	330u
(36B)	98-95-3	nitrobenzene	330u
(62B)	86-30-6	N-nitrosodiphenylamine	330u
(63B)	621-64-7	N-nitrosodipropylamine	330u
(66B)	117-81-7	bis (2-ethylhexyl) phthalate	330u
(67B)	85-68-7	benzyl butyl phthalate	330u
(68B)	84-74-2	di-n-butyl phthalate	330u
(69B)	117-84-0	di-n-octyl phthalate	330u
(70B)	84-66-2	diethyl phthalate	330u
(71B)	131-11-3	dimethyl phthalate	330u
(72B)	56-55-3	benzo(a)anthracene	660u
(73B)	50-32-8	benzo(a)pyrene	660u
(74B)	205-99-2	benzo(b)fluoranthene	660u
(75B)	207-08-9	benzo(k)fluoranthene	660u
(76B)	218-01-9	chrysene	330u
(77B)	208-96-8	acenaphthylene	330u
(78B)	120-12-7	anthracene	330u
(79B)	191-24-2	benzo(ghi)perylene	660u
(80B)	86-73-7	fluorene	330u
(81B)	85-01-8	phenanthrene	330u
(82B)	53-70-3	dibenzo(a,h)anthracene	660u
(83B)	193-39-5	indeno(1,2,3-cd)pyrene	660u
(84B)	129-00-0	pyrene	330u
	62-53-3	aniline	330u
	100-51-6	benzyl alcohol	660u
	106-47-8	4-chloroaniline	1650u
	132-64-9	dibenzofuran	330u
	91-57-6	2-methylnaphthalene	660u
	88-74-4	2-nitroaniline	3300u
	99-09-2	3-nitroaniline	3300u

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

Date 8/15

COVER PAGE
INORGANIC ANALYSES DATA PACKAGE

Lab Name Radian Case No. 2991

Q.C. Report No. 33

Sample Numbers

EPA No.	Lab ID N	No.	Lab ID No.
MC3660	84-07-049-01		
MC3661	84-07-049-02		
MC3662	84-07-049-03		
MC3663	84-07-049-04		
MC3664	84-07-049-05		
MC3665	84-07-049-06		
MC3666	84-07-049-07		

Comments:

ICP Interelement and background corrections applied? Yes ✓ No ___.

Footnotes:
NR - not required by contract at this time
C - blank corrected
ND/B - not detected due to blank.
Form I:
Value - If the result is a value greater than or equal to the instrument detection limit but less than the contract required detection limit, report the value in brackets (i.e., [10]). Indicate the analytical method used with P (for ICP/AA) or F (for furnace).
< - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., <10).
E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.
S - Indicates value determined by Method of Standard Addition.

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EPA Sample No.
MC 3660

Date ~~8-15~~ 8-15

INORGANIC ANALYSIS DATA SHEET

LAB NAME Radian CASE NO. 2991

LAB SAMPLE ID. NO. 8407049-01 QC REPORT NO. 33

Matrix H_2O

Elements Identified and Measured

ug/L or mg/kg (Circle One)

1.	Aluminum	420	P	13.	Magnesium	NR	
2.	Antimony	[6]	F	14.	Manganese	[8]	-P C
3.	Arsenic	[3]	F C	15.	Mercury	~~.02~~ .5	
4.	Barium	[36]	P C	16.	Nickel	[17]	P
5.	Beryllium	[2]	P C	17.	Potassium	NR	
6.	Cadmium	1	F	18.	Selenium	6	F C
7.	Calcium	NR		19.	Silver	<10	P
8.	Chromium	15	P C	20.	Sodium	NR	
9.	Cobalt	[18]	P	21.	Thallium	<2	F
10.	Copper	[37]	P C	22.	Tin	~~22~~ <5	F C
11.	Iron	280	P C	23.	Vanadium	[79]	P C
12.	Lead	3.2 ~~<2~~	F C	24.	Zinc	29	P
Cyanide		<10		Percent Solids		NR	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager [signature]

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EPA Sample No.
MC3661

Date 8-15

INORGANIC ANALYSIS DATA SHEET

LAB NAME Radian CASE NO. 2991

LAB SAMPLE ID. NO. 8407049-02 QC REPORT NO. 33

Matrix H_2O

Elements Identified and Measured

(ug/L) or mg/kg (Circle One)

1.	Aluminum	[76]	P	13.	Magnesium	NR	
2.	Antimony	[5]	F	14.	Manganese	[5]	P C
3.	Arsenic	[7]	F C	15.	Mercury	.5	
4.	Barium	[26]	P C	16.	Nickel	<3	P
5.	Beryllium	<0.5	P C	17.	Potassium	NR	
6.	Cadmium	8	F	18.	Selenium	8	F C
7.	Calcium	NR		19.	Silver	<10	P
8.	Chromium	<1	P C	20.	Sodium	NR	
9.	Cobalt	<6	P	21.	Thallium	<2	F
10.	Copper	<1	P C	22.	Tin	24 <5	F C
11.	Iron	210	P C	23.	Vanadium	<3	P C
12.	Lead	7.4 <2	F C	24.	Zinc	[8]	P
Cyanide		<10		Percent Solids		NR	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager _____

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703/557-2490 FTS: 8-557-2490

EPA Sample No.
MC 3662

Date 8-15

INORGANIC ANALYSIS DATA SHEET

LAB NAME Radian

CASE NO. 2991

LAB SAMPLE ID. NO. 840044-03

QC REPORT NO. 33

Matrix Solid

Elements Identified and Measured

ug/L or mg/kg (Circle One)

1.	Aluminum	880	P	13.	Magnesium	NR	
2.	Antimony	[0.2]	F	14.	Manganese	110	- D
3.	Arsenic	11.5, 10 5.0	F C	15.	Mercury	.27	
4.	Barium	30	P C	16.	Nickel	<1.5	P
5.	Beryllium	<.24	P	17.	Potassium	NR	
6.	Cadmium	1.3	F C	18.	Selenium	<0.1	F C
7.	Calcium	NR		19.	Silver	<0.5	P
8.	Chromium	<.50	P	20.	Sodium	NR	
9.	Cobalt	<3.0	P	21.	Thallium	<0.1	F
10.	Copper	19	P	22.	Tin	6.3 <0.2	F C
11.	Iron	5300	P C	23.	Vanadium	<1.5	P
12.	Lead	60 36	F C	24.	Zinc	110	P
	Cyanide	<.2			Percent Solids	NR	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments:

Lab Manager

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EPA Sample No.
MC 3663

Date 8-15

INORGANIC ANALYSIS DATA SHEET

LAB NAME Radian CASE NO. 2991

LAB SAMPLE ID. NO. 8407049-04 QC REPORT NO. 33

Matrix H_2O

Elements Identified and Measured

(ug/L) or mg/kg (Circle One)

1.	Aluminum	<50	P	13.	Magnesium	NR	
2.	Antimony	[7]	F	14.	Manganese	<1	P C
3.	Arsenic	27	F C	15.	Mercury	.5	
4.	Barium	[33]	P C	16.	Nickel	<3	P
5.	Beryllium	[2]	P C	17.	Potassium	NR	
6.	Cadmium	11	F	18.	Selenium	11	F C
7.	Calcium	NR		19.	Silver	<10	P
8.	Chromium	<1	P C	20.	Sodium	NR	
9.	Cobalt	<6	P	21.	Thallium	<2	F
10.	Copper	<1	P C	22.	Tin	33 45	F C
11.	Iron	290	P C	23.	Vanadium	<3	P C
12.	Lead	29 28 21	F C	24.	Zinc	<3	P
Cyanide		<10		Percent Solids		NR	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager [signature]

U.S. EPA Contract Laboratory Program
Sample Management Office
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EPA Sample No.
MC3664

Date 8-7-5

INORGANIC ANALYSIS DATA SHEET

LAB NAME Radian CASE NO. 2991

LAB SAMPLE ID. NO. 8407049-05 QC REPORT NO. 33

Matrix Solid

Elements Identified and Measured

ug/L or mg/kg (Circle One)

1.	Aluminum	1100 P	13.	Magnesium	NR
2.	Antimony	<0.1 F	14.	Manganese	44 P
3.	Arsenic	~~390~~ 10 11 F C	15.	Mercury	.30
4.	Barium	23 P C	16.	Nickel	<1.5 P
5.	Beryllium	<.24 P	17.	Potassium	NR
6.	Cadmium	0.9 F C	18.	Selenium	0.1 F C
7.	Calcium	NR	19.	Silver	<0.5 P
8.	Chromium	<.50 P	20.	Sodium	NR
9.	Cobalt	<3.0 P	21.	Thallium	<0.1 F
10.	Copper	59 P	22.	Tin	5.6 <0.2 F C
11.	Iron	5200 P C	23.	Vanadium	25 P
12.	Lead	6945 F C	24.	Zinc	240 P
	Cyanide	<.2		Percent Solids	NR

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments:

Lab Manager

U.S. EPA Contract Laboratory Program
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703/557-[illegible] FTS: 8-557-2490

EPA Sample No. MC 3665

Date 8-15

INORGANIC ANALYSIS DATA SHEET

LAB NAME Radian CASE NO. 2991

LAB SAMPLE ID. NO. 8407049-06 QC REPORT NO. 33

Matrix H_2O

Elements Identified and Measured

(ug/L) or mg/kg (Circle One)

1.	Aluminum	<50	P	13.	Magnesium	NR	
2.	Antimony	<2	F	14.	Manganese	<1	P C
3.	Arsenic	~~80~~ ~~<2~~ <2	F C	15.	Mercury	.60	
4.	Barium	[17]	P C	16.	Nickel	<3	P
5.	Beryllium	<0.50	P C	17.	Potassium	NR	
6.	Cadmium	27	F	18.	Selenium	10	F C
7.	Calcium	NR		19.	Silver	<10	P
8.	Chromium	<1	P C	20.	Sodium	NR	
9.	Cobalt	<16	P	21.	Thallium	<2	F
10.	Copper	<1	P C	22.	Tin	91 48	F C
11.	Iron	140	P C	23.	Vanadium	<3	P C
12.	Lead	21 28	F C	24.	Zinc	<3	P
	Cyanide	<10			Percent Solids	NR	

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager [signature]

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EPA Sample No.
MC 3666

Date 8-11

INORGANIC ANALYSIS DATA SHEET

LAB NAME Rollins CASE NO. 2991

LAB SAMPLE ID. NO. 84-07-049-07 QC REPORT NO. 33

Matrix solid

Elements Identified and Measured

ug/L or (mg/kg) (Circle One)

1.	Aluminum	<25	P	13.	Magnesium	NR	
2.	Antimony	<0.1	F	14.	Manganese	<0.6	P
3.	Arsenic	<0.1	F C	15.	Mercury	.50	
4.	Barium	11	P C	16.	Nickel	<1.5	P
5.	Beryllium	<0.3	P	17.	Potassium	NR	
6.	Cadmium	<0.05	F C	18.	Selenium	<0.1	F C
7.	Calcium	NR		19.	Silver	<0.5	P
8.	Chromium	<0.5	P	20.	Sodium	NR	
9.	Cobalt	<3.0	P	21.	Thallium	<0.1	F
10.	Copper	<0.5	P	22.	Tin	<0.2	F C
11.	Iron	<4.0	P C	23.	Vanadium	<1.5	P
12.	Lead	<0.1 <0.T	F C	24.	Zinc	<1.5	P
Cyanide		<.2		Percent Solids		NR	

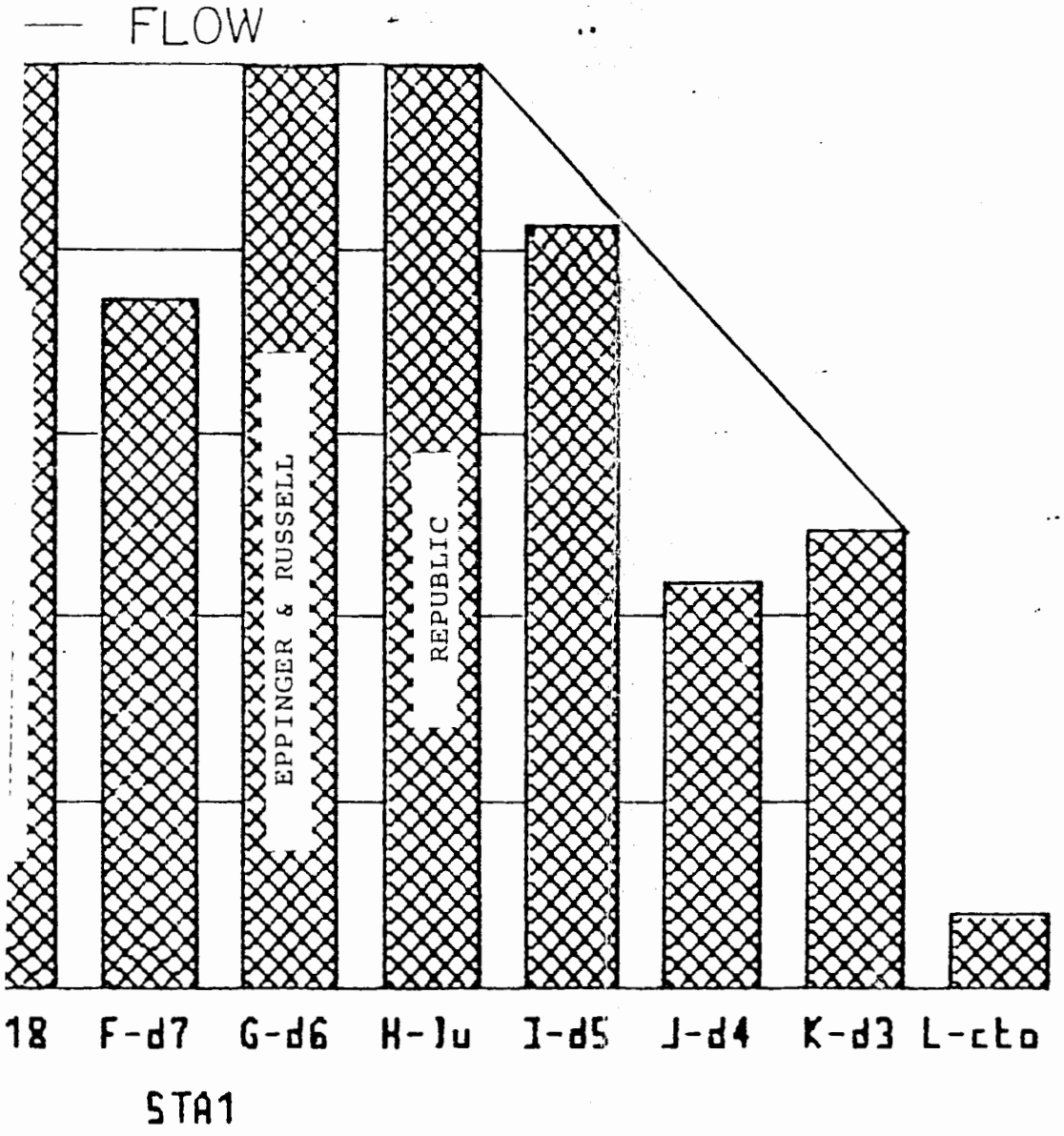
Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

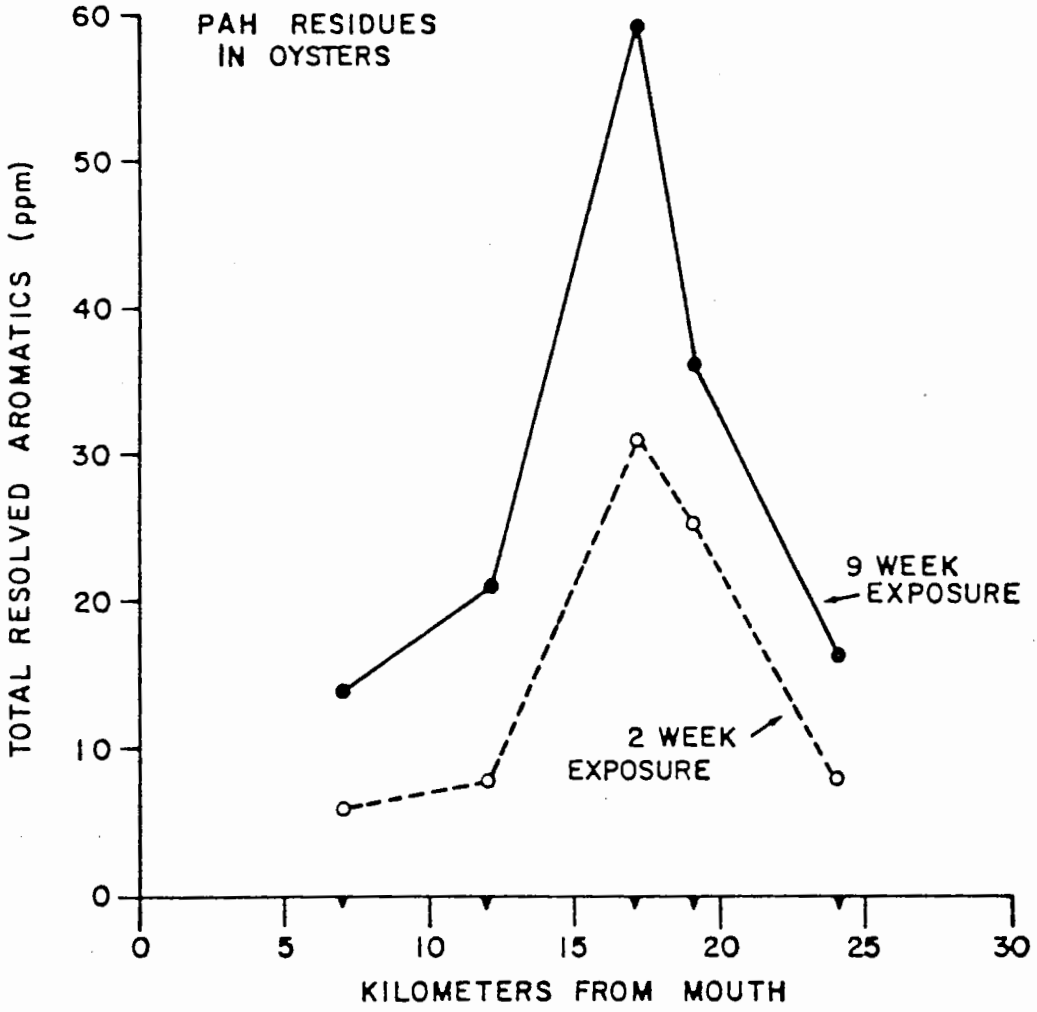
Comments:

Lab Manager

r Sediment Bioassay

t Mortality 6-10-84




PAH RESIDUES
IN OYSTERS
TOTAL RESOLVED AROMATICS (ppm)
60
50
40
30
20
10
0
0
5
10
15
20
25
30
KILOMETERS FROM MOUTH
9 WEEK
EXPOSURE
2 WEEK
EXPOSURE