US Army Corps
of Engineers
New York District
26 Federal Plaza
New York, N.Y. 10278
ATTN:

Public Notice

In replying refer to:

Public Notice No. 96/97 NWK

Published: 17 MARCH 1997 Expires: 17 APRIL 1997

NEWARK BAY, HACKENSACK AND PASSAIC RIVERS, NJ
FEDERAL NAVIGATION PROJECT
MAINTENANCE DREDGING WITH CAPPING IN THE OCEAN

TO WHOM IT MAY CONCERN:

Pursuant to Sections 404 (33 U.S.C. 1344) of the Federal Water Pollution Control Act (amended in 1977 and commonly referred to as the Clean Water Act), and Section 103 (33 U.S.C. 1413, Stat. 1052) of the Marine Protection, Research and Sanctuaries Act of 1972(commonly referred to as the Ocean Dumping Act), notice is hereby given that the U.S. Army Engineer District, New York, proposes to perform maintenance dredging in the Newark Bay portion of Newark Bay Hackensack & Passaic Rivers, New Jersey (See Map 1) Federal Navigation Project, and dispose of the dredged material in the approved Mud Dump disposal site in the Atlantic Ocean.

FEDERAL PROJECT AUTHORIZATION:

The Newark Bay Channels were authorized by the Rivers and Harbors Acts of 1922 and subsequently modified by the Rivers and Harbors Acts of 1943, 1954, 1964, 1966, 1975 and 1985.

FEDERAL PROJECT DESCRIPTION:

The existing project in **NEWARK BAY** provides for depths of 40 ft. from the junction with Kill Van Kull channel to the northernmost channel line of the Port Newark Branch Channel and thence for 35 ft. depths to the junction of the Hackensack and Passaic River Channels. A **main channel** with an approximate 2,400 ft width at the junction with Kill Van Kull channel, narrowing sharply to its 800 ft width on an approx. 1,500 ft distance, thence the width is constant 800 ft to the branch channel at Port Newark, thence 500 ft wide to a turning basin 1,300 ft long and 900 ft wide at the junction of the Hackensack and Passaic River channels, length about 4.7 miles; a **maneuvering area** 1.12 mile long starting from the Arthur Kill Junction with a width of approximately 950 ft

continuing north for a distance of approx. 2,675 ft where the width reduces to approx. 225 ft thence constant width of 225 ft for approx. 1,550 ft; a **combined bend cutoff and maneuvering area** with an approximate length of 850 ft where the width reaches 1,050 ft, creating a widening and bend cutoff at the entrance of South Elizabeth Channel, followed by a maneuvering area, 1.30 mile long, running parallel to the Port Elizabeth Pierhead Channel, 750 ft wide at the southern end and the width reduced gradually to 400 ft ending at the at the northern channel line of Elizabeth Channel. At Port Newark -- a **branch channel** (Port Newark Channel) 800 ft wide leading to an inshore channel 400 ft wide, total length about 1.6 miles; a **pierhead channel** (Port Newark Pierhead Channel) 200 ft wide along the east bulkhead between the Port Newark and Elizabeth branch channels, length 4,100 ft. At Elizabeth Marine Terminal -- a **branch** (Elizabeth Channel) 500 ft wide, length about 1.4 miles; a **pierhead channel** (Port Elizabeth Pierhead Channel) along the east bulkhead 290 ft wide, length about 1.1 miles; a **south channel** (South Elizabeth Channel) along the south bulkhead 290 ft wide, length about 2,600 ft.

DESCRIPTION OF PLANNED FEDERAL ACTION:

The proposed action by the U.S. Army Engineer District, New York is the maintenance dredging of a portion of the Federal Navigation Channels in Newark Bay and the capping of these sediments with dredged material from Sandy Hook and Ambrose Channels (See Map No.3) **Only the following portion of the 40 foot project are being considered for dredging: Elizabeth Channel, Port Elizabeth Pierhead Channel and adjacent maneuvering area, and South Elizabeth Channel (See Map No. 1).** Maintenance dredging of the channel is generally accomplished by clamshell or similar plant. The entire channel will generally not require maintenance dredging; only areas where shoaling has reduced the depth of the channel will require dredging. These parts of the channels were last maintenance dredged in 1982, with the removal of 438,729 cubic yards of material. The proposed future maintenance dredging would involve the removal of approximately 390,000 cubic yards of material. The purpose of the proposed work is to maintain the authorized project dimensions, thereby assuring safe and economical use of the Newark Bay 40 ft. depth Channel by shipping interests.

Capping is the controlled accurate placement of dredged material at an open water disposal site, followed by a covering or cap of clean isolating material. At the Mud Dump Site, dredged material

is placed on the sea floor in a mounded configuration and subsequently covered with "clean" sediment. The cap is usually applied in a series of disposal sequences, and is measured and monitored several times during and after placement to ensure adequate coverage. A number of capping operations under a variety of placement conditions have been completed at various locations, particularly at disposal sites in Long Island Sound and in the Seattle, Washington, area, as well as at the Mud Dump Site.

ENVIRONMENTAL IMPACT STATEMENT:

A final supplement to the final Environmental Impact Statement (FEIS) for **Newark Bay** has been prepared by the U.S. Army Corps of Engineers, New York District, in May 1987, which updates the FEIS filed in June 1981. It has been determined that maintenance dredging of the Newark Bay Channel with disposal of the dredged material at the designated ocean dumping site (Mud Dump Site), has no significant adverse environmental impacts on water quality, marine resources, wildlife, (including endangered species) recreation, aesthetics and flood protection.

A 404(b) evaluation will be prepared as required by 40 CFR 230 to evaluate the impact of dump scow or hopper dredge overflow.

DISPOSAL SITE:

The dredged material will be transported by dump scows to the Atlantic Ocean Mud Dump Disposal Site and deposited using the bottom dumping process, with clean sand used as capping material. Possible source of capping material is the Sandy Hook Federal Channel and the Ambrose Federal Channel (See Map No. 3) where approximately 1,200,000 CY of sand is available.

Mud Dump Site: This Atlantic Ocean site was designated by the U.S. Environmental Protection Agency (EPA). The approved Mud Dump Site (See Map No. 2) has an area of 2 square miles and an average depth of 64 feet, having its corner points located at:

LATITUDE			LONGITUDE		
40°	23′ 48"	North	73°	51′ 28"	West
40°	23′ 48"	North	73°	50′ 00"	West
40°	21′ 48"	North	73°	51′ 28"	West

40° 21' 48" North 73° 50' 00" West

This site has been used for disposal of dredged material since 1976 and has disposal depths within the site ranging from 35 to 80 feet below mean low water. The U.S. Coast Guard conducts surveillance of ocean dumping at the Mud Dump Site.

It is estimated that since 1976 approximately 6.0 million cubic yards of material has been disposed annually at this site. The disposal of dredged material prior to official designation in 1984 has created a mound of sediment at the Northwest quadrant of the site, which has resulted in an accumulation of approximately 40 to 60 feet of material.

ALTERNATIVES TO THE PROPOSED ACTION:

a. Dredging - The no dredge alternative would result in continued silting of the existing channel, which would eventually result in a reduction of capacity and consequent loss of accessibility to those activities which depend upon water transportation.

b. Disposal Options - As stated in EPA's Ocean Dumping Criteria, 40 CFR 227.16(b), "...alternative methods of disposal are practicable when they are available at reasonable incremental cost and energy expenditures which need to be competitive with the cost of ocean dumping..." The New York District has evaluated the practicability of potential disposal alternatives in a report entitled "Dredged Material Disposal within the New York District". The alternatives considered include land disposal, use of sanitary landfill cover, disposal in subaqueous borrow pits (and possible capping with clean material), creation of islands and/or wetlands, disposal on beaches or wetlands, placement in deep mines, and incineration. At the present time, ocean disposal -- with the specified amount of clean sand capping -- is the only available disposal option for this project.

The following non-Federal governmental agencies will be contacted with a view toward identifying suitable sites that could be used for disposal of the dredged material in lieu of ocean or open water disposal:

1. Port Authority of New York and New Jersey

2. New Jersey Department of Environmental Protection

TESTING:

GRAIN SIZE ANALYSES (Sandy Hook and Ambrose Channels):
Results of past grain size analyses performed on samples collected within the project area have consistently indicated that the material to be deposited is predominantly sand (greater than 90% sand). Also both these channels exist in environments which can be described as coastal areas exhibiting high current energy and wave activity. This is clean sand material which has been found suitable for use in capping and meeting the exclusionary criteria at 40 CFR 227.13 (b)(1).

GRAIN SIZE ANALYSES (Newark Bay):
The proposed dredged material was sampled and separated into two reaches for testing, A and B. These reaches were assigned to reflect potential differences in the depositional, hydrographic or contaminant source characteristics between areas of the project. Thirteen (13) samples were collected from each of the two reaches in the project area.

Grain size distributions of the material in the two reaches are as follows:

REACH A: 3.5 %SAND, 44.6 %SILT, 51.8 %CLAY

REACH B: 11.8 %SAND, 39.1 %SILT, 49.1 %CLAY

Based on the grain size distributions of sediments in the two project reaches and in accordance with Title 40 of the Code of Federal Regulations (CFR), Part 227 further testing was required to determine the suitability of the materials for ocean disposal.

LIQUID PHASE CHEMISTRY:
Under the requirements of 40 CFR Part 227, chemical analysis was conducted on project sitewater and elutriate for the constituents listed in Table 1 (Attachment II). Detection limits are reported for only those constituents, identified by ND in the concentration column, which occurred at concentrations below the method detection limit. (This reporting convention was similarly applied in reporting the results of bioaccumulation potential testing, Attachment IV).

Expected concentrations of chemical constituents in the water column following disposal, after allowing for initial mixing, were calculated using the Automated Dredging and Disposal Alternatives Management System (ADDAMS), a mixing model developed by the U.S. Army Corps of Engineers Waterways Experimental

Station (WES) and described in the implementation manual entitled "Ecological Evaluation of Proposed Discharge of Dredged Material Into Ocean Water" (commonly referred to as the "Green Book"), published in February 1991 by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency. The model predicted that chemical constituents in the water column following disposal of materials from the two reaches will dilute to concentrations below Federal marine acute water quality criteria within the initial four hour period and will not exceed the boundaries of the disposal site (40 CFR 227.29 (a).)

Further Tier III (biological) testing was conducted to determine the suitability of sediments from the two reaches for ocean disposal.

BIOASSAYS (TOXICITY):
In accordance with 40 CFR Part 227 of the Ocean Dumping Report, bioassays were performed to assess the toxicities of the solid phase, liquid phase and suspended particulate phase of the proposed dredged material from each of the two project reaches. Bioassays were performed using appropriate sensitive marine organisms as discussed below. Bioassay testing conformed to procedures outlined in the 1991 Green Book. The results of bioassay tests conducted on sediments from the two reaches are provided in Table 2 (Attachment III).

The solid phase is the whole test sediment before it has undergone processing that might alter its chemical or toxicological properties. The suspended particular phase (SPP) is considered to be the supernatant remaining after one hour of undisturbed settling following a vigorous, 30 minute agitation of a 1:4 mixture of bottom sediment and water collected from the dredging site. The suspended particulate phase also contains the liquid phase of the dredged material

For the solid phase bioassay, 10-day toxicity was determined by exposing a filter feeding mysid shrimp *(Mysidopsis bahia)* and a deposit feeding, burrowing amphipod *(Ampelisca abdita)* to composites of sediment from each of the two reaches and comparing mortalities in those treatments to mortalities experienced after exposure to a reference sediment. The reference sediment represents existing background conditions in the vicinity of the dumpsite, removed from the influence of any disposal operation. Results are evaluated for biologically and statistically significant differences in mortality between treatments. The 1991 Green Book indicates that dredged material does not meet the whole sediment toxicity criterion when mortality in the test treatments is a) statistically significant and greater than in

the reference sediment and (b) exceeds mortality in the reference treatment by at least 10% for mysid shrimp and 20% for amphipod species. The whole sediment toxicity criterion was not exceeded for either organism in either reach.

For the liquid and suspended phase bioassay, those concentrations of SPP resulting in 50% mortality (LC50s), were determined for the three animal species tested- a crustacean (*M. bahia*), a finfish (*Menidia beryllina*), and the planktonic larvae of a bivalve (*Mytilus galloprovincialis*). The median effective concentration (EC50), based on normal larval development to the D-cell stage, was also calculated for *M. galloprovincialis*. The limiting permissible concentration (LPC) of SPP is calculated by multiplying the LC50 or EC50 of the most sensitive organism by a safety factor of 100 (0.01 of the toxic concentration (LC50 or EC50) of the most sensitive organism tested). The LPC of Reach A SPP was calculated at 0.225% and was obtained from the EC50 of *M. galloprovincialis*. The LPC of Reach B SPP was calculated at 0.210% and was obtained from the LC50 of *M. beryllina*.

In accordance with the provisions of 40 CFR Sect. 227.27 (a)(2), the material can be considered suitable for ocean disposal if the concentration of the SPP of the dredged material, after allowance for initial mixing, will not exceed the LPC beyond the boundaries of the disposal site within the first four hours following dumping or at any point in the marine environment after the first four hours.

Initial mixing evaluations of the SPPs of the two reaches were conducted using the ADDAMS mixing model. Results of the analyses indicate that the LPC will be met for the proposed dredged material from the two reaches.

BIOACCUMULATION POTENTIAL:
An estimate of bioaccumulation potential was made by analyzing the concentrations of contaminants in tissue of organisms surviving 28-day exposure to sediments composited from each of the two project reaches, and comparing them to tissue levels of organisms exposed to reference sediment. Bioaccumulation potential was analyzed in two organisms, a burrowing, deposit-feeding polychaete (*Nereis virens*) and a filter-feeding bivalve (*Macoma nasuta*).

Based on the requirements of 40 CFR Sect. 227.6 and 227.27, the EPA Region II Administrator has requested that bioaccumulation analyses be performed for the chemical constituents listed in Table 3 (Attachment IV). All constituents identified in worm and clam tissue were compared to existing Food and Drug Administration (FDA) action levels for poisonous or deleterious

substances in fish and shellfish for human food, regional disposal criteria.

Concentration of dioxin above the regional category 1 values (1 parts per trillion (pptr) for 2,3,7,8-TCDD, and 4.5 pptr for the non 2,3,7,8-TCDD congeners), but less than the regional Category 3 value, were measured in the tissues of organisms exposed to proposed dredged material sediments. As per New York Harbor regional disposal criteria for the dredged material containing dioxin, dredged material that results in such tissue concentrations is capped following ocean disposal.

Based on the results of the testing performed, the U.S. Army Corps of Engineers has determined that the proposed dredged material from Port Elizabeth Channel Reaches A and B are considered Category II dredged material and are suitable for ocean disposal with capping. The material contains none of the constituents prohibited in 40 CFR 227.6 as other than trace contaminants, and meets the LPC requirements of 40 CFR 227.27.

Dredged material from Sandy Hook Channel is identified as a possible source of clean cap material for this project.

MISCELLANEOUS INFORMATION:

Any person may request, in writing, that a public hearing be held to consider the proposed disposal of this dredged material. Requests for public hearing must state the specific reasons for holding a hearing.

Based upon a review of the latest public version of the threatened and endangered species listing, a preliminary determination indicated that the proposed activity under consideration will not affect those species listed or their critical habitat. See Section 7 of the Endangered Species Act (16 U.S.C. (531)).

There are no known sites within the project areas that are eligible for or included in the National Register of Historic Places. Presently no known archaeological, scientific, prehistorical or historical data may be lost by work accomplished under the required dredging.

Water Quality Certification will be obtained from the State of New Jersey Department of Environmental Protection, in accordance with Section 401 of the Clean Water Act prior to the beginning of the proposed action.

CENAN-OP-ST
PUBLIC NOTICE NO. 96/97 NWK

The proposed work is being coordinated with the following Federal, State and local agencies:

U.S. Environmental Protection Agency

U.S. Department of the Interior, Fish and Wildlife Service

U.S. Department of Commerce, National Marine Fisheries Service

U.S. Coast Guard, Third Coast District

New Jersey Department of Environmental Protection

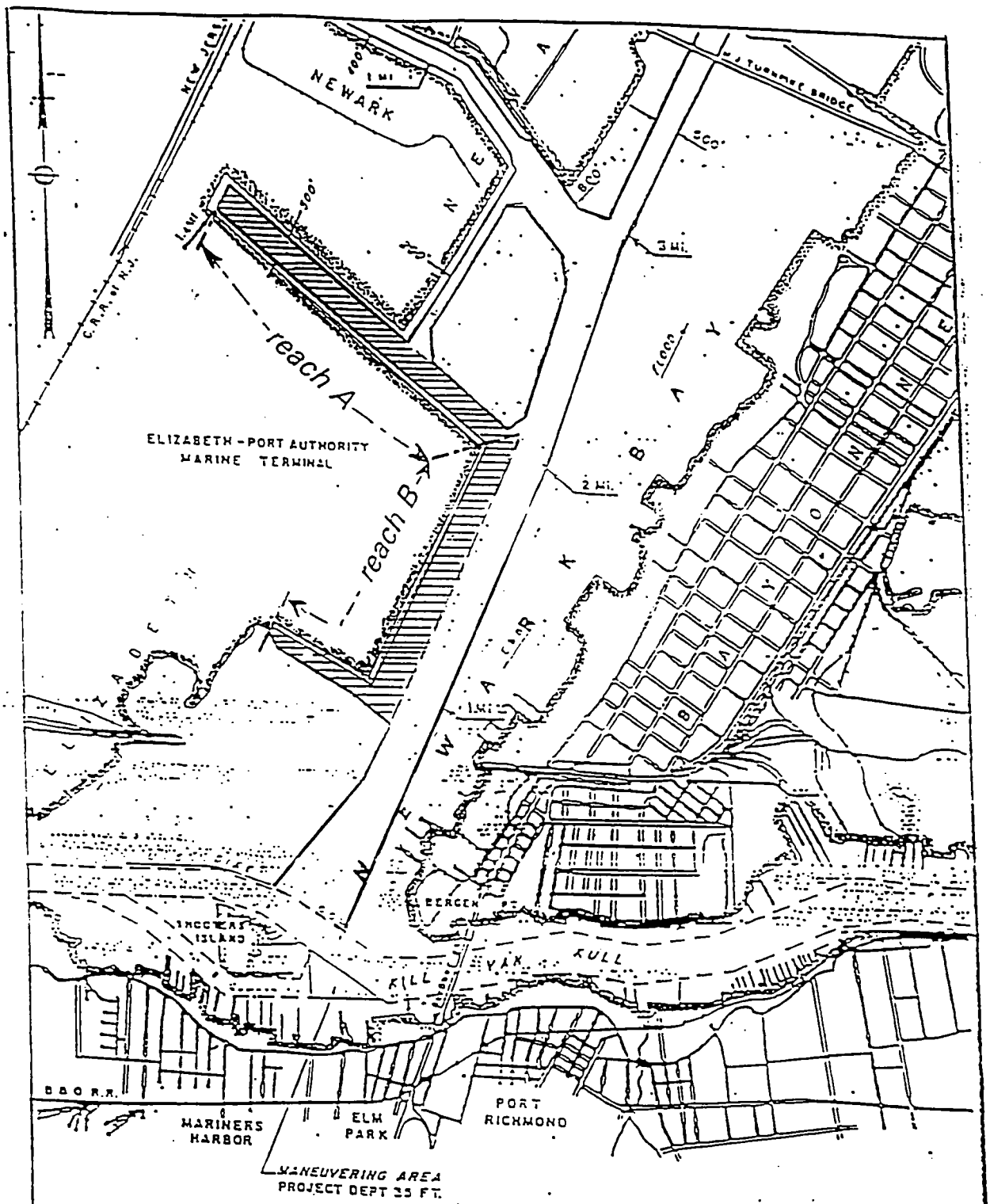
Since this activity is located within the coastal zone of the State of New Jersey which has federally approved coastal zone management program, the Corps of Engineers has applied to this state for certification that the proposed action will be conducted in a manner that is in compliance with the rules of the state coastal resources management programs and policies. Reference is made to Section 307(c) of the Coastal Zone Management Act of 1972 as amended (16 U.S.C. 1456(c)).

Any criticisms or protests regarding the proposed work should be **PREPARED IN WRITING AND MAILED TO REACH THIS OFFICE** prior to the expiration date; otherwise it will be presumed that there are no objections.

It is requested that you communicate the foregoing information concerning the proposed work to any persons known by you to be interested and who did not receive a copy of this notice.

If you have any questions please do not hesitate to contact Mr. Adam Devenyi of my staff at 212-264-0199.

JOHN R. HARTMANN
Chief, Operations Division



LEGEND

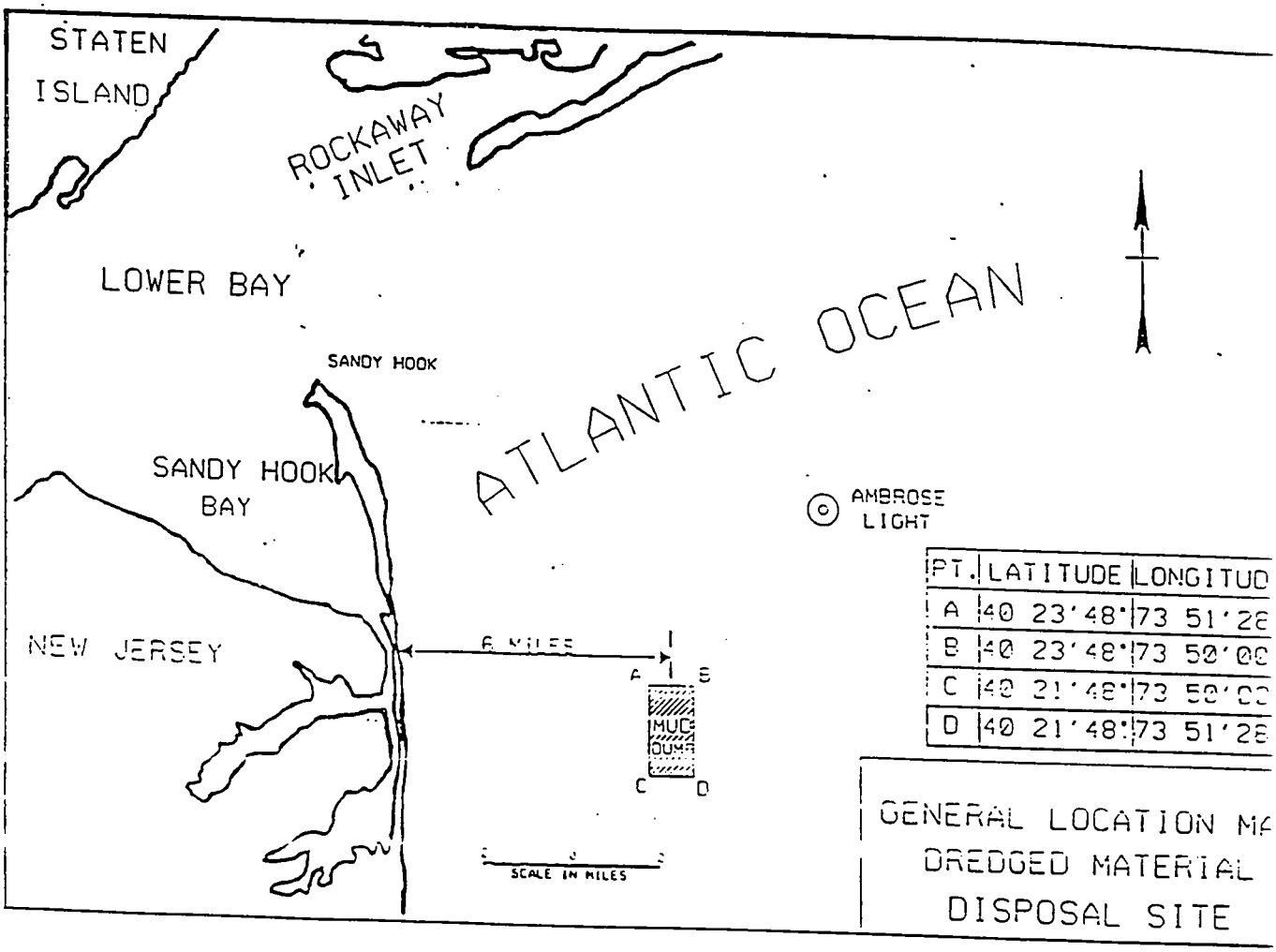
AREA TO BE DREDGED

MAP NO. 1

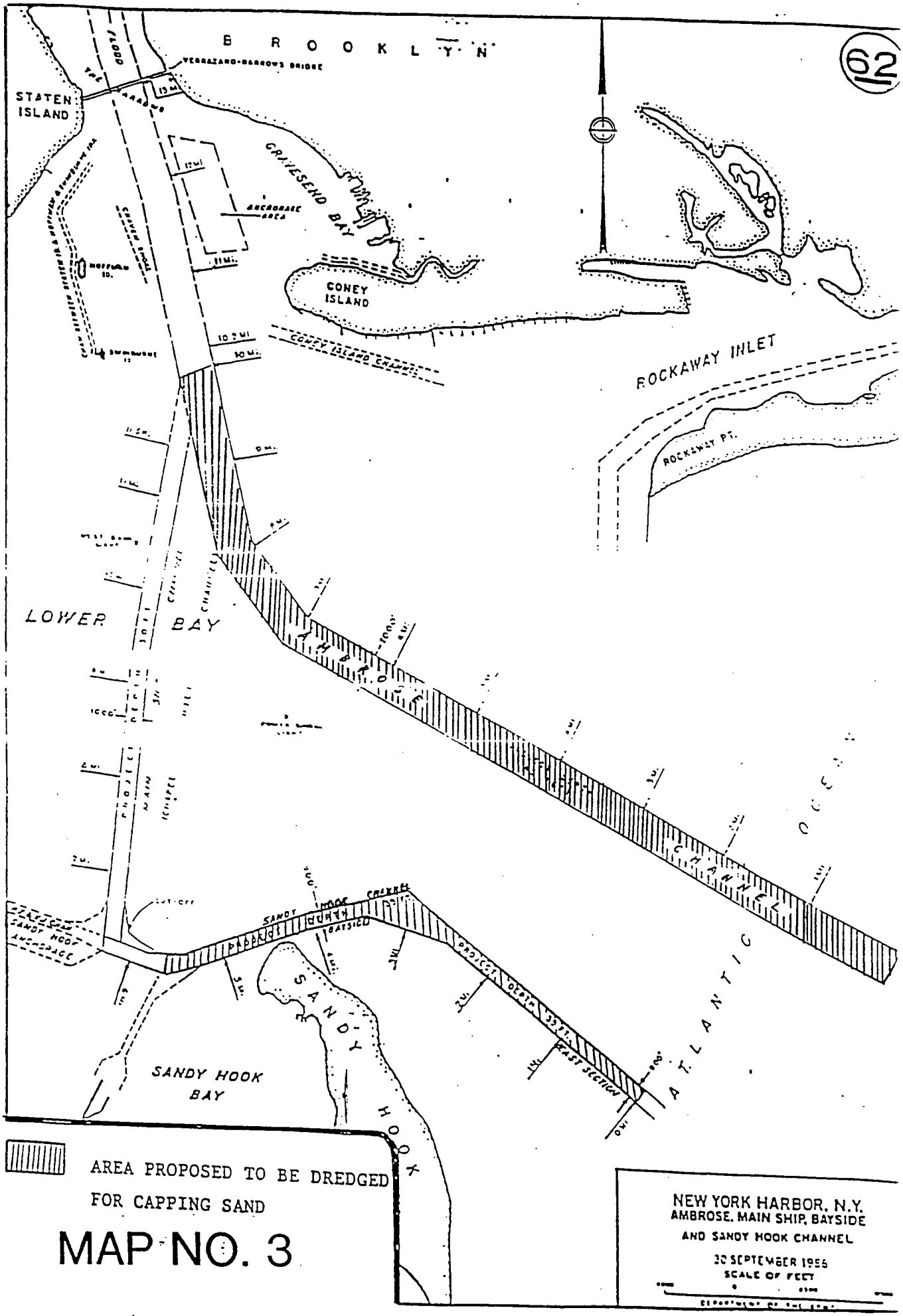
NEWARK BAY,
HACKENSACK & PASSAIC RIVERS, N
NEWARK BAY

SCALE OF FEET
3000 0 3000

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
NEW YORK, NEW YORK


STATEN ISLAND
ROCKAWAY INLET
LOWER BAY
ATLANTIC OCEAN
SANDY HOOK
SANDY HOOK BAY
NEW JERSEY
AMBROSE LIGHT
6 MILES
A
B
C
D
MUD DUMP
SCALE IN MILES
PT. | LATITUDE | LONGITUD
A | 40 23'48" | 73 51'28
B | 40 23'48" | 73 50'00
C | 40 21'48" | 73 50'00
D | 40 21'48" | 73 51'28
GENERAL LOCATION MA
DREDGED MATERIAL
DISPOSAL SITE

MAP NO. 2


62
BROOKLYN
VERRAZANO-NARROWS BRIDGE
STATEN ISLAND
GRAVESEND BAY
ANCHORAGE AREA
CONEY ISLAND
CONEY ISLAND CHANNEL
ROCKAWAY INLET
ROCKAWAY PT.
LOWER BAY
SANDY HOOK CHANNEL
PROJECT DEPTH 35 FT.
EAST SECTION
SANDY HOOK BAY
SANDY HOOK
ATLANTIC OCEAN
AREA PROPOSED TO BE DREDGED FOR CAPPING SAND
MAP NO. 3
NEW YORK HARBOR, N.Y.
AMBROSE, MAIN SHIP, BAYSIDE AND SANDY HOOK CHANNEL
30 SEPTEMBER 1955
SCALE OF FEET

Attachment II

PORT ELIZABETH CHANNEL FP NO. 63

TABLE 1. RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE

CONSTITUENTS	PORT ELIZABETH CHANNEL REACH A			
	SITE WATER		ELUTRIATE	
	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	ppb (ug/L)	ppb (ug/L)	ppb (ug/L)	ppb (ug/L)
Ag		0.02		0.01
Cd		0.08		0.01
Cr		1.62		1.33
Cu		3.12		2.48
Hg		0.01		0.02
Ni		15.80		3.77
Pb		1.17		0.65
Zn		11.70		20.90
Pesticides	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
Aldrin	2.20	ND		0.87
alpha-Chlordane	1.44	ND		0.29
trans-Nonachlor	1.82	ND		0.27
Dieldrin		1.16		0.43
4,4-DDT	1.04	ND	1.04	ND
2,4-DDT	1.56	ND	1.56	ND
4,4-DDD		0.83		1.91
2,4-DDD	1.24	ND	1.24	ND
4,4-DDE	1.22	ND		1.00
2,4'-DDE	0.70	ND		3.11
Total DDT		[illegible]		[illegible]
Endosulfan I	1.08	ND	1.08	ND
Endosulfan II	1.62	ND	1.62	ND
Endosulfan sulfate	1.24	ND	1.24	ND
Heptachlor	3.40	ND	3.40	ND
Heptachlor epoxide	1.36	ND	1.36	ND
Industrial Chemicals	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
PCB 8		4.41		4.21
PCB 18	2.66	ND		2.09
PCB 28	1.64	ND		1.55
PCB 44	1.94	ND		[illegible]
PCB 49	2.06	ND		2.77
PCB 52	2.30	ND		3.78
PCB 66	1.64	ND		0.45
PCB 87		0.64		1.85
PCB 101	5.00	ND		0.94
PCB 105	2.70	ND		0.37
PCB 118	1.02	ND		0.72
PCB 128	1.58	ND		0.78
PCB 138	1.08	ND		1.00
PCB 153	0.40	ND		1.00
PCB 170	2.02	ND		1.03
PCB 180	1.68	ND		0.47
PCB 183	0.66	ND		0.50
PCB 184	0.78	ND		0.42
PCB 187	0.82	ND		0.32
PCB 195	2.02	ND	2.70	ND
PCB 206	1.84	ND		0.94
PCB 209	2.34	ND		1.17
Total PCB		91.80		58.77

Concentrations shown are the mean of three replicate analyses.
ND = Not detected
Total PCB = sum of congeners reported*2
Total DDT = sum of 2,4'- and 4'4'-DDE, DDD, and DDT
Means and total PCBs were determined using conservative estimates of concentrations of constituents at concentrations below the detection limit

PORT ELIZABETH CHANNEL FP NO. 63

TABLE 1. RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE

CONSTITUENTS	PORT ELIZABETH CHANNEL REACH B			
	SITE WATER		ELUTRIATE	
	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	ppb (ug/L)	ppb (ug/L)	ppb (ug/L)	ppb (ug/L)
Ag		0.02		0.02
Cd		0.07		0.07
Cr		0.78		2.90
Cu		3.87		4.28
Hg		0.02		0.06
Ni		2.32		1.59
Pb		1.35		2.32
Zn		11.60		8.23
Pesticides	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
Aldrin	2.20	ND	2.20	ND
alpha-Chlordane	1.44	ND		1.57
trans-Nonachlor	1.62	ND		0.51
Dieldrin		1.01		0.47
4,4-DDT	1.04	ND	1.04	ND
2,4-DDT	1.56	ND	1.56	0.64
4,4-DDD		0.00		0.00
2,4-DDD	1.24	ND	1.24	3.14
4,4-DDE	1.22	ND		16.50
2,4'-DDE	0.70	ND		10.60
Total DDT		3.69		35.40
Endosulfan I	1.08	ND	1.08	ND
Endosulfan II	1.62	ND	1.62	ND
Endosulfan sulfate	1.24	ND	1.24	ND
Heptachlor	3.40	ND	3.40	ND
Heptachlor epoxide	1.36	ND	1.36	ND
Industrial Chemicals	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
PCB 8		3.75		4.94
PCB 18	2.66	ND		5.55
PCB 28	1.84	ND		7.41
PCB 44	1.94	ND		7.01
PCB 49	2.06	ND		10.50
PCB 52	2.30	ND		13.60
PCB 66	1.64	ND		5.70
PCB 87	2.06	ND		2.64
PCB 101	5.00	ND		9.32
PCB 105	2.70	ND		2.53
PCB 118	1.02	ND		5.96
PCB 128	1.58	ND		1.09
PCB 138	1.08	ND		7.84
PCB 153	0.40	ND		8.93
PCB 170	2.02	ND		1.76
PCB 180	1.68	ND		5.26
PCB 183	0.86	ND		1.51
PCB 184	0.78	ND	0.78	ND
PCB 187	0.82	ND		3.10
PCB 195	2.02	ND		0.99
PCB 206	1.84	ND		1.22
PCB 209	2.34	ND		1.41
Total PCB		84.56		217.00

Concentrations shown are the mean of three replicate analyses.
ND = Not detected
Total PCB = sum of congeners reported*2
Total DDT = sum of 2,4'- and 4'4'-DDE, DDD, and DDT
Means and total PCBs were determined using conservative estimates of concentrations of constituents at concentrations below the detection limit

TABLE 2. TOXICITY TEST RESULTS

APPLICATION NO.:

Port Elizabeth Channel Reach A
Suspended Particulate Phase

Test Species	Test Duration	LC_{50}/EC_{50}	LPC[a]
Menidia beryllina	96 hrs	25.9%[a]	0.259%[b]
Mysidopsis bahia	96 hrs	51.9%[a]	0.519%[b]
Mytilus galloprovincialis (larvae survival)	48 hrs	>100%[a]	>1.00%[b]
Mytilus galloprovincialis (larvae normal development)	48 hrs	22.5%[b]	0.225%[c]

(a) Limiting Permissible Concentration (LPC) is the LC50 or EC50 times 0.01.
(b) Median Lethal Concentration (LC50) resulting in 50% mortality at test termination.
(c) Median Effective Concentration (EC50) based on normal development to the D-cell, prodissoconch I stage.

Port Elizabeth Channel Reach A
Whole Sediment (10 days)

Test Species	% Survival in Reference	% Survival in Test	% Difference (Reference-Test)	Is difference statistically significant? (p=0.05)
Ampelisca abdita (static renewal)[d]	84%	83%	1	No
Mysidopsis bahia (static renewal)[e]	97%	96%	1	No

(d) Initial total ammonia levels in porewater were > 30mg/l, in exceedance of the NOEC (EPA 1993 memo). Sediments were ammonia purged prior to and during test initiation. Two volumes of water were exchanged per day prior to and during amphipod exposure.
(e) Initial overlying water unionized ammonia levels were 0.34 mg/l, below the NOEC. Sediments were not ammonia purged prior to test initiation. Two volumes of water were exchanged per day during mysid exposure.

ATTACHMENT III

PORT ELIZABETH CHANNEL FP NO. 64

TABLE 2. TOXICITY TEST RESULTS

APPLICATION NO.:

Port Elizabeth Channel Reach B
Suspended Particulate Phase

Test Species	Test Duration	LC_{50}/EC_{50}	LPC[a]
Menidia beryllina	96 hrs	21.0%[b]	0.210%
Mysidopsis bahia	96 hrs	59.1%[b]	0.591%
Mytilus galloprovincialis (larvae survival)	48 hrs	>100%[b]	>1.0%
Mytilus galloprovincialis (larvae	48 hrs	22.5%[c]	0.225%

(a) Limiting Permissible Concentration (LPC) is the LC50 or EC50 times 0.01.
(b) Median Lethal Concentration (LC50) resulting in 50% mortality at test termination.
(c) Median Effective Concentration (EC50) based on normal development to the D-cell, prodissoconch I stage.

Port Elizabeth Channel Reach B
Whole Sediment (10 days)

Test Species	% Survival in Reference	% Survival in Test	% Difference (Reference-Test)	Is difference statistically significant? (p=0.05)
Ampelisca abdita[d] (static renewal)	84%	90%	(6)	No
Mysidopsis bahia (static renewal)[e]	92%	97%	(5)	No

(d) Initial total ammonia levels in porewater were > 30mg/l, in exceedance of the NOEC (EPA 1993 memo). Sediments were ammonia purged prior to and during test initiation. Two volumes of water were exchanged per day prior to and during amphipod exposure.
(e) Initial unionized ammonia levels in the overlying water were 0.68 mg/l, in exceedance of the NOEC. Sediments were ammonia purged for one day prior to test initiation. Two volumes of water were exchanged per day prior to and during mysid exposure.

Attachment IL

NEWARK BAY, HACKENSACK AND PASSAIC RIVERS-PORT ELIZABETH CHANNELS FP NO. 63

TABLE 3. 28-DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE (in wet weight concentrations)

	PORT ELIZABETH CHANNELS REACH A							
	Macoma nasuta				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
CONSTITUENTS	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION
Metals	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)
Ag		0.06		0.100*		0.03		0.040*
As		3.59		4.33		2.98		2.41
Cd		0.06		0.121*		0.05		0.05
Cr		0.44		1.74*		0.05		0.09
Cu		7.24		6.98		2.05		1.90
Hg		0.02		0.046*		0.02		0.01
Ni		1.61		1.97		0.10		0.160*
Pb		0.91		3.50*		0.12		0.197*
Zn		27.2		25.5		25.60		23.70
Pesticides	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
Aldrin	0.18	ND	0.20	ND	0.06	ND	0.06	ND
g-Chlordane		[illegible]		[illegible]		[illegible]		[illegible]
trans-Nonachlor		0.11		0.33*		0.32		0.75*
Dieldrin		0.75		0.68		0.13		0.72*
4,4'-DDT		0.04		0.03	0.02	ND	0.04	ND
2,4'-DDT	0.10	ND		0.19*		0.03		0.08*
4,4'-DDD		0.75		2.89*		0.15		2.56*
2,4'-DDD		0.06		0.30*		0.10		[illegible]
4,4'-DDE		9.50		7.82		0.11		1.34*
2,4'-DDE	0.10	ND	0.10	ND	0.18	ND		0.80*
TOTAL DDT		9.44		11.50		0.83		5.32*
Endosulfan I	0.07	ND		[illegible]	0.10	ND	0.12	ND
Endosulfan II	0.22	ND	0.24	ND	0.18	ND	0.26	ND
Endosulfan sulfate		0.02		0.08*		0.09		0.09
Heptachlor	0.16	ND	0.16	ND	0.06	ND	0.10	ND
Heptachlor epoxide	0.22	ND	0.24	ND		0.02	0.12	ND
Industrial Chemicals	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
PCB 8		0.02		0.38		0.47		0.31
PCB 18	0.16	ND		0.75*	0.22	ND		1.27*
PCB 28		0.16		2.54*		0.04		1.34*
PCB 44		0.09		1.51*		0.02		0.98*
PCB 49		0.15		2.22*		0.02		1.37*
PCB 52		0.18		3.41*		0.11		3.55*
PCB 66		0.20		2.58*		0.06		1.39*
PCB 87		0.13		0.09*		0.02		0.26*
PCB 101		0.21		2.55*		0.27		2.32*
PCB 105		0.15		0.85*		0.43		1.23*
PCB 118		0.37		1.64*		0.12		1.29*
PCB 128		0.06		0.30*		0.14		0.56*
PCB 138		0.36		2.01*		0.94		3.51*
PCB 153		0.41		2.39*		1.14		4.07*
PCB 170		0.03		0.34*		0.28		0.84*
PCB 180		0.05		0.77*		0.57		1.84*
PCB 183		0.02		0.31*		0.17		0.55*
PCB 184	0.08	ND	0.10	ND	0.10	ND	0.14	ND
PCB 187		0.05		0.52*		0.52		1.23*
PCB 195		0.01		0.11*		0.11		0.25*
PCB 206		0.12		0.48*		0.16		0.32*
PCB 209		0.03		0.19*		0.19		0.33*
TOTAL PCB		5.91		53.6*		11.9		57.4*
1,4-Dichlorobenzene		1.53		2.23		1.20		1.51

PORT ELIZABETH CHANNELS FP NO. 64

TABLE 3. (Continued)

CONSTITIUENTS	PORT ELIZABETH CHANNELS REACH A							
	Macoma nasuta				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION
PAHs	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
Naphthalene		1.58		1.81		2.48		2.88
Acenaphthylene		0.17		1.24*		0.19		0.57*
Acenaphthene	6.80	ND		0.57*	0.64	ND		1.91*
Fluorene	5.86	ND		1.19*	0.76	ND		0.59
Phenanthrene		0.68		8.88*		0.16		1.14*
Anthracene		0.25		5.27*	4.62	ND		0.96*
Fluoranthene		2.12		73.43*		0.37		15.98*
Pyrene		1.08		83.43*	1.20	ND		18.97*
Benz[a]anthracene		1.00		29.40*	1.24	ND		1.18*
Chrysene		2.15		31.52*	1.64	ND		9.13*
Benzo[b]fluoranthene		1.34		37.47*	3.54	ND		2.38*
Benzo[k]fluoranthene		0.69		11.00*	1.82	ND		1.45*
Benzo[a]pyrene		0.28		22.23*	1.78	ND		1.63*
Indeno[1,2,3-cd]pyrene		0.10		7.67*	4.12	ND		0.99*
Dibenzia,h]anthracene	3.52	ND		2.07*	3.55	ND	4.56	ND*
Benzo[g,h,i]perylene		0.16		10.41*	4.66	ND		2.09*
Dioxins	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)
2,3,7,8-TCDD	0.64	ND		3.15*	1.74	ND		2.94*
1,2,3,7,8-PeCDD	0.64	ND	0.62	ND	2.32	ND	3.12	ND
1,2,3,4,7,8-HxCDD	0.46	ND	0.52	ND	0.95	ND	0.47	ND
1,2,3,6,7,8-HxCDD	0.38	ND		0.34*	0.88	ND	0.85	ND
1,2,3,7,8,9-HxCDD	0.24	ND		0.29*	0.70	ND	0.37	ND
1,2,3,4,6,7,8-HpCDD		0.65		6.18*		1.21		1.53
OCDD		5.60		55.5*		9.73		11.43
Furans	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)
2,3,7,8-TCDF		0.20		0.99*		1.84		3.00*
1,2,3,7,8-PeCDF	0.53	ND	0.48	ND	1.18	ND	1.40	ND
2,3,4,7,8-PeCDF	0.80	ND	0.72	ND	2.06	ND	1.72	ND*
1,2,3,4,7,8-HxCDF	0.26	ND	0.22	ND	1.00	ND	0.95	ND
1,2,3,6,7,8-HxCDF	0.40	ND	0.50	ND	0.92	ND	1.00	ND
1,2,3,7,8,9-HxCDF	0.46	ND	0.88	ND	1.14	ND	1.04	ND
2,3,4,6,7,8-HxCDF		0.23		0.46*	1.36	ND	1.32	ND
1,2,3,4,6,7,8-HpCDF	0.18	ND		4.43*		0.40		0.58
1,2,3,4,7,8,9-HpCDF	0.36	ND	0.62	ND	1.02	ND	1.06	ND
OCDF	0.54	ND		6.13*		0.76		1.01

Concentrations shown are the mean of five replicate analyses

* Significant higher than reference at 95% confidence interval.

-ND = Not detected

Total PCB = 2(x), where x = sum of all PCB congeners detected

Total DDT=sum of 2,4' and 4,4' DDE, DDD, and DDT

Means and statistical comparisons were determined using conservative estimates of concentrations of constituents that were at concentrations below the detection limit

TABLE 3. 28-DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE (in wet weight concentrations)

	PORT ELIZABETH CHANNELS REACH B							
	Macoma nasuta				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
CONSTITUENTS	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION
Metals	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)
Ag		0.06		0.12*		0.03		0.05*
As		3.59		5.15		2.98		2.71
Cd		0.06		0.08		0.06		0.07
Cr		0.44		1.51		0.05		0.18*
Cu		7.24		8.15		2.05		2.25
Hg		0.02		0.04		0.02		0.01
Ni		1.61		2.05		0.10		0.21*
Pb		0.91		3.32*		0.12		0.26*
Zn		27.2		21.90		25.60		
Pesticides	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
Aldrin	0.18	ND	0.32	ND	0.06	ND	0.08	ND
a-Chlordane		0.11		0.55*		0.12		0.60*
trans-Nonachlor		0.11		0.30*		0.32		0.55*
Dieldrin		0.79		0.75*		0.13		0.57*
4,4'-DDT		0.04		0.31*	0.05	ND	0.12	ND
2,4'-DDT	0.10	ND		*0.21*		0.08		0.23*
4,4'-DDD		0.75		4.40*		0.15		0.77*
2,4'-DDD		0.08		1.05*		0.15		0.42*
4,4'-DDE		5.80		10.70		0.41		1.42*
2,4'-DDE	0.10	ND	0.18	ND	0.18	ND		0.52*
TOTAL DDT		9.44		16.84		0.83		7.40
Endosulfan I	0.07	ND		1.24*	0.10	ND		0.07*
Endosulfan II	0.22	ND	0.38	ND	0.18	ND	0.22	ND
Endosulfan sulfate		0.02		0.13*		0.09		0.06
Heptachlor	0.10	ND	0.28	ND	0.08	ND	0.08	ND
Heptachlor epoxide	0.22	ND	0.38	ND		0.02	0.10	ND
Industrial Chemicals	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
PCB 8		0.32		0.24		0.47		0.27
PCB 18	0.16	ND		0.42*	0.22	ND		0.82*
PCB 28		0.16		2.51*		0.04		1.05*
PCB 44		0.09		1.19*		0.02		0.69*
PCB 49		0.15		2.14*		0.02		1.08*
PCB 52		0.13		2.93*		0.11		2.88*
PCB 66		0.20		2.81*		0.06		1.03*
PCB 87		0.13		0.79*		0.02		0.17*
PCB 101		0.21		2.32*		0.27		1.70*
PCB 105		0.15		0.77*		0.43		1.08*
PCB 118		0.37		1.57*		0.12		0.88*
PCB 128		0.06		0.25*		0.14		0.42*
PCB 138		0.36		1.63*		0.94		2.43*
PCB 153		0.41		1.99*		1.14		2.84*
PCB 170		0.03		0.23*		0.28		0.61*
PCB 180		0.05		0.53*		0.57		1.29*
PCB 183		0.02		0.24*		0.17		0.39*
PCB 184	0.08	ND	0.16	ND	0.10	ND	0.12	ND
PCB 187		0.05		0.42*		0.52		0.94*
PCB 195		0.01		0.10*		0.11		0.21*
PCB 206		0.12		0.43*		0.16		0.30*
PCB 209		0.03		0.13*		0.19		0.28*
TOTAL PCB		5.91		47.88*		11.9		42.40*
1,4-Dichlorobenzene		1.53		1.81		1.20		1.45

PORT ELIZABETH CHANNELS FP NO. 64

TABLE 3. (Continued)

	PORT ELIZABETH CHANNELS REACH B							
	Macoma nasuta				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
CONSTITIUENTS	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION
PAHs	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
Naphthalene		1.58		2.51		2.48		2.97
Acenaphthylene		0.17		1.49*		0.19		0.61*
Acenaphthene	6.80	ND		4.09*	0.64	ND		4.30*
Fluorene	5.86	ND		1.45*	0.76	ND		0.84*
Phenanthrene		0.63		11.20*		0.16		1.51*
Anthracene		0.25		8.77*	4.62	ND		1.15*
Fluoranthene		2.12		63.5*		0.37		13.2*
Pyrene		1.08		74.8*	1.20	ND		14.9*
Benz[a]anthracene		1.00		28.5*	1.24	ND		1.06*
Chrysene		2.15		31.1*	1.64	ND		7.16*
Benzo[b]fluoranthene		1.34		33.6*	3.54	ND		1.82
Benzo[k]fluoranthene		0.69		10.7*	1.82	ND		1.06
Benzo[a]pyrene		0.28		21.8*	1.78	ND		1.80*
Indeno[1,2,3-cd]pyrene		0.10		6.97*	4.12	ND		1.63*
Dibenz[a,h]anthracene	3.52	ND		2.01*	3.56	ND		3.09*
Benzo[g,h,i]perylene		0.16		9.61*	4.89	ND		0.35*
Dioxins	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)
2,3,7,8-TCDD	0.54	ND		3.12*	1.74	ND		2.64*
1,2,3,7,8-PeCDD	0.64	ND	0.74	ND	2.32	ND	3.33	ND
1,2,3,4,7,8-HxCDD	0.48	ND	0.60	ND	0.88	ND	1.41	ND
1,2,3,6,7,8-HxCDD	0.38	ND	0.56	ND	0.89	ND	1.35	ND
1,2,3,7,8,9-HxCDD	0.24	ND		2.23*	0.70	ND	1.11	ND
1,2,3,4,6,7,8-HpCDD		0.65		7.94*		1.21		1.71
OCDD		5.60		63.0*		9.78		11.22
Furans	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)	ppt (pg/g)
2,3,7,8-TCDF		0.20		1.08*		1.64		2.74*
1,2,3,7,8-PeCDF	0.58	ND	0.68	ND	1.18	ND	1.88	ND
2,3,4,7,8-PeCDF	0.50	ND	0.64	ND	2.08	ND	3.02	ND
1,2,3,4,7,8-HxCDF	0.26	ND		0.30	1.00	ND	1.08	ND
1,2,3,6,7,8-HxCDF	0.40	ND	0.52	ND	0.82	ND	1.04	ND
1,2,3,7,8,9-HxCDF	0.46	ND	1.38	ND	1.14	ND	2.02	ND
2,3,4,6,7,8-HxCDF		0.23		0.47	1.36	ND	2.93	ND
1,2,3,4,6,7,8-HpCDF	0.13	ND		4.11*		0.48		0.82*
1,2,3,4,7,8,9-HpCDF	0.36	ND	0.50	ND	1.02	ND	0.93	ND
OCDF	0.54	ND		6.27*		0.76		1.15

Concentrations shown are the mean of five replicate analyses

* Significant higher than reference at 95% confidence interval.

-ND = Not detected

Total PCB = 2(x), where x = sum of all PCB congeners detected

Total DDT=sum of 2,4' and 4,4' DDE, DDD, and DDT

Means and statistical comparisons were determined using conservative estimates of concentrations of constituents that were at concentrations below the detection limit