60185

A REMEDIAL ACTION PLAN
NEW BEDFORD HARBOR SUPERFUND SITE

PRESENTED AT

ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND REGION
BOSTON, MASSACHUSETTS 02203-2211

OCTOBER 19, 1988

PRESENTATION OVERVIEW

1. BACKGROUND

   - PCB PROBLEM
   - REMEDIAL ALTERNATIVES UNDER CONSIDERATION
   - ASSESSMENT

2. ENVIRONMENTAL SETTING

3. REMEDIAL ACTION CONCEPT

   - IMPACT OF CAPPING ON PCB FLUX RATES

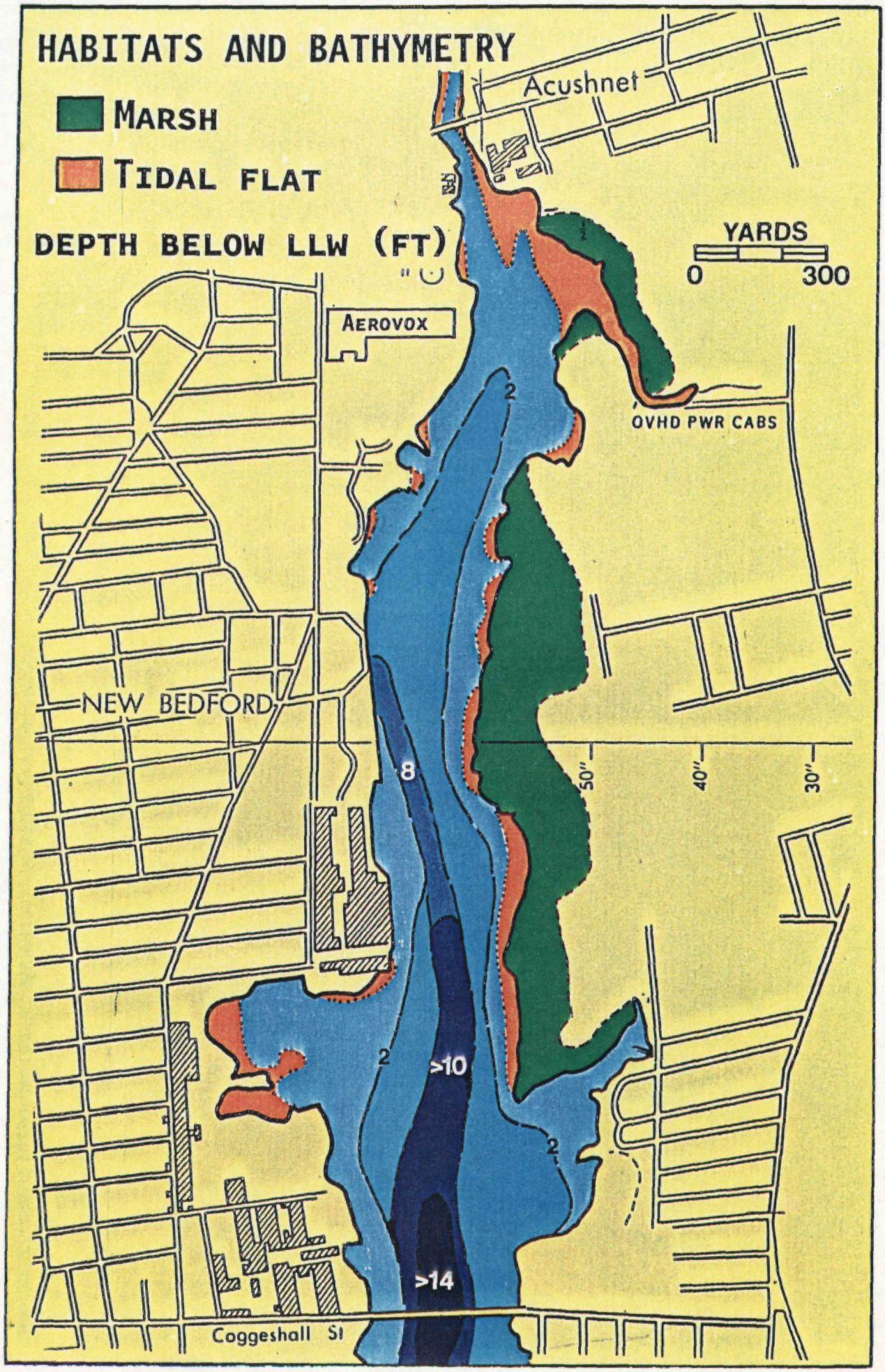
   - CAPPING CONCEPT
     - OVERVIEW
     - ENGINEERING FEASIBILITY
     - CONSTRUCTION METHODOLOGY
     - ENVIRONMENTAL IMPACT
     - COST ESTIMATES

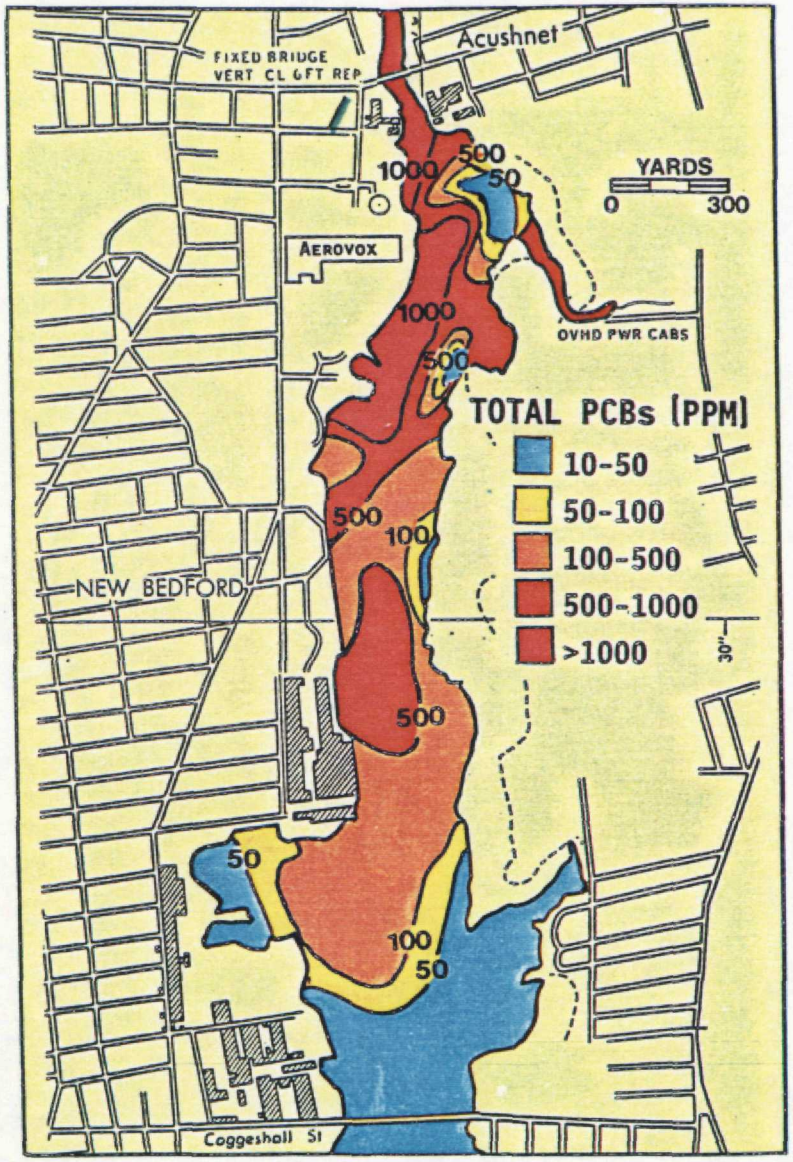
4. SUMMARY ASSESSMENT OF PROPOSED REMEDIAL ACTION PLAN

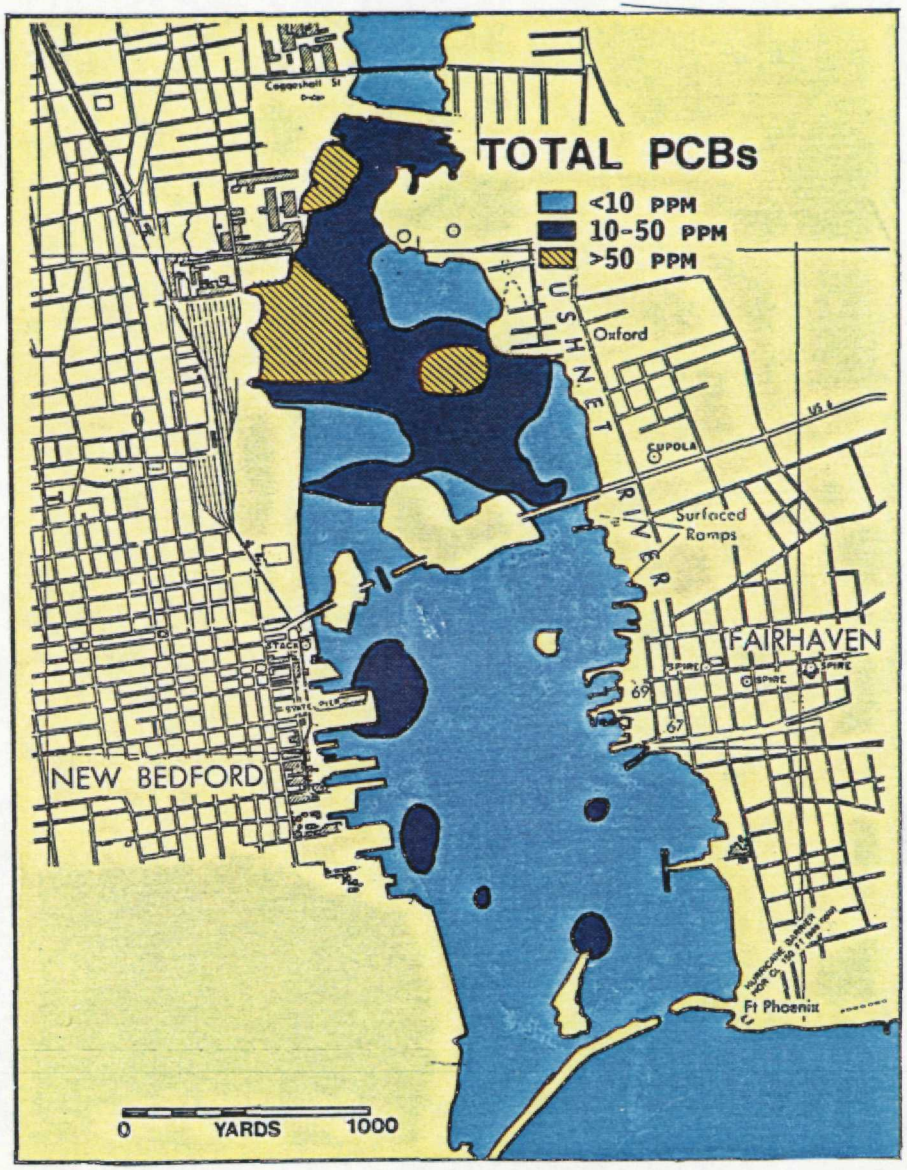
5. CONCLUSION

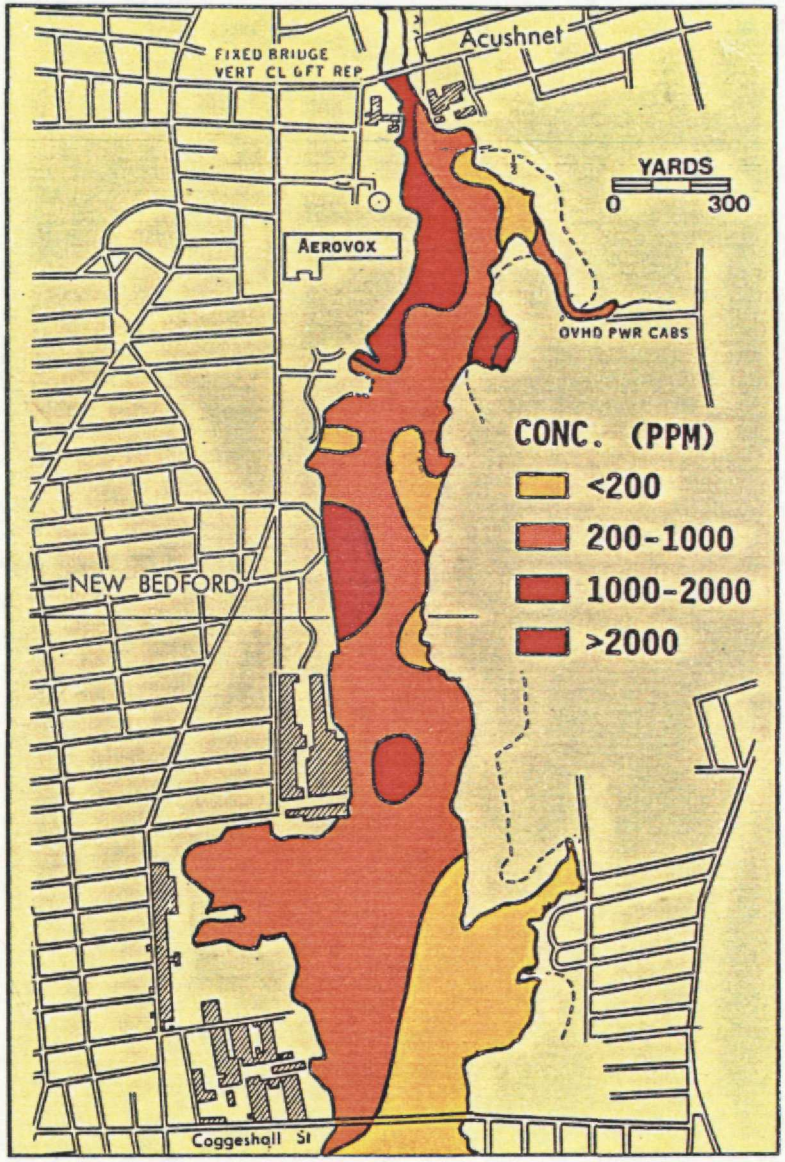
HISTORY OF PCB PROBLEM IN NEW BEDFORD HARBOR

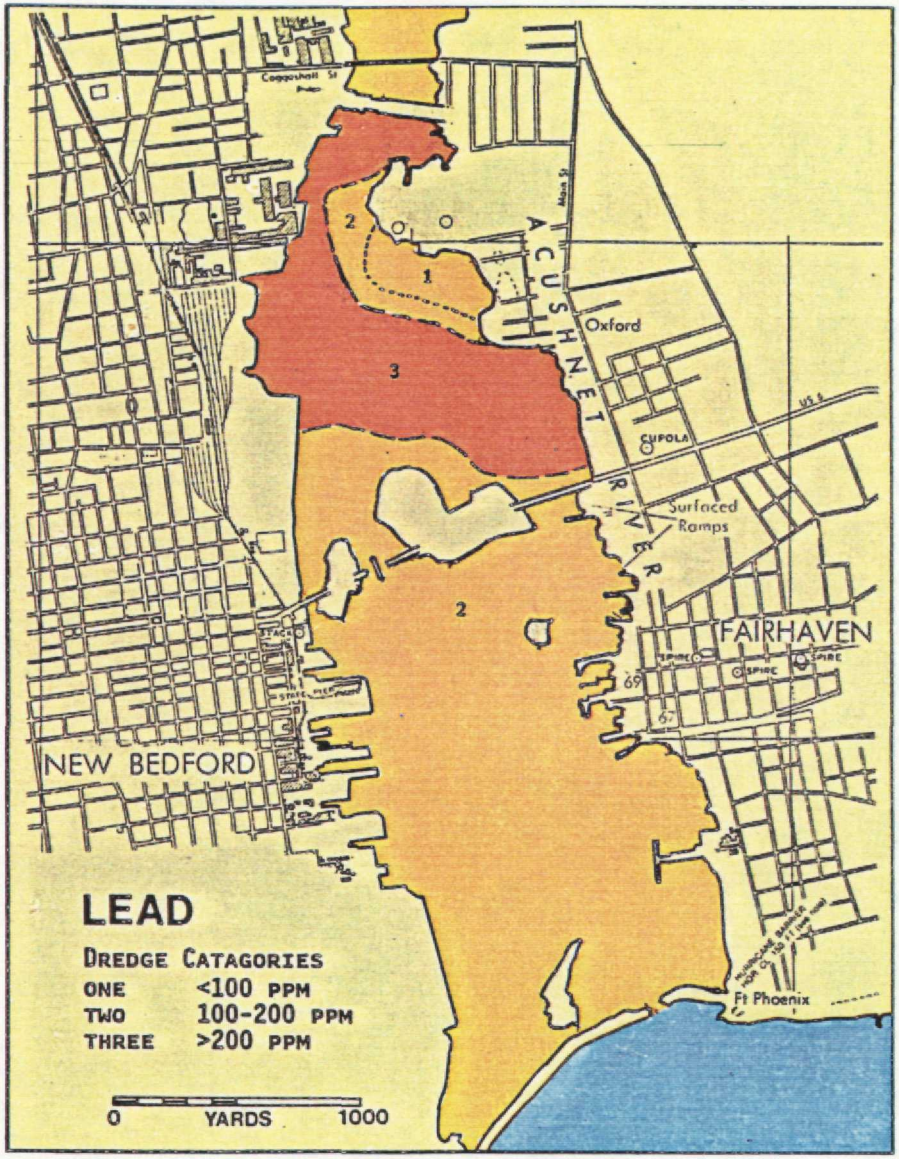
1976-1979	PCB CONTAMINATION DOCUMENTED IN NEW BEDFORD HARBOR BY EPA AND ACADEMIC SCIENTISTS, MASSACHUSETTS CLOSES ESTUARY TO FISHING
1982	NEW BEDFORD HARBOR NAMED BY EPA TO NATIONAL PRIORITIES LIST OF HAZARDOUS WASTE SITES (SUPERFUND SITE)
1983	NUS WORK PLAN-REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
1984	NUS FAST TRACK FEASIBILITY STUDY (FS) UPPER ESTUARY
1985-88	US ARMY CORPS ENGINEERING FEASIBILITY STUDY, EVALUATE CAD AND CDF APPROACHES
1987	EBASCO ANALYSIS OF REMEDIAL TECHNOLOGIES FOR NEW BEDFORD HARBOR, FEASIBILITY STUDY
1987-	US ARMY CORPS/EPA PILOT STUDY - DREDGING AND DISPOSAL ALTERNATIVES

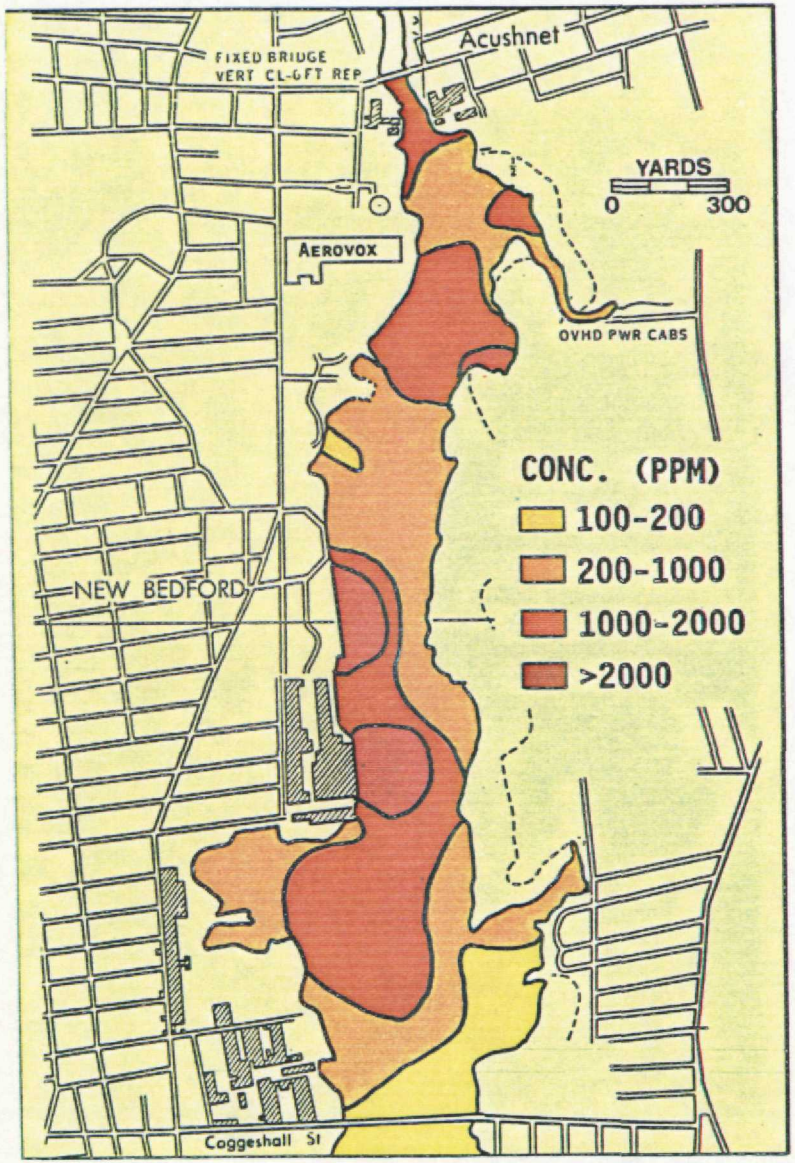

HABITATS AND BATHYMETRY
MARSH
TIDAL FLAT
DEPTH BELOW LLW (FT)
Acushnet
YARDS
0
300
AEROVOX
OVHD PWR CABS
NEW BEDFORD
50"
40"
30"
2
8
2
>10
2
>14
Coggeshall St

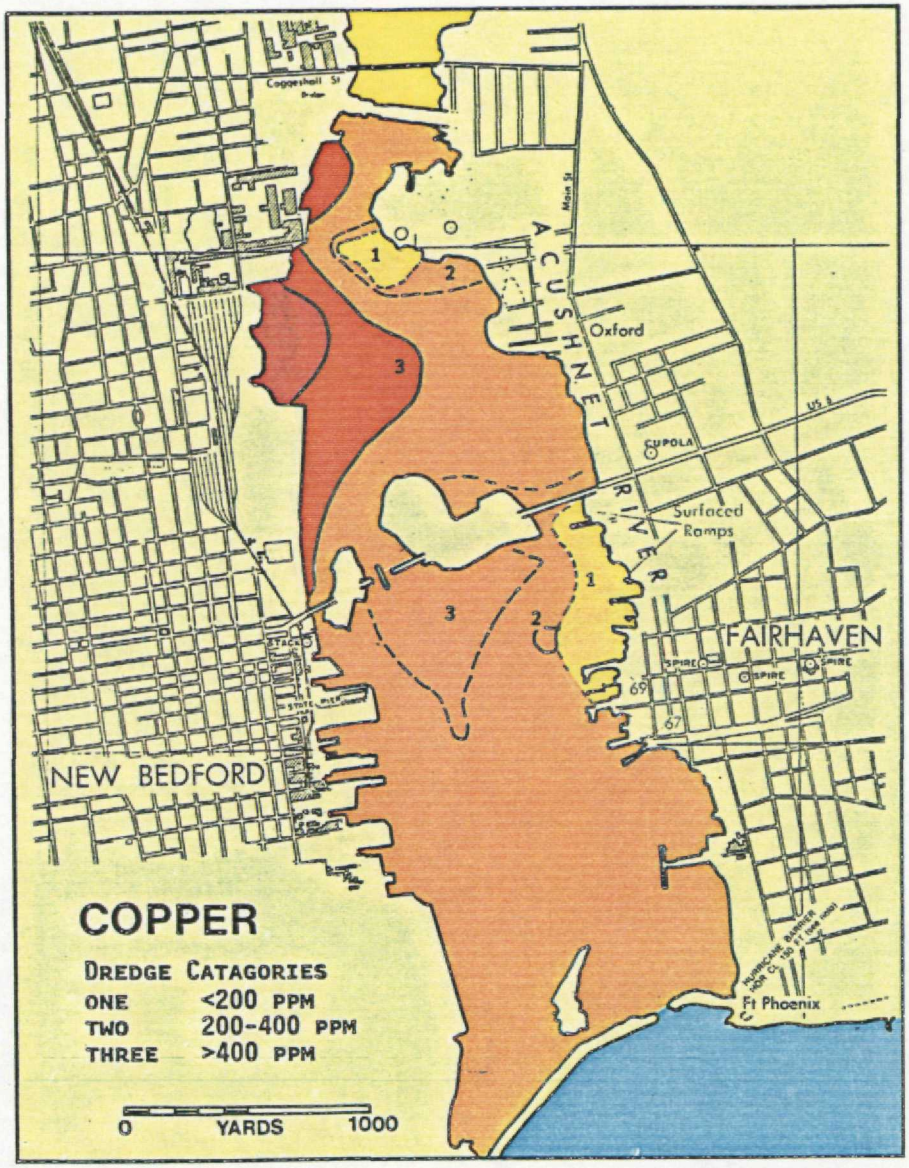

FIXED BRIDGE
VERT CL 6FT REP
Acushnet
YARDS
0
300
AEROVOX
OVHD PWR CABS
TOTAL PCBs (PPM)
10-50
50-100
100-500
500-1000
>1000
NEW BEDFORD
Coggeshall St


TOTAL PCBs
<10 PPM
10-50 PPM
>50 PPM
Oxford
CUSHNET
RIVER
CUPOLA
Surfaced
Ramps
FAIRHAVEN
NEW BEDFORD
Ft Phoenix
0
YARDS
1000


FIXED BRIDGE
VERT CL 6FT REP
Acushnet
YARDS
0
300
AEROVOX
OVHD PWR CABS
CONC. (PPM)
<200
200-1000
1000-2000
>2000
NEW BEDFORD
Coggeshall St


Coggeshall St
Main St
2
1
3
ACUSHNET
RIVER
Oxford
US 6
CUPOLA
Surfaced
Ramps
FAIRHAVEN
SPIRE
69
67
NEW BEDFORD
LEAD
DREDGE CATAGORIES
ONE <100 PPM
TWO 100-200 PPM
THREE >200 PPM
0
YARDS
1000
Ft Phoenix


FIXED BRIDGE
VERT CL-GFT REP
Acushnet
YARDS
0
300
AEROVOX
OVHD PWR CABS
CONC. (PPM)
100-200
200-1000
1000-2000
>2000
NEW BEDFORD
Coggeshall St


Coggeshall St
Main St
ACUSHNET
RIVER
Oxford
US 6
CUPOLA
Surfaced
Ramps
FAIRHAVEN
SPIRE
SPIRE
SPIRE
69
67
1
2
3
NEW BEDFORD
COPPER
DREDGE CATAGORIES
ONE <200 PPM
TWO 200-400 PPM
THREE >400 PPM
0
YARDS
1000
Ft Phoenix

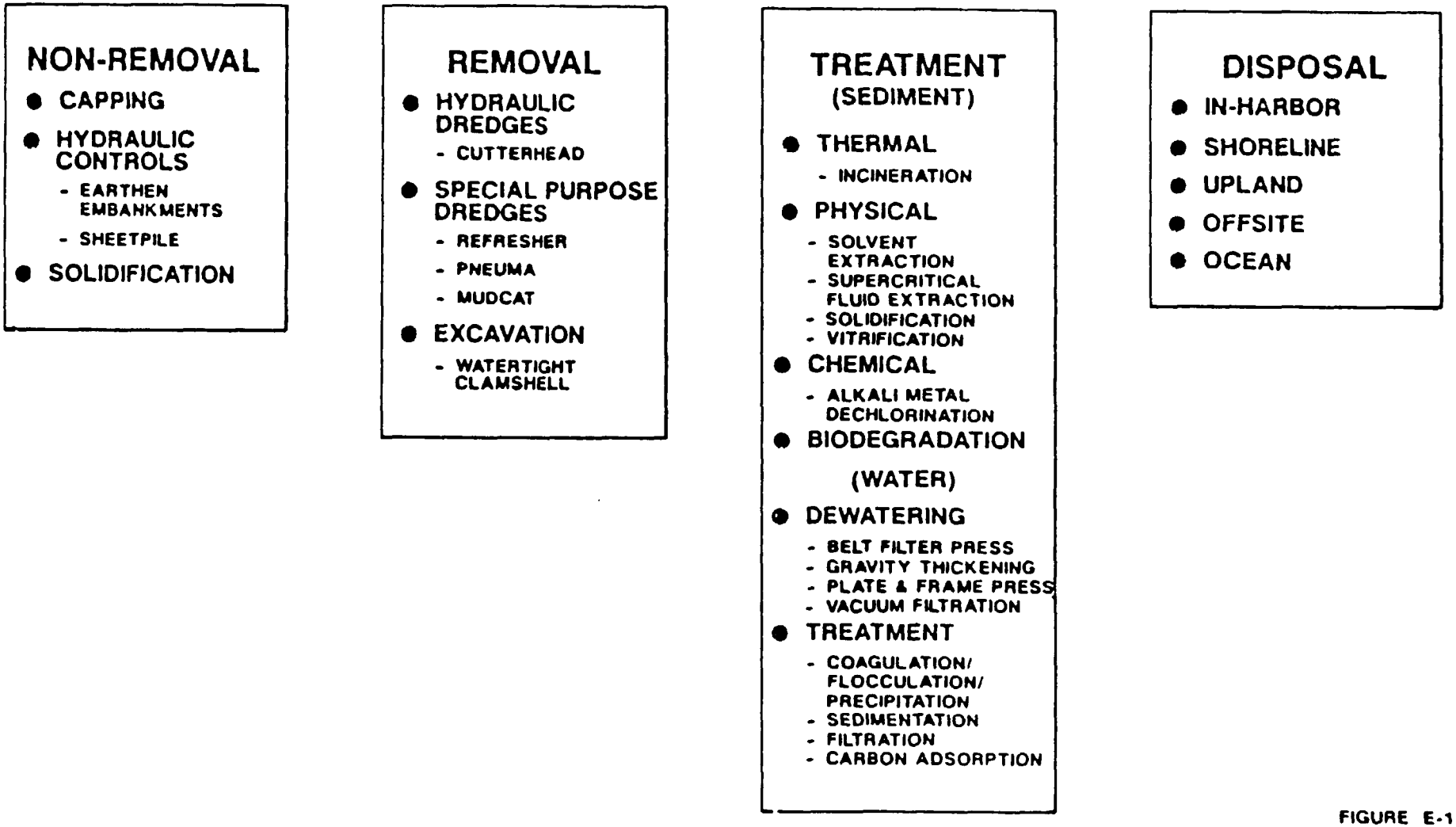


FIGURE E-1
TECHNOLOGIES RETAINED FOR
DEVELOPMENT OF REMEDIAL ALTERNATIVES
NEW BEDFORD HARBOR

E.C.JORDAN CO.

CRITERIA FOR REMEDIAL ACTION PLAN*

- EFFECTIVENESS
  - RELIABILITY
  - SIGNIFICANTLY AND PERMANENTLY REDUCE TOXICITY, MOBILITY, AND VOLUME

- IMPLEMENTATION
  - TECHNICAL, INSTITUTIONAL, ADMINISTRATIVE FEASIBILITY TO INSTALL, MONITOR AND MAINTAIN TECHNOLOGY

- COSTS
  - DIRECT - INDIRECT COSTS
  - OPERATION AND MAINTENANCE COSTS

*IN ACCORDANCE WITH

CERCLA FEASIBILITY (CERCLA-FS)
NATIONAL CONTINGENCY PLAN (NCP)
SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA)

RECOMMENDED APPROACHES

NUS FAST TRACK FEASIBILITY STUDY
REMEDIAL ACTION ALTERNATIVES (UPPER ESTUARY)

- HYDRAULIC CONTROL OF RIVER WITH SEDIMENT CAPPING

- SEDIMENT DREDGING WITH IN HARBOR DISPOSAL (LINED OR PARTIALLY LINED) (CONTAINMENT DIKE FACILITY, CDF)

- DREDGING WITH UPLAND DISPOSAL

- BURIAL (CLEAN SEDIMENT CAP) IN ESTUARY BOTTOM (CONFINED AQUATIC DISPOSAL, CAD)

EPA/US ARMY CORPS PILOT STUDY - DREDGING/CAPPING EVALUATION

- EVALUATE DREDGING TECHNOLOGY

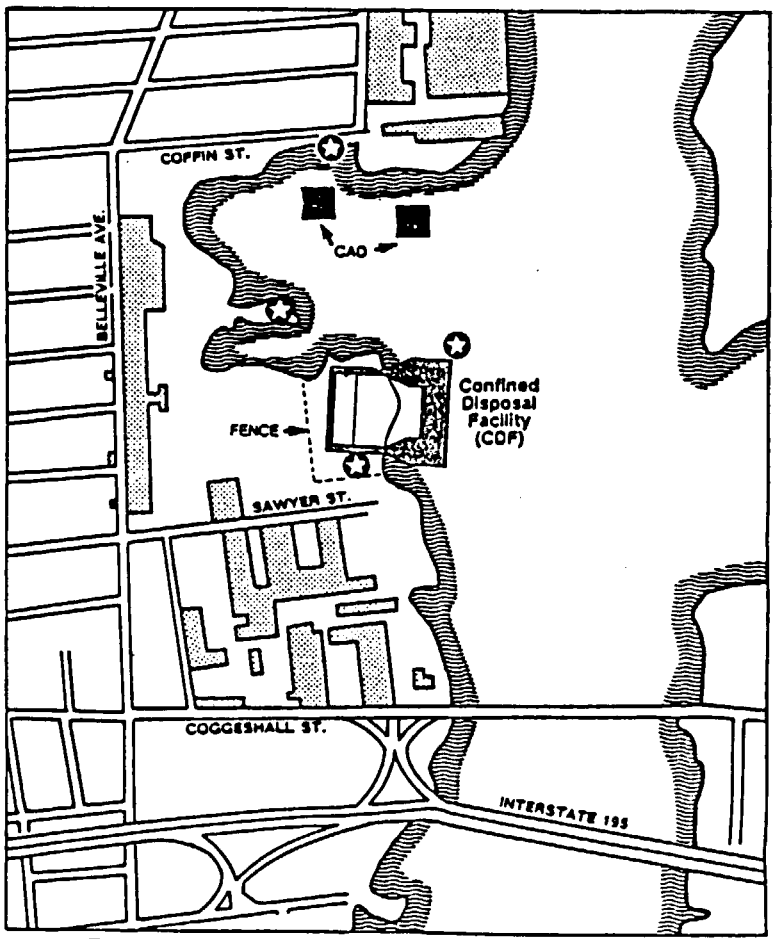
  - HYDRAULIC PIPELINE CUTTER HEAD (WITH/WITHOUT MATCH BOX)
  - MUD CAT (HORIZONTAL AUGER)

- CONFINED DISPOSAL FACILITY (CDF)

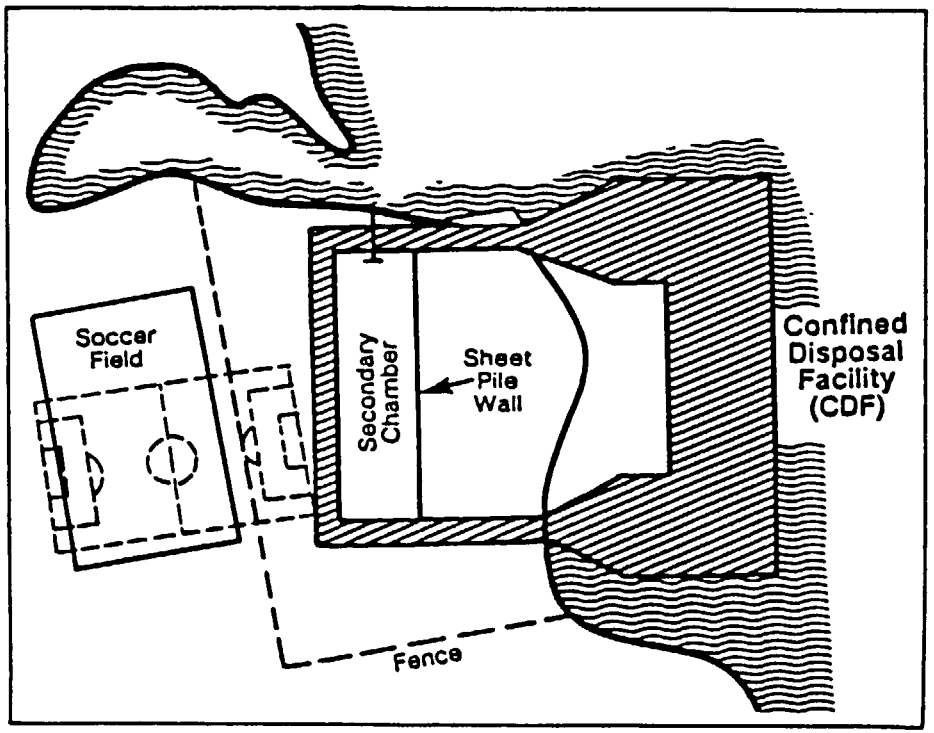
  AREA - 125,000 FT^2
  DREDGED MATERIAL - 10,000 CU YD (5,000 CU YD CONTAMINATED)
  DIKE LENGTH - 1700 FT
  DIKE VOLUME - 24,500 CU YD
  DREDGED SEDIMENT PCB CONCENTRATION - 100 PPM
  GEOFABRIC, LINED
  PRIMARY/SECONDARY CELL
  FINAL CAP VOLUME - 5,000 CU YD

- CONFINED AQUATIC DISPOSAL (CAD)

  SIZE - 250 FT X 250 FT
  DREDGED MATERIAL - 5,000 CU YD (2500 CU YD CONTAMINATED)
  CAP THICKNESS - 2 FT



= monitoring stations = estações de vigilância



CONCERNS WITH PRESENT DREDGING/CAPPING APPROACHES

- HIGH RISK OF CONTAMINANT RELEASE
- HANDLE LARGE VOLUMES CONTAMINATED SEDIMENTS
- LARGE SCALE ENVIRONMENTAL IMPACT
- UNFAVORABLE COST BENEFIT PROBABLE
- CHANGE PHYSICAL CHARACTER OF ESTUARY
- LOSS OF HABITAT
- NOT APPLICABLE TO "HOT SPOT"
- LIMITED EXPERIENCE WITH APPROACHES
- SIGNIFICANT ENGINEERING PROBLEMS

PHYSICAL

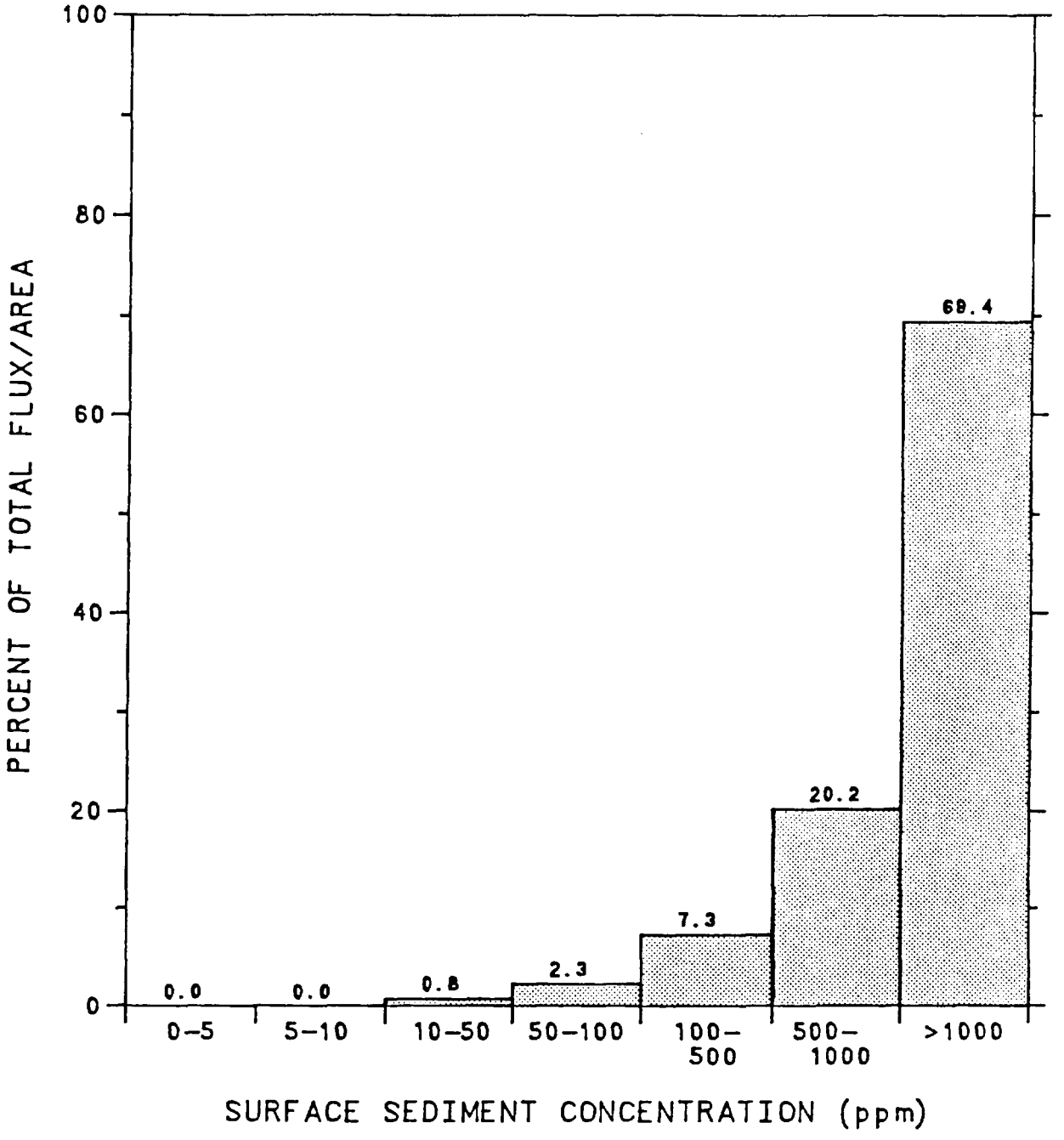
- SMALL URBAN ESTUARY
- LOW FRESHWATER INPUT
- PRIMARILY TIDAL CIRCULATION
- HURRICANE BARRIER ISOLATES ESTUARY FROM OFFSHORE WATERS (STORM SURGES)

GEOLOGICAL

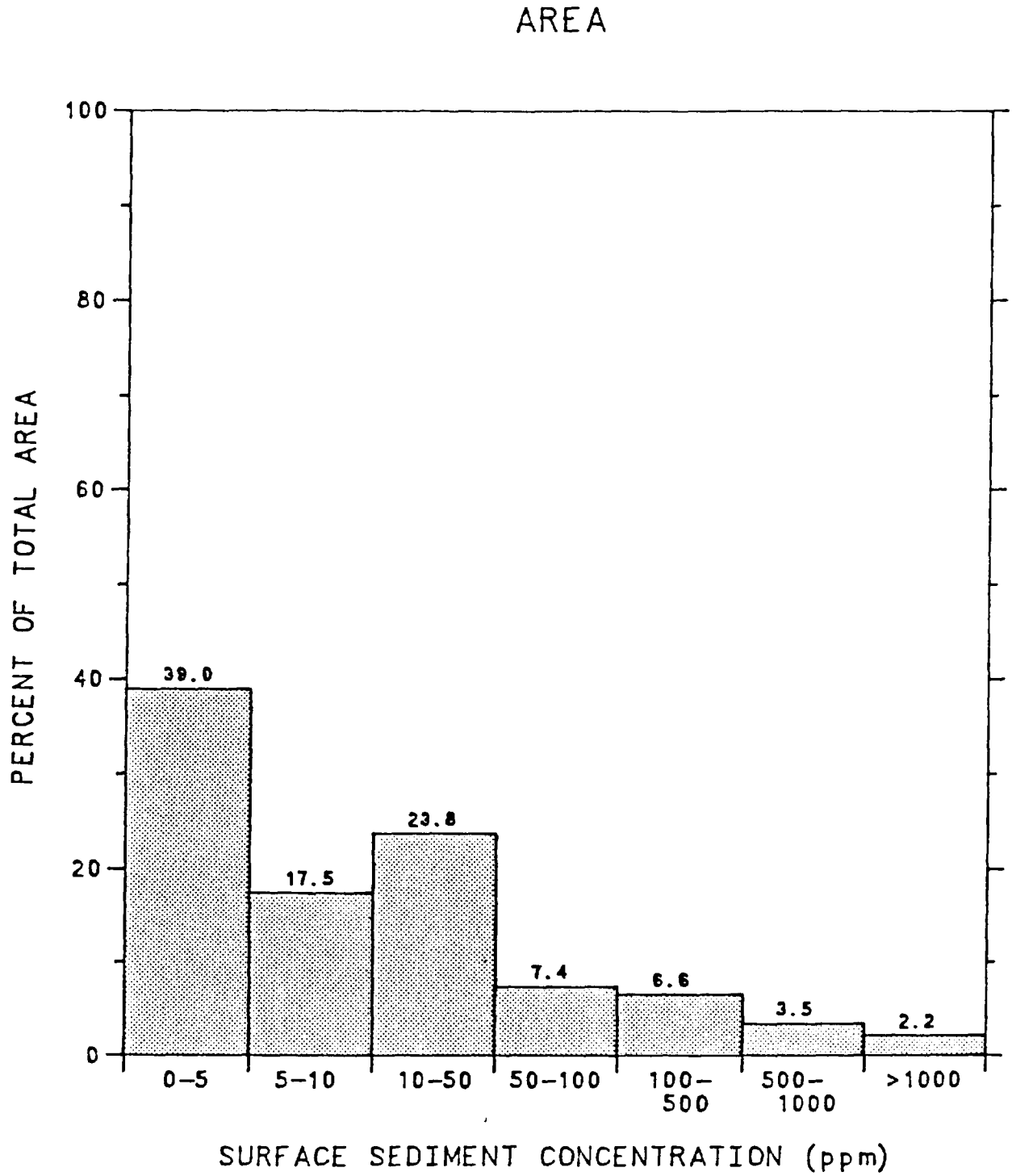
- DEPOSITIONAL ENVIRONMENT
- COMPLEX TIDAL FLATS, SHALLOW BASINS AND TIDAL CHANNELS; SIGNIFICANT HUMAN ALTERATIONS - DREDGING AND FILLING
- ORGANIC-RICH SILTS/CLAYS IN UPPER ESTUARY TO COARSER SANDS/GRAVELS IN LOWER ESTUARY
- NET SEDIMENT TRANSPORT INTO HARBOR FROM BUZZARDS BAY

BIOLOGICAL

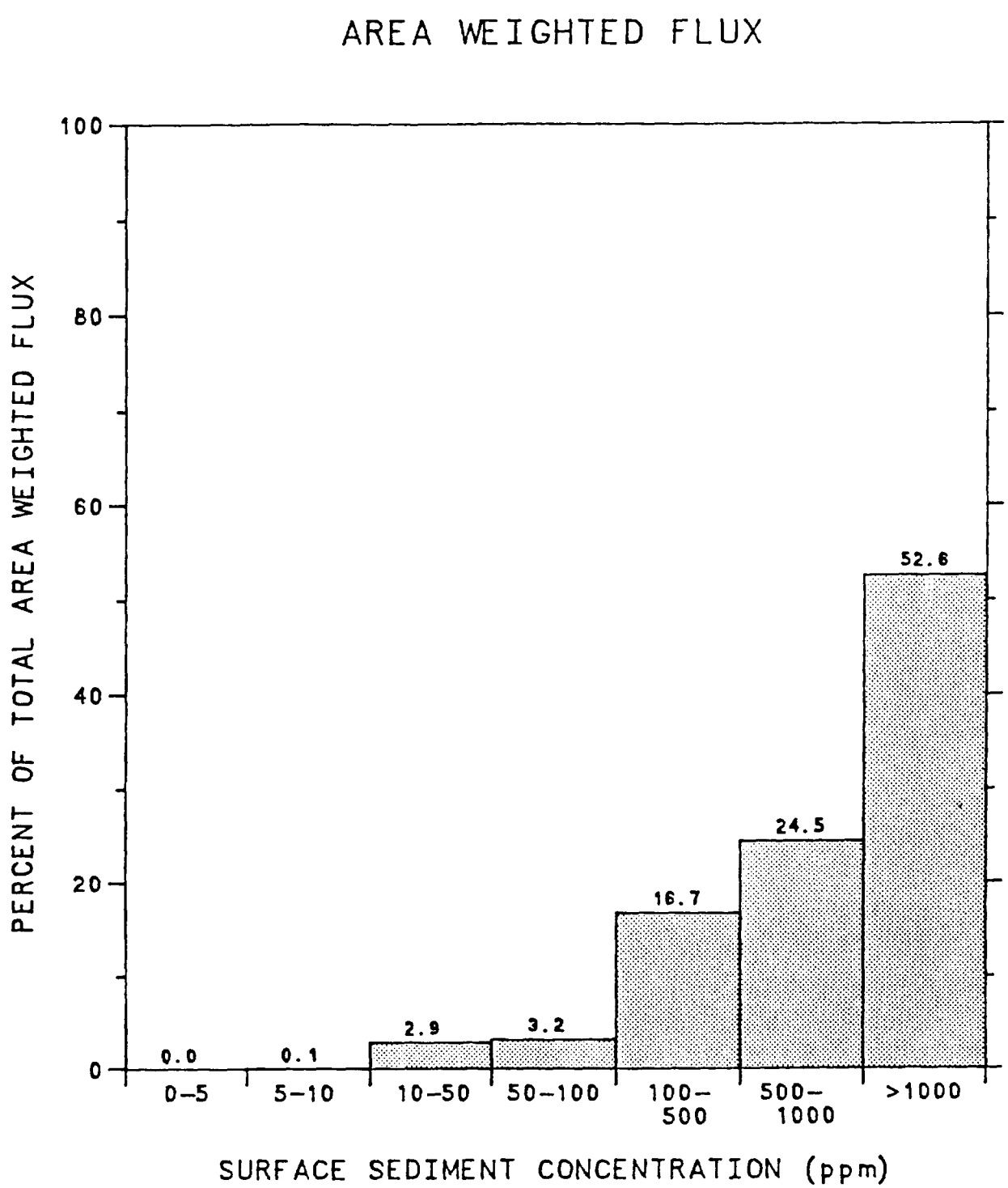
- ESTUARINE
- EUTROPHIC
- HIGH POLLUTANT LOAD
- SUBTIDAL: MUD BOTTOM, HIGH TURBIDITY, PLANKTON-BASED FOOD CHAIN
- INTERTIDAL: MUD FLATS AND SALT MARSH; SALT MARSH IS 80% HIGH MARSH CONTAINING *SPARTINA PATENS* (SALT MEADOW CORDGRASS)



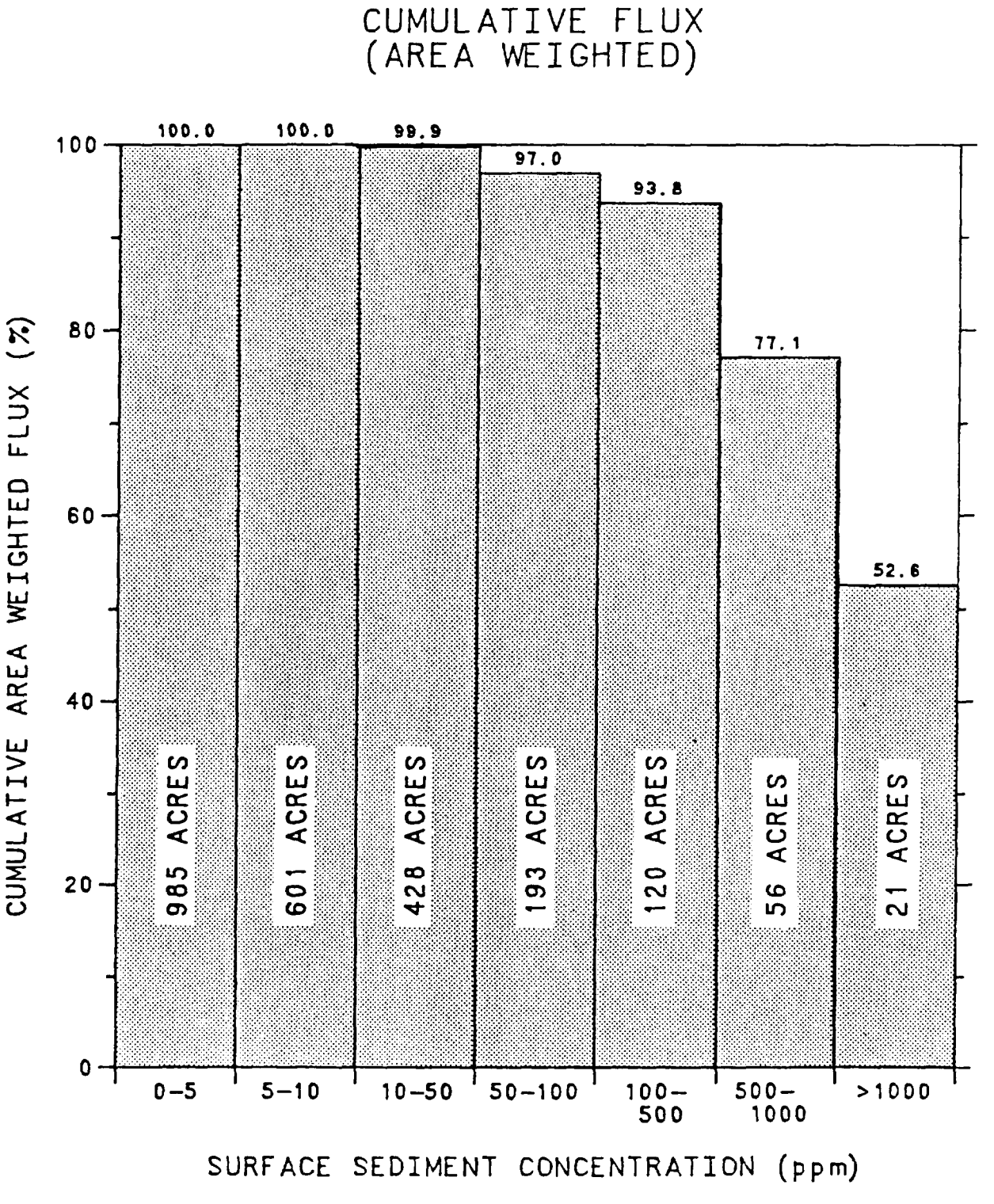
HISTOGRAM OF PCB FLUX PER UNIT AREA FROM THE SEA FLOOR INTO THE WATER COLUMN VERSUS SURFACE SEDIMENT PCB CONCENTRATION CONTOURS (PPM). CALCULATIONS ARE NONDIMENSIONALIZED WITH TOTAL FLUX INTEGRATED OVER ALL CONTOUR INTERVALS.



HISTOGRAM OF BOTTOM AREA VERSUS SURFACE SEDIMENT PCB CONCENTRATION CONTOURS (PPM). VALUES ARE NONDIMENSIONALIZED WITH THE TOTAL AREA (NORTH OF THE HURRICANE BARRIER) HAVING PCB SURFACE SEDIMENT CONCENTRATIONS GREATER THAN 1 PPM.



HISTOGRAM OF AREA WEIGHTED PCB FLUX FROM THE SURFACE SEDIMENTS TO THE WATER COLUMN VERSUS SURFACE SEDIMENT PCB CONCENTRATION CONTOURS (PPM). VALUES ARE NONDIMENSIONALIZED WITH TOTAL FLUX INTEGRATED OVER THE ENTIRE ESTUARY (NORTH OF THE HURRICANE BARRIER).



HISTOGRAM OF THE CUMULATIVE AREA WEIGHTED PCB FLUX FROM THE SURFACE SEDIMENTS TO THE WATER COLUMN VERSUS SURFACE SEDIMENT PCB CONCENTRATION CONTOURS (PPM). THE INTEGRATION HAS BEEN DONE FROM HIGHER TO LOWER PCB CONCENTRATION LEVELS. THE AREA NOTED FOR EACH INTERVAL IS THE CUMULATIVE AREA (ACRES).

CAPPING VOLUME REQUIREMENTS

PCB SEDIMENT CONCENTRATIONS (PPM)	CUMULATIVE AREA (ACRES)	CUMULATIVE VOLUME (CU YD)
1000->	21	50,007
500->	56	133,351
100->	120	285,754
50->	193	459,587
10->	428	1,019,188
5->	601	1,431,150
1->	985	2,345,560
UPPER ESTUARY		
(<MHW)	257	611,988
(<MSL)	204	485,781
(<MLW)	175	416,724

ASSUME CAP THICKNESS 45 CM (1.476 FT)

ADVANTAGES OF CAPPING APPROACH

- WIDELY USED PRACTICE
- SUCCESSFULLY IMPLEMENTED (ROTTERDAM; 1981; SEATTLE, 1984; NEW YORK EXP. MUD DUMP, 1983; LONG ISLAND SOUND, 1980'S)
- EFFECTIVELY ISOLATE WASTE
- COST EFFECTIVE
- TECHNOLOGY AND EQUIPMENT READILY AVAILABLE
- NO HAZARDOUS MATERIAL IS HANDLED, RISK OF RELEASE MINIMAL
- CAPPING MATERIAL ABUNDANT AND FREE (OFFSHORE BORROW SITE)

REMEDIAL ACTION PLAN SUMMARY
INLET MODIFICATION - CAPPING

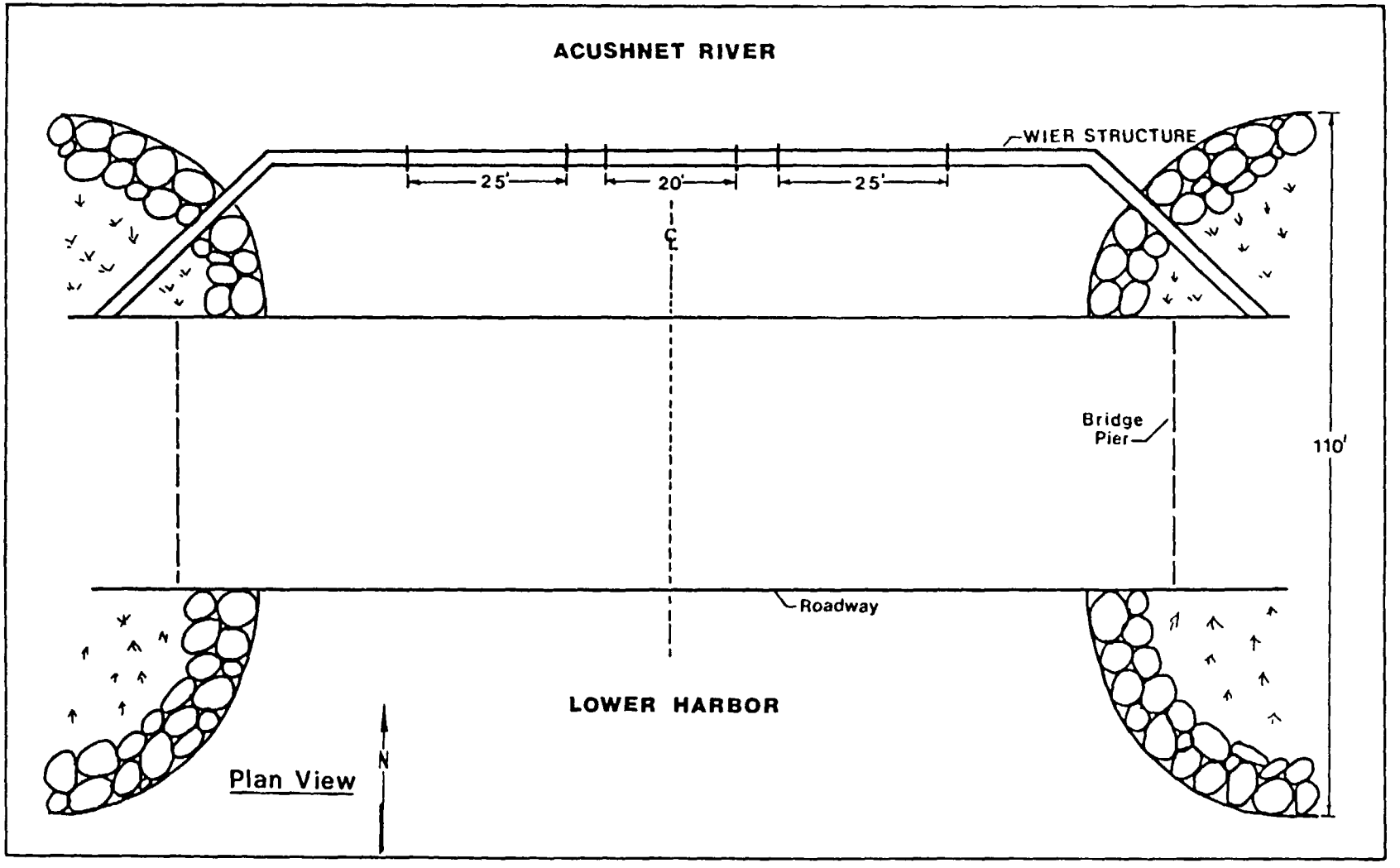
- CONSTRUCT TEMPORARY DAM (WITH VARIABLE HEIGHT WEIR) AT COGGESHALL ST. BRIDGE

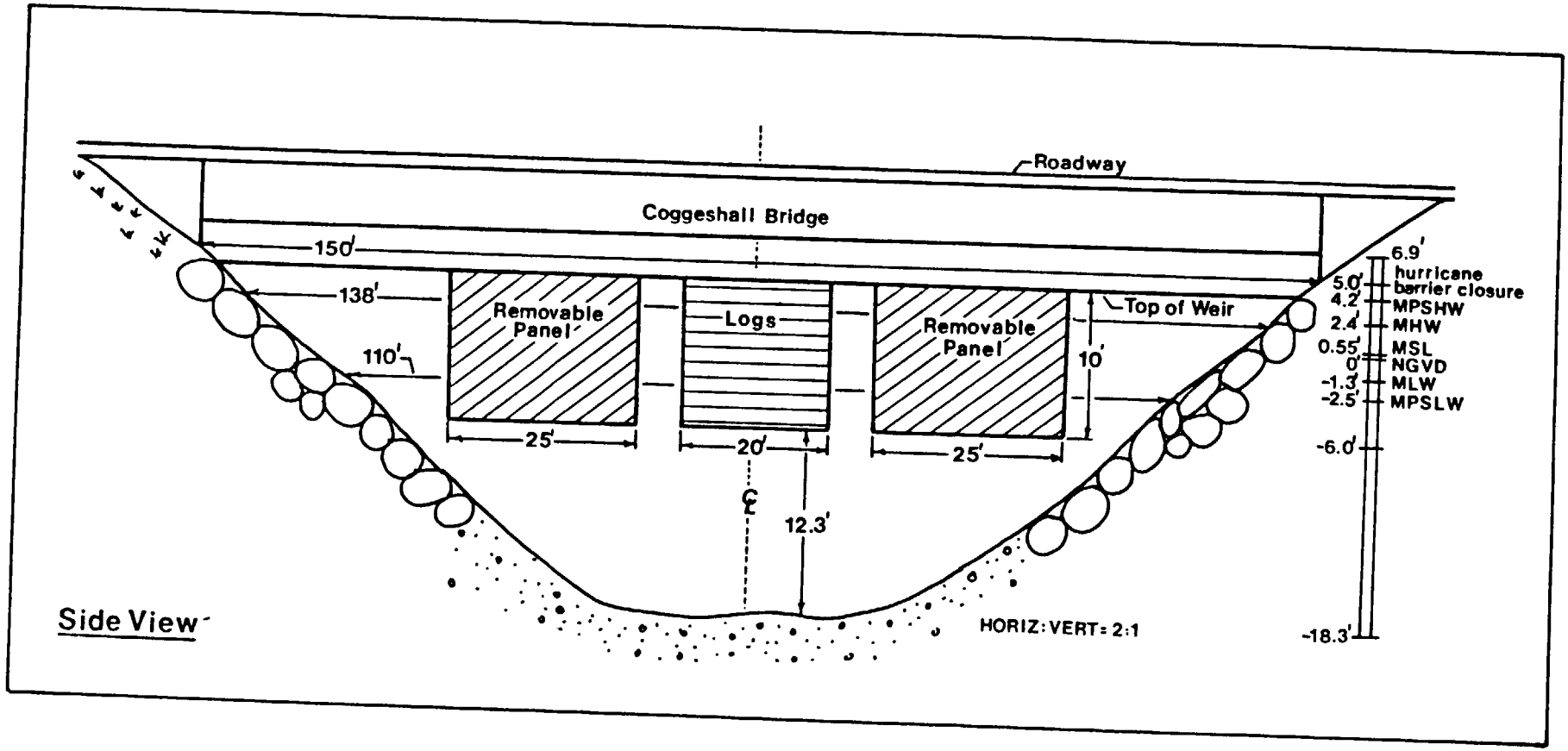
  - WEIR AT MHW - CONTROL CIRCULATION AND WATER LEVEL DURING CAPPING

  - WEIR AT MLW - TIDAL UPPER ESTUARY, SALINITY RANGE TYPICAL PRESENT, TIDAL RANGE AND FLOW REDUCED BY 65%

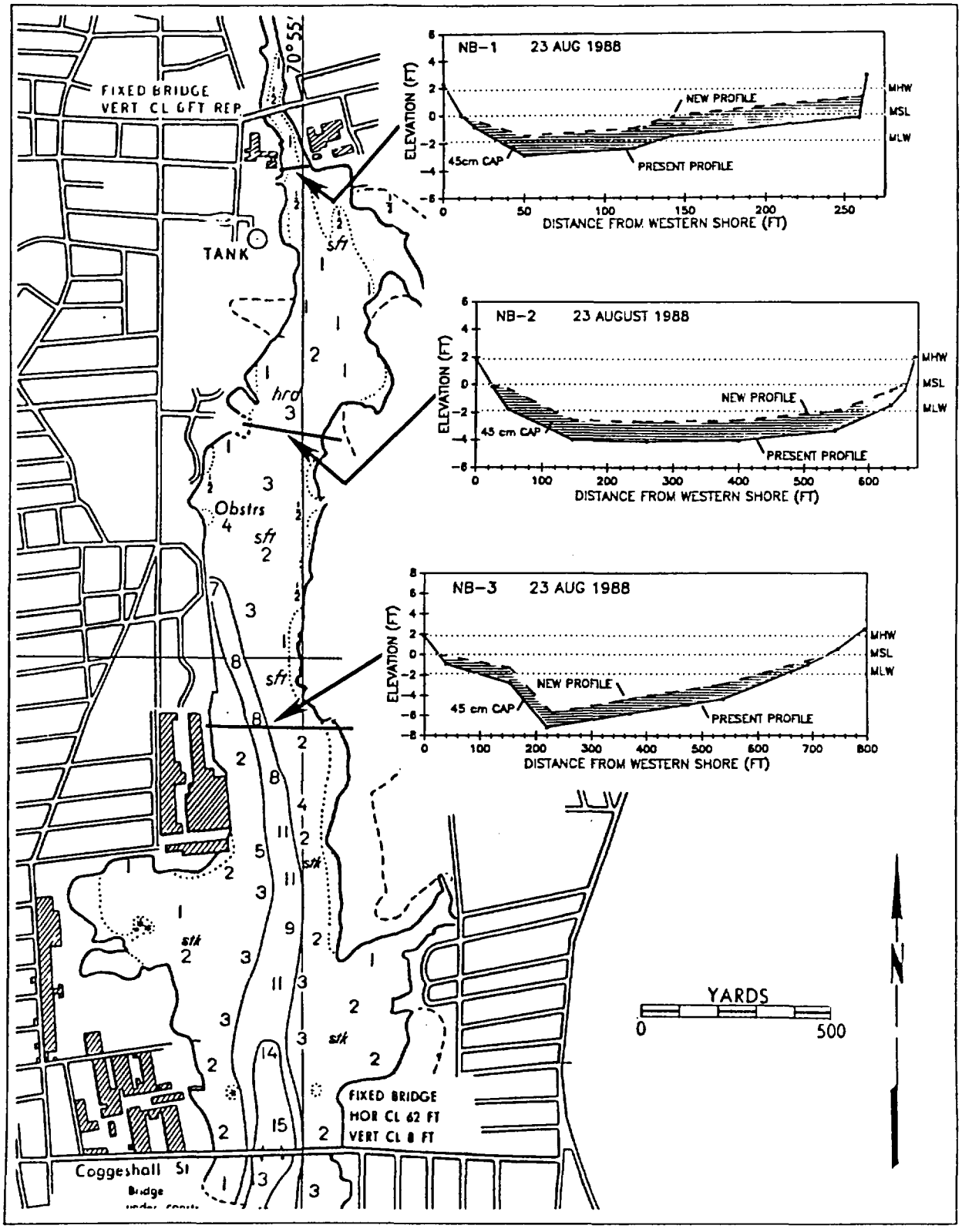
- CAP UPPER ESTUARY SEDIMENTS

  - CAP ENTIRE UPPER ESTUARY, OBTAIN CLEAN MATERIAL FROM OFFSHORE OR LAND BORROW PIT
  - GEOFABRIC COVERS
  - GRAVEL-STONE EROSION PROTECTION (18 ACRES, HOT SPOT AND VICINITY)
  - CAPPING DEPTH - 45 CM

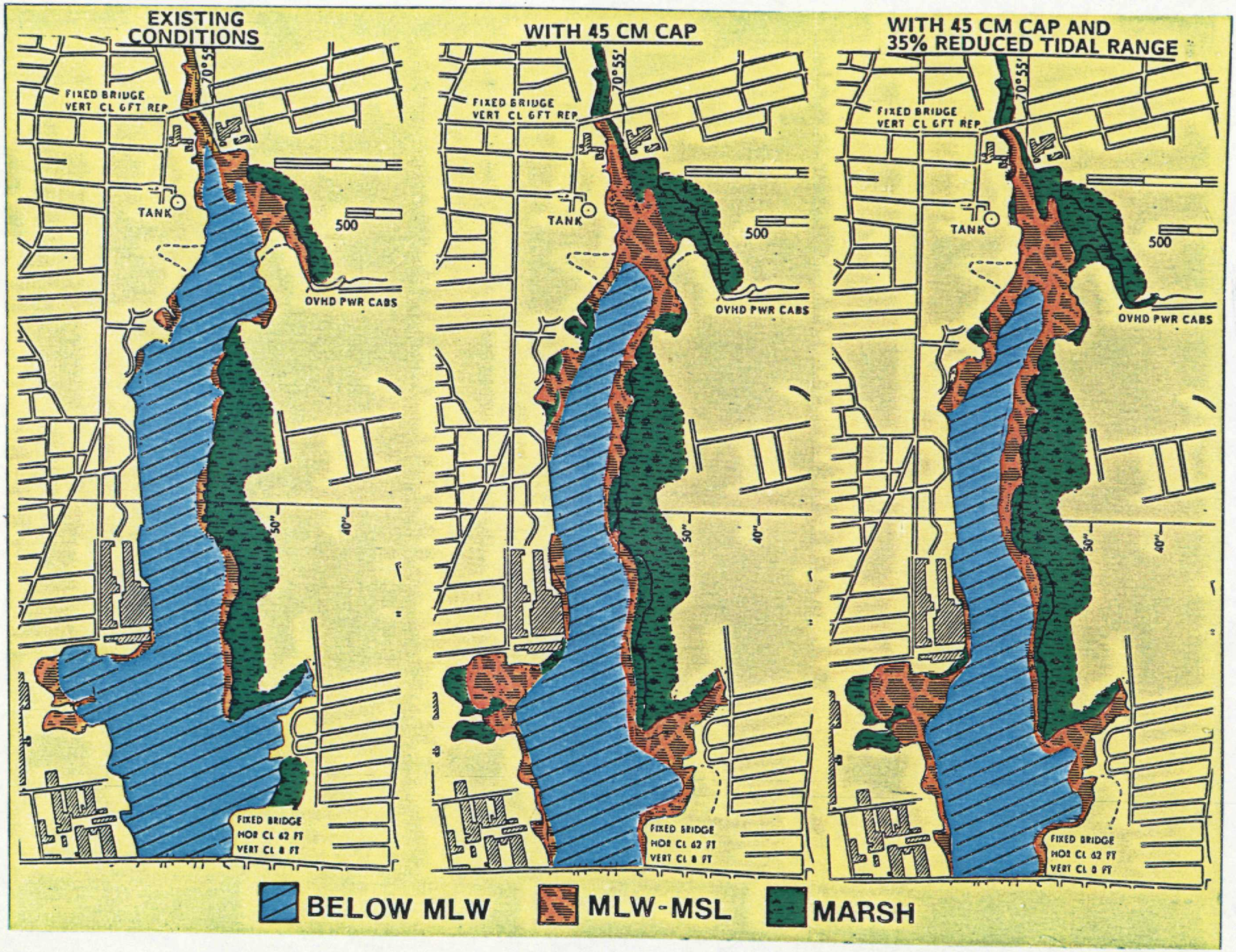

ACUSHNET RIVER
WIER STRUCTURE
25'
20'
25'
℄
Bridge Pier
110'
Roadway
LOWER HARBOR
N
Plan View



Side and plan views of the proposed dam with adjustable weir.

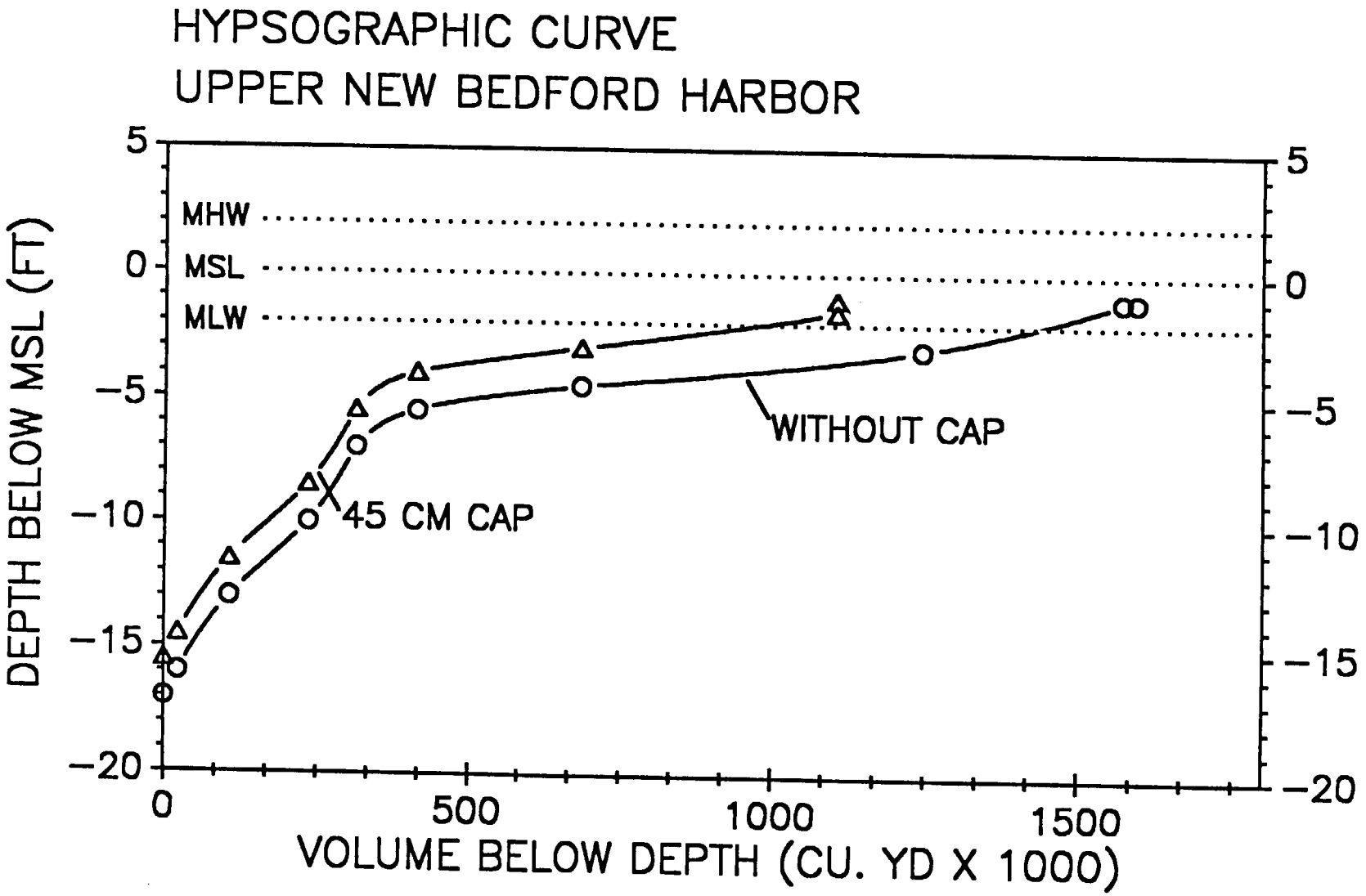


Cross sections of the upper estuary showing the pre and post cap conditions.

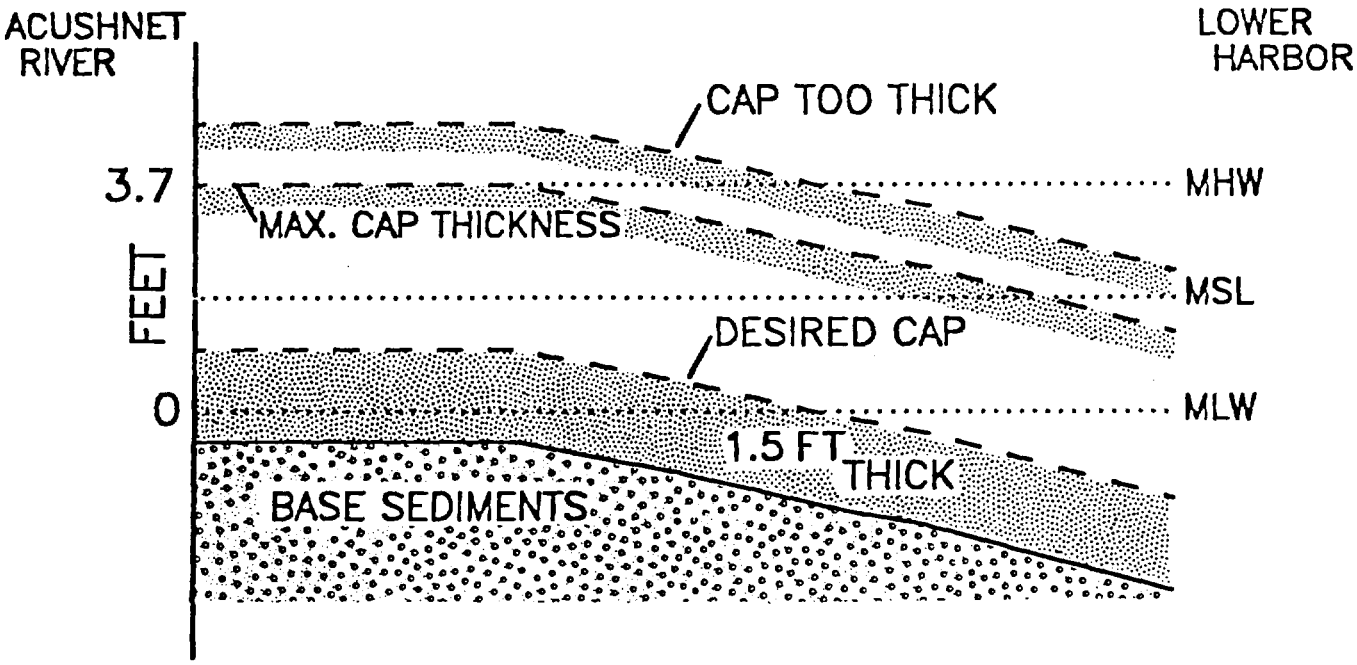

EXISTING CONDITIONS
WITH 45 CM CAP
WITH 45 CM CAP AND 35% REDUCED TIDAL RANGE
FIXED BRIDGE VERT CL 6FT REP
70°55'
TANK
500
OVHD PWR CABS
50"
40"
FIXED BRIDGE HOR CL 62 FT VERT CL 8 FT
BELOW MLW
MLW-MSL
MARSH

AREAL EXTENT OF PRESENT AND POTENTIAL BIOLOGICAL HABITATS ASSUMING A 45 CM CAP OVER THE ENTIRE UPPER ACUSHNET RIVER ESTUARY NORTH OF THE COGGESHALL ST. BRIDGE AND A WEIR REDUCING THE TIDAL RANGE TO 35% OF PRESENT RANGE. (MSL = MEAN SEA LEVEL; MSLW = MEAN SPRING LOW WATER; MPSHW = MAXIMUM PROBABLE SPRING HIGH WATER).

HABITAT	DEPTH ZONE	AREAL EXTENT (ACRES)		
		PRESENT	CAP ONLY	CAP AND WEIR
SALT MARSH	MPSHW-MSL	53	83	48
INTERTIDAL MUD FLAT	MSL-MSLW	29	54	37
INTERTIDAL RIP-RAP CHANNEL	MSL-MSLW	0	12	12
SUBTIDAL MUD	<MSLW	175	102	119
SUBTIDAL RIP-RAP CHANNEL	<MSLW	0	6	6
NEWLY CREATED UPLAND	>MPSHW	0	0	35
TOTAL	<MPSHW	257	257	257


HYPSOGRAPHIC CURVE
UPPER NEW BEDFORD HARBOR
DEPTH BELOW MSL (FT)
5
0
−5
−10
−15
−20
MHW
MSL
MLW
WITHOUT CAP
45 CM CAP
0
500
1000
1500
VOLUME BELOW DEPTH (CU. YD X 1000)

RELATIONSHIP OF CAP WATER LEVELS IN UPPER ESTUARY



NO RISE IN HIGHEST WATER LEVEL (PONDING) AS LONG AS HEIGHT IS LESS THAN MHW.

MAXIMUM CAP THICKNESS: TIDAL RANGE + MLW DEPTH.
(3.7 ft + 0.5 ft = 4.2 ft)

PREFERABLE TO HAVE CAP LOWER THAN MSL.
(1.85 ft + 0.5 ft = 2.35 ft)

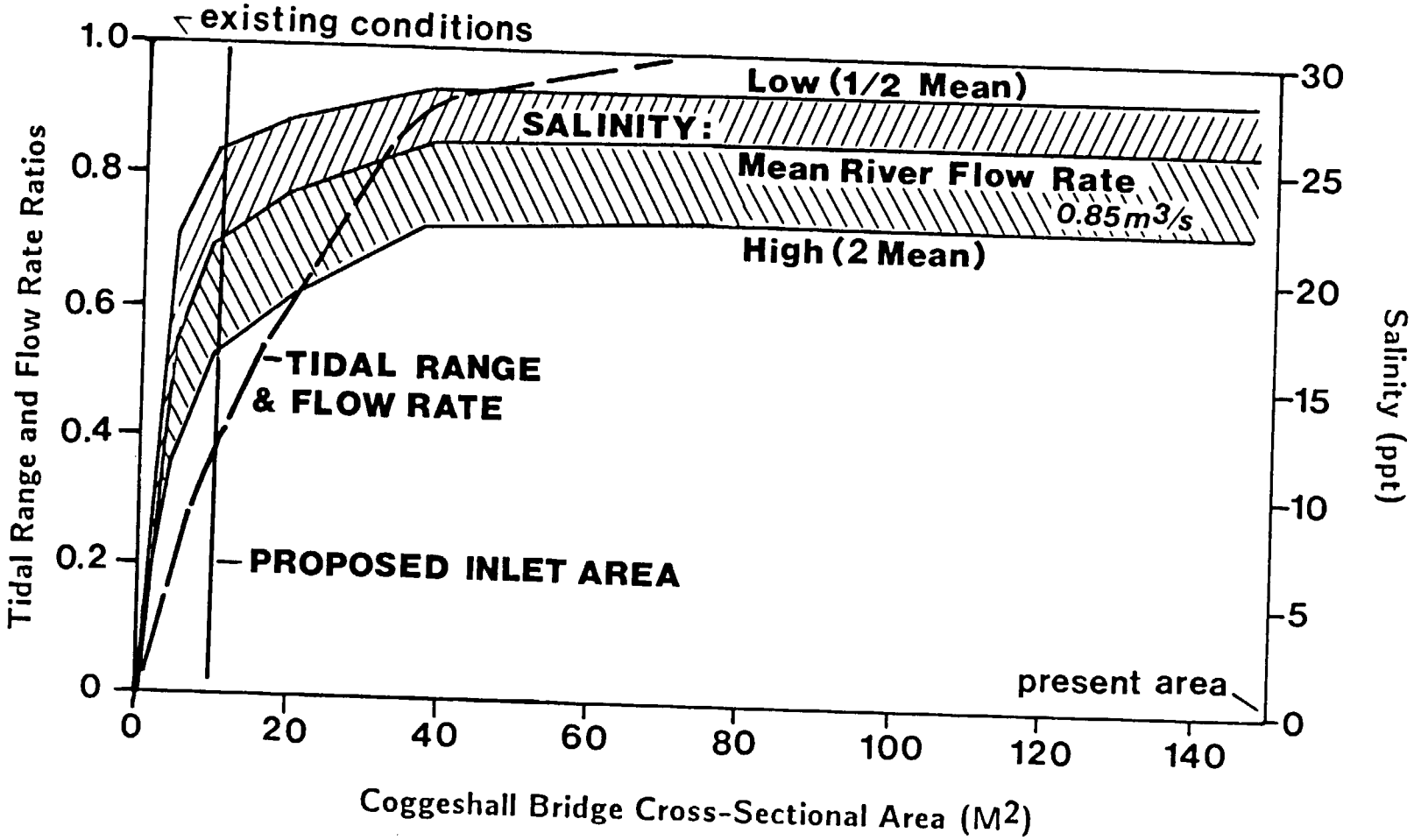
PCB AND METALS: EFFECT OF CAPPING UPPER ESTUARY

PARAMETER	% MASS CAPPED*
CHROMIUM	34
COPPER	30
LEAD	46
ZINC	68
PCB	95 (**)

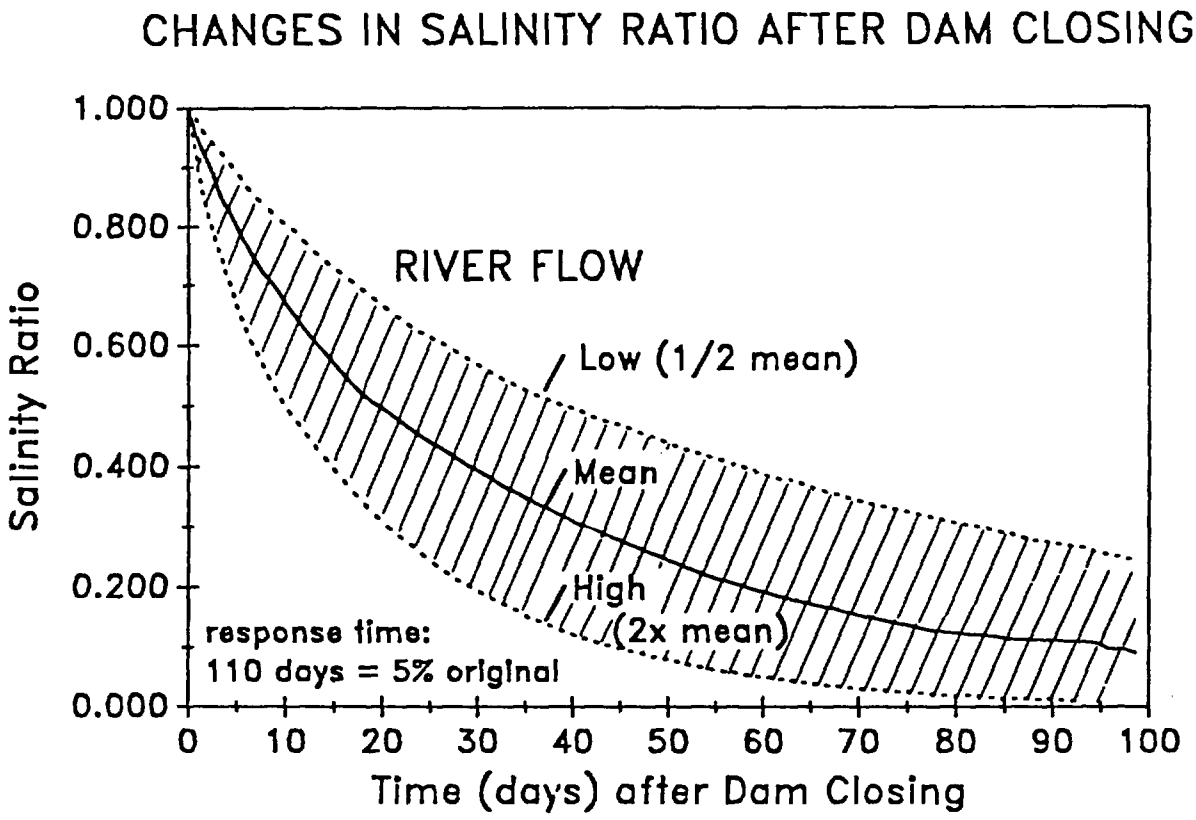
* BASED ON TOTAL MASS (0-12 IN.) IN ESTUARY (NORTH OF HURRICANE BARRIER)

** BASED ON TOTAL ESTUARY MASS FLUX RATE (KG/YR)

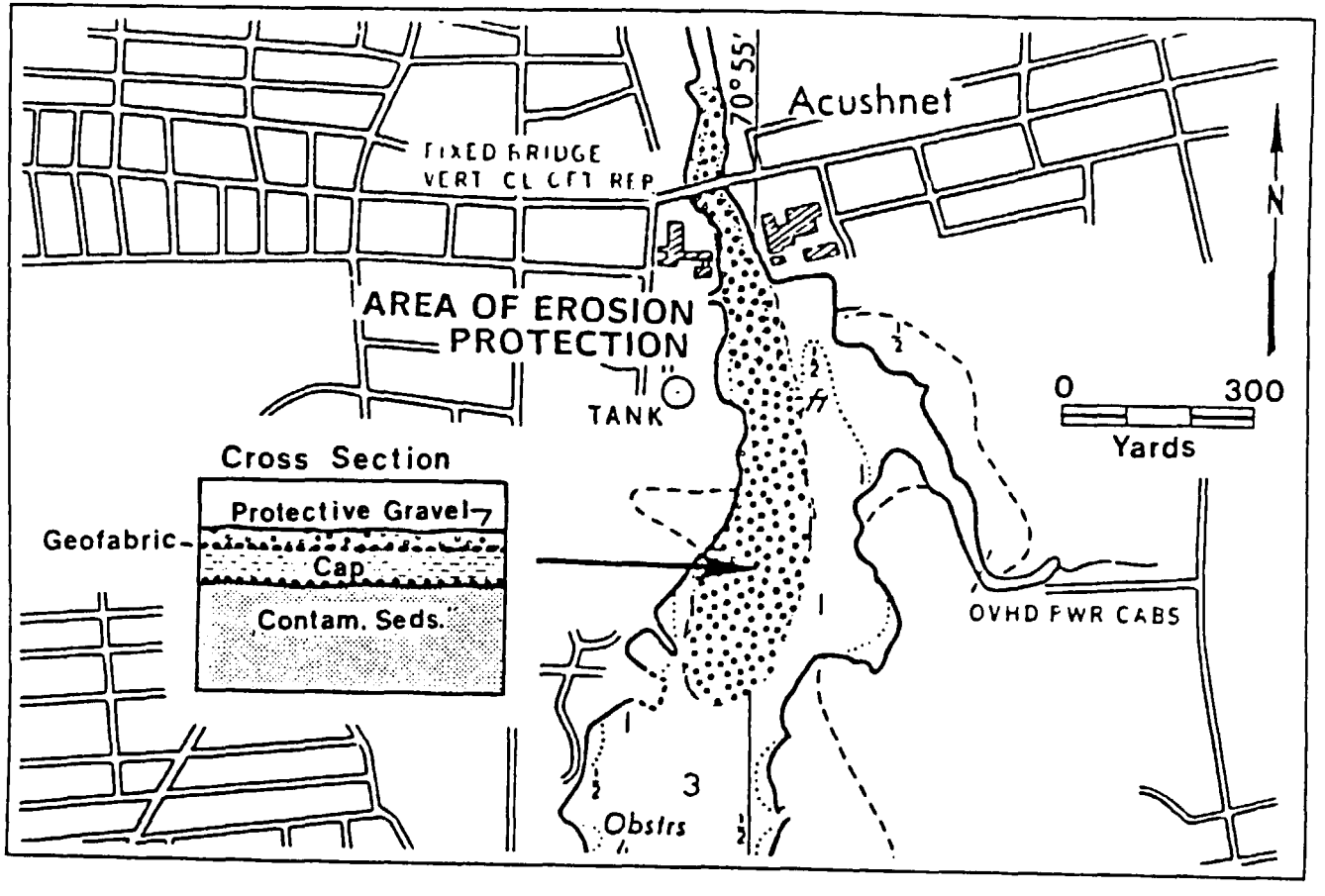
IMPACT OF COGGESHALL INLET MODIFICATIONS ON SALINITY, TIDAL RANGE, AND FLOW RATE OF UPPER NEW BEDFORD ESTUARY



Tidal range and discharge, and salinity versus cross-sectional area of Coggeshall St. Bridge channel.



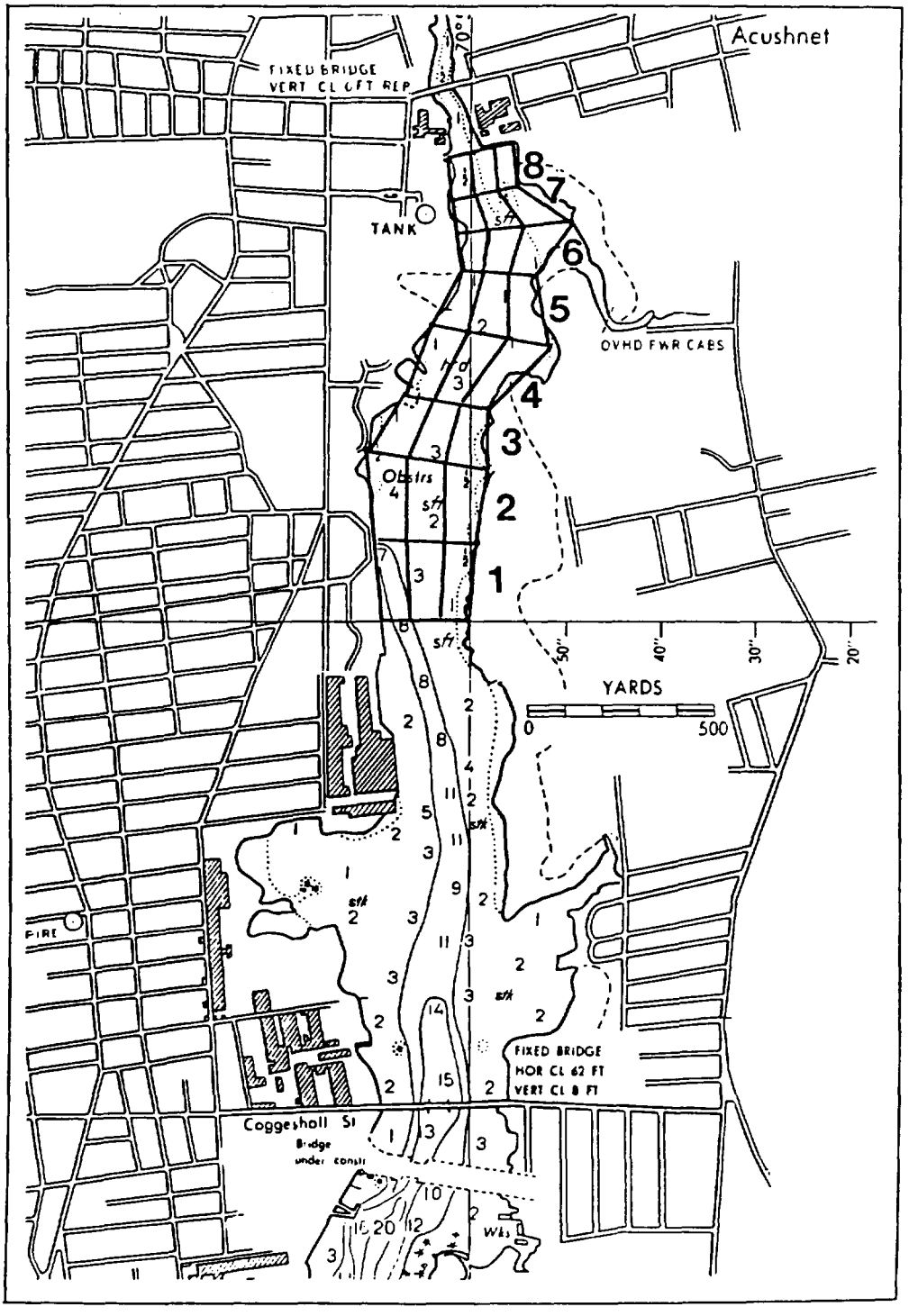
Salinity ratio (non dimensional, 1.0 = 26 ppt) versus time (days) after closing of Coggeshall St. channel. Acushnet River flows are low (one-half mean), mean (0.85 m^3/sec) and high (twice mean).


FIXED BRIDGE
VERT CL CFT REP
70°55'
Acushnet
N
AREA OF EROSION
PROTECTION
TANK
0
300
Yards
Cross Section
Protective Gravel
Geofabric
Cap
Contam. Seds.
OVHD PWR CABS
3
Obstrs

Estimates of peak flow rates for the Acushnet River

Storm Flow Event (Return Period)	Peak Flow Rate (m^3/s) (ft^3/sec)			
	NUS (1984)	US Army Corps (1987)	Balsam (1988b) (HEC-1)	FEMA (1982)
100 year	38.2 (1350)	38.2 (1350)	-	17.8 (630)
50 year	22.7 (800)	24.9 (980)	39.6 (1397)	13.5 (475)
25 year	20.5 (723)	20.9 (740)	24.6 (867)	-
10 year	17.0 (600)	13.47 (475)	11.1 (392)	7.9 (280)

Note: The U.S. Army Corps of Engineers (1961) estimate is an average over a 5 hour storm and results in 18.4 m^3/s for the 100 year storm.



Inlet basin hydrodynamic model channel grid system for the upper estuary.

Inlet basin hydrodynamic model predicted flow velocities and associated cross-sectional areas for the channel sections shown in Figure 4-3. Values are for peak flow rates 100 year storm, with and without a 45 cm cap in the upper estuary.

Channel Number (Figure 4-3)	Average Channel Velocities (cm/sec.)		Channel Cross-Sectional (m^2)	
	Existing	With 45 cm cap.	Existing	With 45 cm cap.
1	10.6	14.7	379.0	273.7
2	10.5	15.8	372.9	246.0
3	14.6	25.1	274.7	160.4
4	17.0	30.7	230.8	125.6
5	20.2	40.3	198.9	99.2
6	22.7	58.1	172.6	60.8
7	24.4	86.6	161.8	41.3
8	36.4	152.1	107.8	17.0

POTENTIAL FOR SURFICIAL SEDIMENT EROSION DURING 100 YEAR STORM UPPER ESTUARY

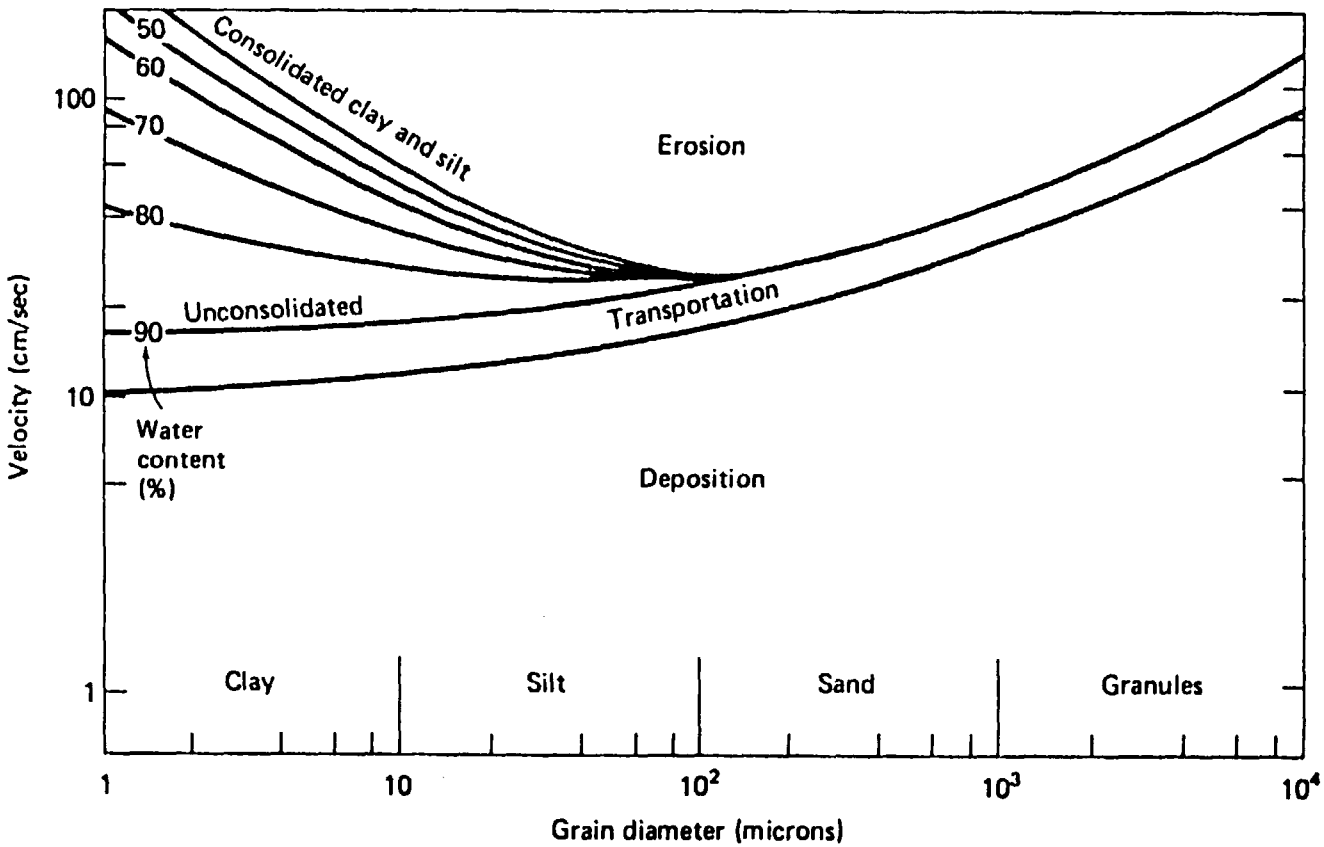
RIVER FLOW RATE (SPF)	38 M^3/SEC
MEAN CROSS SECTION VELOCITY (SECTIONS 4-8)	30.7-152 CM/SEC
VELOCITY REQUIRED FOR SEDIMENT RESUSPENSION (AFTER CONSOLIDATION)	28 CM/SEC

STORM FLOW VELOCITY > RESUSPENSION VELOCITY

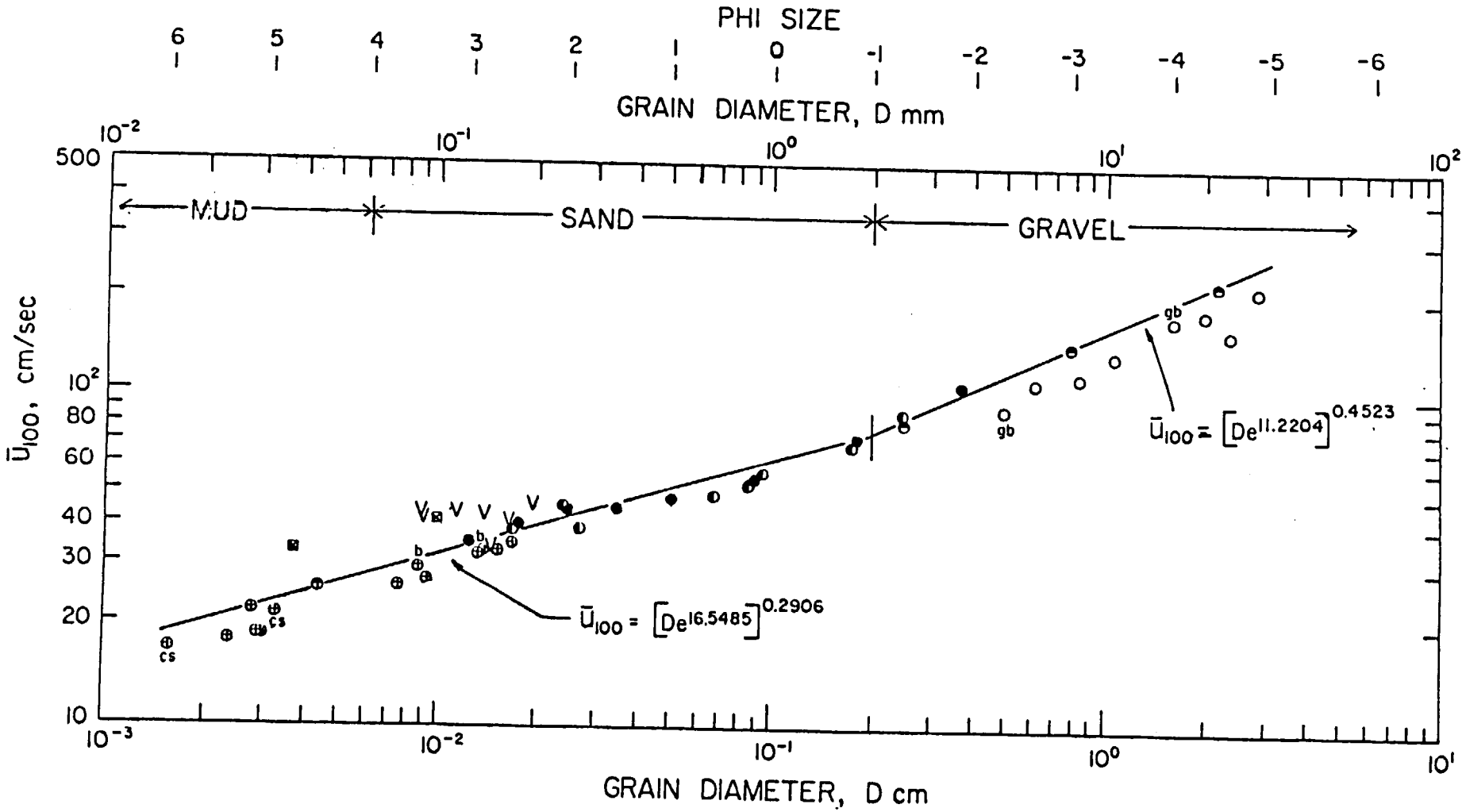
<u>EROSION OCCURS</u>

SOLUTION:

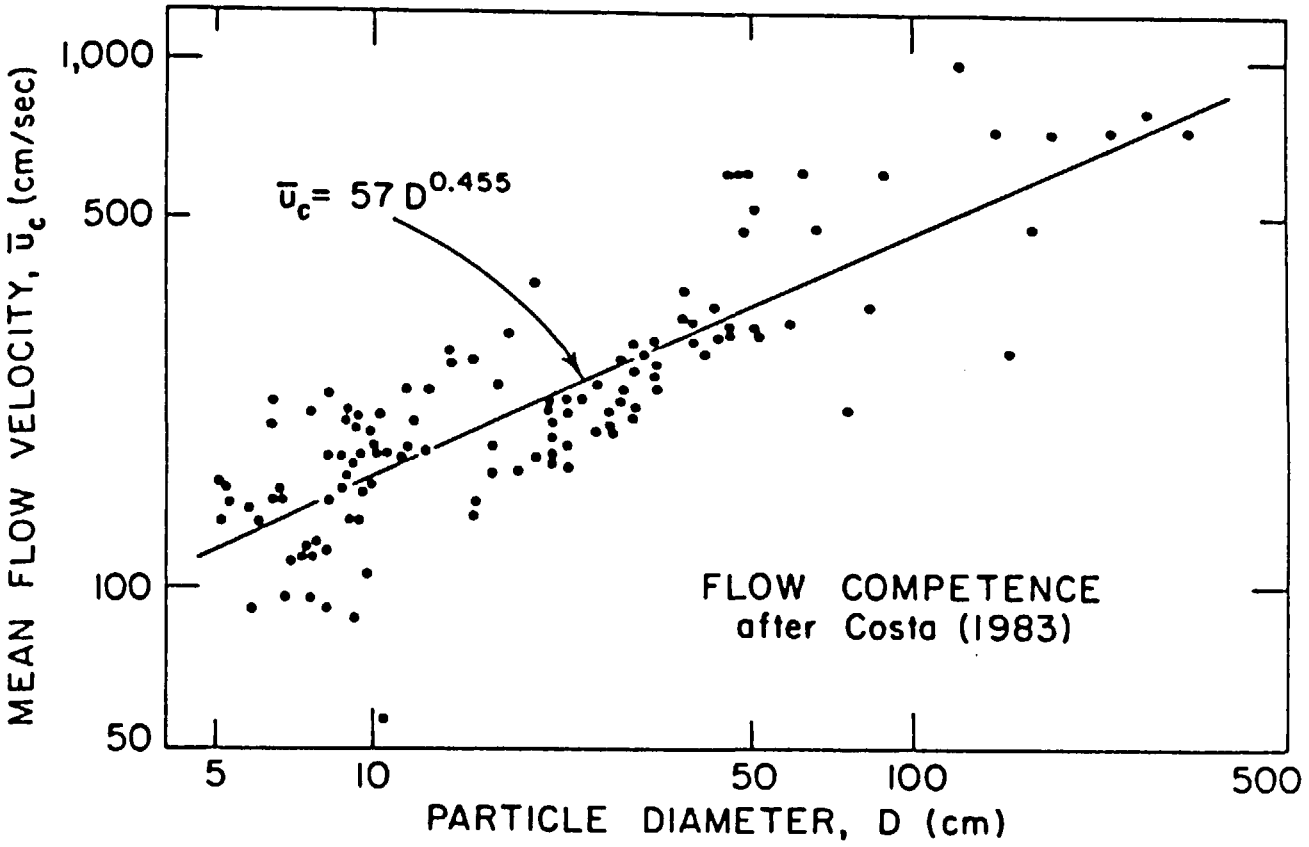
- USE GRAVEL-STONE PROTECTIVE CAP IN AREA
- PLANT CORDGRASS ON LOW INTERTIDAL AREAS



Bottom-current velocities (cm/sec) for erosion, transportation, and sedimentation of sediments according to grain size. Velocity measured 15 cm above the bottom. Note effects of consolidation upon commencement of erosion in clays and silts. (After Postma, 1967 and Gardner, 1978)


PHI SIZE
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
GRAIN DIAMETER, D mm
10^{-2}
10^{-1}
10^{0}
10^{1}
10^{2}
MUD
SAND
GRAVEL
$\bar{U}_{100}$, cm/sec
500
10^{2}
80
60
40
30
20
10
$\bar{U}_{100} = [De^{16.5485}]^{0.2906}$
$\bar{U}_{100} = [De^{11.2204}]^{0.4523}$
cs
gb
b
10^{-3}
10^{-2}
10^{-1}
10^{0}
10^{1}
GRAIN DIAMETER, D cm

GRAIN THRESHOLD AND FLOW COMPETENCE



GENERAL STEPS IN CAPPING UPPER ESTUARY

- CONSTRUCT TEMPORARY DAM WITH GATES/WEIR AT COGGESHALL ST. BRIDGE USE DAM/WEIR SYSTEM TO CONTROL WATER LEVEL AND CIRCULATION IN REGION

  - DAM CLOSED AT MHW GIVES ADDED WATER DEPTH; ELIMINATES TIDAL CURRENTS

  - WEIR SET AT MLW ALLOWS LIMITED TIDAL CIRCULATION

- CAP UPPER ESTUARY WITH SAND FROM OFFSHORE BORROW PIT

  - PLACE GEOFABRIC IN EROSIVE CAP AREA (18 ACRES)

  - OBTAIN CLEAN MATERIAL, SAND OR SAND/GRAVEL, FROM BURROW SITE IN BUZZARDS BAY

  - TRANSPORT MATERIAL TO NEW BEDFORD HARBOR (MIDDLE) BY BARGE

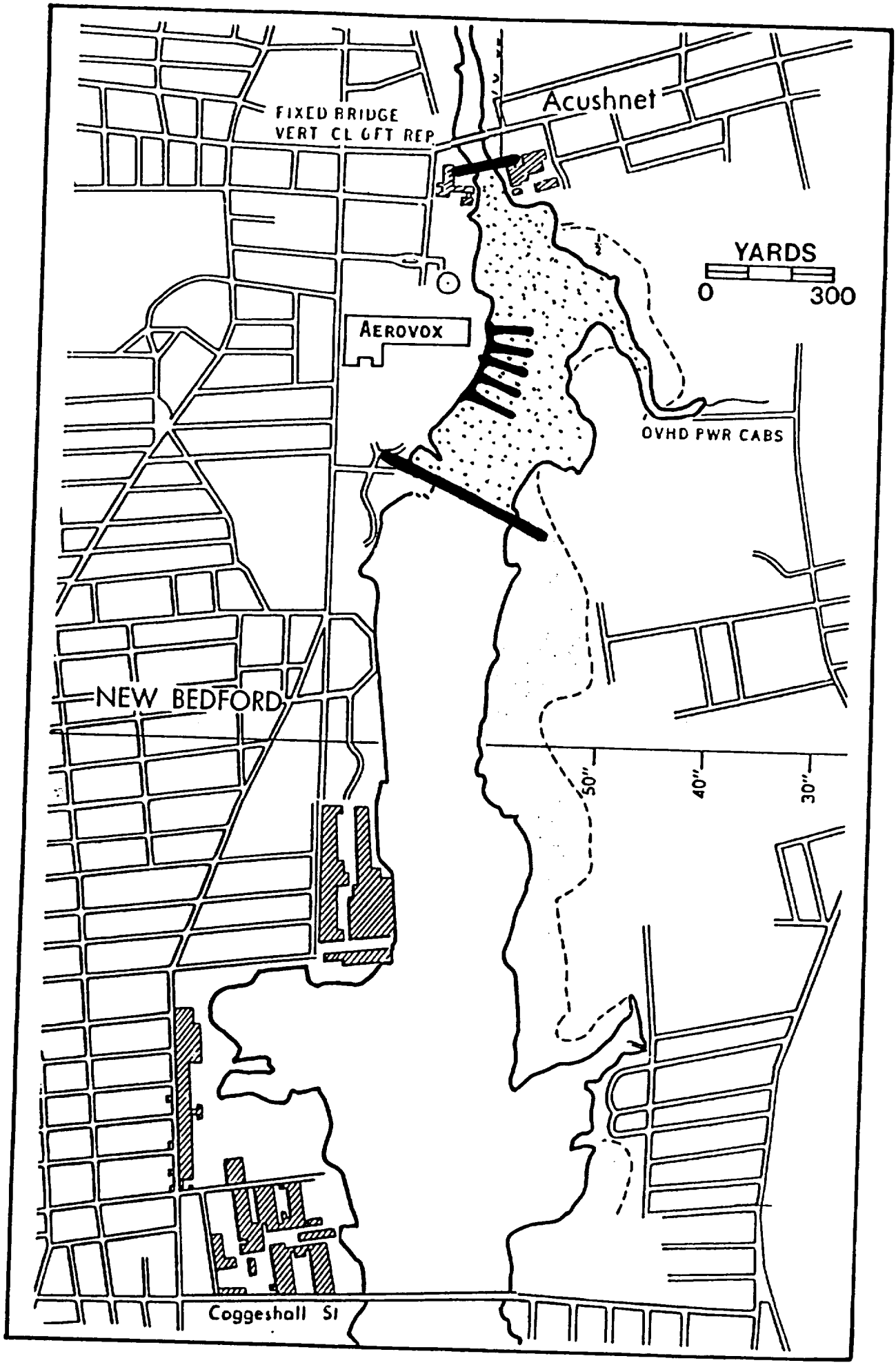
  - HYDRAULICALLY PUMP CAP MATERIAL THROUGH PIPELINE TO DISCHARGE BARGE

  - PLACE CAP MATERIAL WITH SUBMERGED DIFFUSER IN UPPER ESTUARY. START AT NORTHERN-MOST END AND WORK SOUTH

- PLACE STONE-GRAVEL PROTECTIVE CAP
  - PLACE GEOFABRIC IN EROSIVE CAP AREA (18 ACRES)
  - USE BARGE MOUNTED CRANE AND SCOW TO PLACE GRAVEL PROTECTIVE CAP. DAM CLOSURE AT MHW GIVES ADDED WATER DEPTH FOR OPERATION
- VEGETATE NEW INTERTIDAL MARSH AREAS
- MONITOR CAP INTEGRITY, VALIDATE CAP PERFORMANCE
- REMOVE TEMPORARY DAM

ALTERNATIVE CONSTRUCTION APPROACH (IN THE DRY) FOR HOT SPOT, PROTECTIVE STONE-GRAVEL CAP AREA

- BLOCK RIVER CHANNEL NORTH AND SOUTH OF HOT SPOT. TIMBER SHEET PILE WALL TO NORTH, LOW EARTHEN DIKE SOUTH SIDE
- REROUTE RIVER FLOW BY PIPELINE AND PUMPING. PUMP ENCLOSED AREA DRY
- LAY GEOFABRIC
- PLACE SAND CAP FROM LAND USING TRUCKS AND SMALL CONSTRUCTION EQUIPMENT. PLACE IN FINGER FORMATION TO AVOID MUD WAVES
- PLACE PROTECTIVE STONE-GRAVEL CAP, SAME TECHNIQUE AS FOR SAND
- REMOVE DAMS AND RETURN AREA TO NORMAL FLOW CONDITIONS


FIXED BRIDGE
VERT CL 0FT REP
Acushnet
YARDS
0
300
AEROVOX
OVHD PWR CABS
NEW BEDFORD
50''
40''
30''
Coggeshall St

SUMMARY OF SHORT TERM BIOLOGICAL IMPACTS

FEATURE	WITH WEIR CONSTRICTION
REDUCED SALINITY	ELIMINATE SOME MARINE SPECIES BUT ESTUARINE SPECIES REMAIN
REDUCED TIDAL RANGE	REDUCED SIZE OF PRESENT HIGH SALT MARSH BUT GAIN NEW MARSH ON PRESENT MUD FLATS
USAGE BY COASTAL MIGRATORY FISH	NO CHANGE
USAGE BY ANADROMOUS FISH	NO CHANGE
USAGE BY WILDLIFE	NO CHANGE
REDUCED FLUSHING	HIGHER NUTRIENT CONCENTRATION, HIGH POLLUTANT CONCENTRATIONS, HIGHER BOD, LOWER OXYGEN

ATTRACTIVE FEATURES OF REMEDIAL ACTION PLAN

- AREA REMAINS ESSENTIALLY AS IS (SALT MARSH)
- PCB BURIED IN PLACE, NEGLIGIBLE CHANCE OF RELEASE TO ENVIRONMENT
- MINIMAL LONG TERM DISTURBANCE TO AREA
- PLAN IS SIMPLE IN CONCEPT, NO OPERATIONAL OR MAINTENANCE COSTS
- TECHNOLOGY WELL KNOWN
- SERVES AS A PERMANENT REMEDIATION
- LONG-TERM ENVIRONMENTAL IMPACT MINIMAL
- AFFORDABLE

SUMMARY OF ASSESSMENT FOR PROPOSED REMEDIAL ACTION PLAN

PARAMETERS	ASSESSMENT
DREDGING	NONE IN UPPER ESTUARY, FOR CAPPING FROM OFFSHORE
CAPPING	45 CM (35 CM FOR CHEMICAL BARRIER, 10 CM TO PREVENT BIOTURBATION), COARSE GRAVEL-STONE PROTECTIVE CAP (18 ACRES) FOR FLOOD EROSION CONTROL
SYSTEM MAINTENANCE	NONE
HYDRAULIC/FLOOD CONTROL	HURRICANE BARRIER PROTECTS AGAINST STORM SURGE, ACCEPTABLE FOR RIVER FLOODING WITH PROTECTIVE CAP
DECREASE IN PCB MIGRATION	SIGNIFICANT (>95%)
ENVIRONMENTAL IMPACT	WITH CAP, CREATE 30 ACRES SALT MARSH

SUMMARY OF ASSESSMENT FOR PROPOSED REMEDIAL ACTION PLAN (CONTINUED)

ECOSYSTEM EFFECTS	MINOR, TEMPORARY WATER QUALITY PROBLEM DUE TO DAM/WEIR CONTROL
MITIGATION	CREATE NEW MARSH (30 ACRES, WITH CAP)
POLITICAL	REMAIN SALT MARSH ENVIRONMENT, LEAVE POLLUTANT WHERE IT IS, SIMPLE SOLUTION, QUICKLY EXECUTED
REGULATORY ACCEPTABILITY	PROBABLY ACCEPTABLE
COST (MILLIONS)	RANGE: $15 - 30