RETURN TO 1998 ROD AR INDEX

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

Site: New Bedford
4.4
63865

SDMS DocID 63865

REPLY TO
ATTENTION OF

January 25, 1990

Operations Division
CENED-OD-S

Ms. Mary Sanderson
EPA
Waste Management Division (HANCAN 2)
J.F. Kennedy Bldg.
Boston, MA 02203-2211

Dear Ms. Sanderson:

The attached information on a capping alternative for the upper estuary of New Bedford Harbor is submitted for your use. It focuses on the questions of cap thickness, construction costs and impacts to the estuary. Copies have been sent to Doug Allen at E.C. Jordan and Alan Fowler at Ebasco.

Please give me a call if there are any questions or comments.

Sincerely,

Mark J. Otis
New Bedford Project Office

JAN 30 90

New Bedford Harbor Superfund Site
Upper Estuary Capping Alternative

Introduction

EPA has requested technical assistance from the Corps of Engineers (NED/WES) in the development of a capping alternative for the upper estuary of New Bedford Harbor. The initial step in this process involved the review of a capping proposal developed by Balsam Environmental Consultants for AVX corporation. Upon completion of the initial review, Mark Otis met on 6 December with Doug Allen and Hans Peter Krahn of E.C. Jordan to develop the scope of the NED/WES effort. This document results from that meeting and contains general comments on the AVX proposal along with detailed information on cap thickness, construction costs and impacts to the upper estuary.

General Comments

Through a technical memorandum dated 1 December 1989, E.C. Jordan highlighted specific questions and concerns they had with the AVX proposal. These issues were subsequently discussed at the 6 December meeting and are summarized below.

Implementation

a) The AVX proposal is feasible in terms of constructability although components of the plan may need to be modified (cap thickness, hydraulic controls).

b. Dry Placement of cap material is not considered feasible except in close proximity (100 feet) of the western shoreline. This is due to the weak foundation conditions and the lack of access to the eastern shoreline.

c. The construction sequence is considered feasible although optimistic in terms of the timeframe. The construction timeframe is discussed in the section on construction costs.

d. Sand is considered to be the most appropriate capping material to be hydraulically placed.

e. Maintaining the high tide water depths will accelerate and facilitate the construction process. For this reason the construction of a hydraulic control structure at the Coggeshall Street Bridge is considered necessary. The installation of the geotextile would be much more difficult and would take considerably longer without the advantage of deeper water. This issue is discussed in the section on construction costs.

<u>Short-term effectiveness</u>

A capping operation will release less contamination than a dredging operation although accurately quantifying the difference would be difficult.

Long-term effectiveness

The Corps of Engineers considers capping to be effective in terms of containing contaminants, assuming a cap of adequate thickness is placed and maintained. The projects cited in the AVX proposal as examples where capping was effectively used are applicable in terms of the use of capping as a containment technique. These projects are not applicable in terms of placement techniques or cap thickness. What AVX proposed is the placement of a thin cap over a highly contaminated sediment over a large area in shallow water. To our knowledge their isn't another project that demonstrates that this project can be carried out with the accuracy and effectiveness claimed in the proposal.

Cap Thickness

The 45 cm (17.7 inch) cap discussed in the AVX proposal is not considered sufficient to contain the contaminants or to accurately address impacts to the upper estuary. The various components of the cap are discussed below along with our recommendations.

a) geotextile: Bottom sediments in the upper estuary are fine grained and unconsolidated. Placement of a geotextile over these sediments will prohibit the mixing of cap material with the contaminated sediment and will provide a more stable base, improving the overall integrity of the cap. The geotextile is critical to minimizing the cap thickness. In areas where deeper water is available and the bottom is more stable, the geotextile would not be needed.

b) chemical barrier: Laboratory testing performed at WES as part of the Engineering Feasibility Study determined that a 35 cm (14 inch) thick cap provided a chemical seal of the contaminated sediment from the overlying water column. Report 6 - "Laboratory Testing for Subaqueous Capping" describes this effort. It is possible that additional testing would show that a cap thickness somewhat less than 35 cm would provide a chemical seal. However, this small scale test is meant to be used as a guide in the selection of a cap. Site conditions in New Bedford are variable in terms of sediment types, contaminant levels and other physical parameters when compared to the controlled conditions in the laboratory. The results of the laboratory test should be conservatively applied. A 35 cm cap thickness for a chemical seal is recommended a this time.

c) bioturbation barrier: We will use 20 cm as the appropriate thickness for this layer; however, the issue should receive additional study. The change from a silt/clay bottom to sand may introduce species of benthic organisms that could penetrate to 50-60 cm. The plan to revegetate portions of the cap also requires a review of how root systems effect the cap system.

d) variability of placement process: The hydraulic placement of a sand cap will not result in a smooth bottom with a cap of uniform thickness. A contractor will require some leeway to insure that the minimum cap thickness is obtained. A twelve (12) inch lift above the minimum required thickness is considered to be a reasonable buffer to insure that the minimum cap is obtained.

e) The various components of the cap are shown below and in figure 1.

chemical barrier	35 cm	14 inches
bioturbation layer	20 cm	8 inches
Minimum Cap thickness		22 inches
variability of placement process		12 inches
Maximum Cap In Place		34 inches

The cap thickness resulting from an effort to install a 22 inch cap will vary from 22 - 34 inches. Costs of construction and impacts to the estuary need to be evaluated based on the maximum cap thickness.

Construction Costs

This estimate includes all costs associated with the placement of a multimedia cap over 187 acres of the upper estuary. The total cost is divided into cost items representing the four main components of the capping proposal. These are the hydraulic control structure at the Coggeshall Street bridge, furnishing and placing geotextile over the upper estuary, furnishing and placing the sand cap and furnishing and placing the stone protection. Costs are also included for the survey and monitoring work associated with these efforts. Figure 2 provides a timeline showing the construction sequence. Attachment 1 provides back up material to the cost estimates.

The 187 acres to be capped includes all areas below the +4 MLW contour (approximate high water line) within the upper estuary. This area exceeds the 164 acres identified by E.C. Jordan as falling within the 10 ppm PCB level contour but more accurately reflects the area that would be capped. The construction procedure discussed below envisions the geotextile being anchored along the western shoreline at or above the +4 contour. Areas with PCB levels below 10 ppm would be covered when connecting the cap into the western shoreline. Other areas where PCB levels are below 10 ppm are located along the eastern fringe of the estuary. The construction procedure does not call for anchoring of the geotextile along the eastern shoreline; however, the cap would have to extend beyond the 10 ppm contour to insure coverage of the contaminated area. The cap would also have to be transitioned into the eastern shoreline to prevent the creation of a channel which would promote erosion. The match point between the cap and the shoreline would fall between the existing low water line and the +4 contour.

a) Hydraulic Control Structure: This item includes the cost of constructing a sheetpile structure just upstream of the Coggeshall Street Bridge for the purpose of maintaining the water level in the upper estuary at the high water (+4 MLW) level. The structure would be tied into the eastern and western shorelines as opposed to the Coggeshall Street Bridge embankment and would be constructed off barge mounted equipment. The structure would have several gates/weirs to allow for the passage of water. The estimated cost of the structure is $975,000. The cost breakdown shown in attachment 1 does not contain itemized costs for the gates/weirs. These costs are included in the contingency. I envision a walkway being constructed along the top of the structure to gain access to the gates. These gates would be prefabricated and mechanically operated. Estimated construction time is 4 months.

b) Geotextile Placement: This item includes the cost of the geotextile plus all placement costs. The proposed method of placement involves unrolling 150′ x 400′ sections of the geotextile by using a crane barge with winches and a shallow draft tugboat (approximately 32′ x 12′ x 3.5′ - 4.5′) which is transportable overland. The western shoreline will be improved and the geotextile will be anchored and unrolled perpendicular to the shoreline. Placement of fabric along center and eastern side of the estuary will be conducted from a barge. It is estimated the 9.3 months will be required to complete geotextile placement, at a total cost of $7,800,000. The construction sequence discussed here is based on sufficient water being available to allow for continuous operations and the installation of the geotextile off a barge along the eastern half of the estuary. This will require the construction of a control structure at the Coggeshall Street Bridge to maintain water depths at the high water (+4 MLW) level. Without such a structure, geotextile installation would be much more costly and time consuming. The geotextile would also have to be installed from land along the eastern portion of the estuary, causing considerable damage to the wetlands in these areas. The construction period would at least double and based on the labor and equipment costs shown in the attachment, construction costs would increase by over $1,000,000.

c) Sand Placement: A 34" sand cap will be placed over 165 acres of the upper estuary with a 22" cap being placed over 22 acres. A 14" cutterhead dredge will be used to move the sand from a staging area constructed adjacent to the Pilot Study CDF to the discharge point. The sand will be transported to the staging area from two land sources. Half the material will be transported 5 miles and half the material 15 miles. Approximately 57 months would be required to complete the capping operation if only one dredge is used. The estimated cost is $24,100,000. Additional information on the staging area, sand sources, and the construction timeframe is contained in the following paragraphs.

Staging Area: The cost estimate envisions the dredge being positioned off the northwest corner of the pilot study site. A short stretch (30′) of sheetpile would be driven along the shoreline with the area in front of this sheetpile wall deepened to provide a working area for the dredge. The area behind the wall would be graded to provide a maneuvering area for trucks delivering sand. The sand would be dumped behind the wall and fed to the dredge by a bulldozer.

Sand Sources: The cost estimate is based on 50% of the material coming form a source 5 miles from the site (Tilcon Quarry) and 50% from a source 15 miles from the site. Specific sources were not contacted as to the availability of material. Periodic surveys of material sources in southeastern Massachusetts are carried out by NED and indicate that this quantity of material is available within the region.

Number of Dredges: During phases of the project when more than one operation is ongoing (geotextile placement and cap placement, stone placement and cap placement) it would be possible to use only one dredge due to space constraints. The use of a second dredge during other stages of the project would reduce the construction time significantly. Bringing in a second dredge would not significantly increase the costs. The limitation on a second dredge would likely be the ability to truck material to the site. Two dredges would require 1400 cubic yards of material per day which equates to 54 truck loads per day if trailer dumps are used and 78 truckloads per day if 18 cy capacity trucks are used.

Use of a Submerged Diffuser: The cost estimate is based on the use of a barge and workboat at the discharge end of the pipeline. This equipment will be required for both a diffuser or some other spreading device that would be designed for this project.

d) Stone Placement: A 6" layer of 1" - 1/12" crushed stone will be placed over a 22 acre area in the northern portion of the upper estuary. The stone will be placed with a crawler type crane mounted on a barge. A supply barge (300 cy capacity) will be loaded by a front end loader from a stockpile of crushed stone. Approximately 2.6 months would be required to complete stone placement at an estimated cost of $865,600.

Impacts to Estuary

The most significant impact associated with a capping alternative is the creation of intertidal area. Attachment 2 is a hydrographic survey of the upper estuary showing the changes caused by the placement of a 34 inch and 22 inch cap. In each case it was assumed that 6 inches of settlement would result from cap placement so that the drawings reflect changes of 28 and 16 inches in the elevation of the estuary bottom. Placement of a 34 inch cap results in the creation of approximately 97 acres of intertidal area while placement of the 22 inch cap results in the creation of approximately 61 acres of intertidal area.

The sand cap would meet the existing shoreline between the low and high water lines so no upland areas would be created. The capping alternative as described in this document also does not envision the capping of any vegetated wetland areas along the eastern shore. The majority of this marsh area is above elevation +3 MLW and is flooded only at the higher stages of the tide or on extremely high tides. The installation of the cap will not change these conditions so impacts to the area should be minimal.

Attachment 3 contains other comments from our technical staff on other environmental aspects of the project. Many of these comments are referenced to the AVX proposal but are pertinent to the capping alternative discussed in this document.

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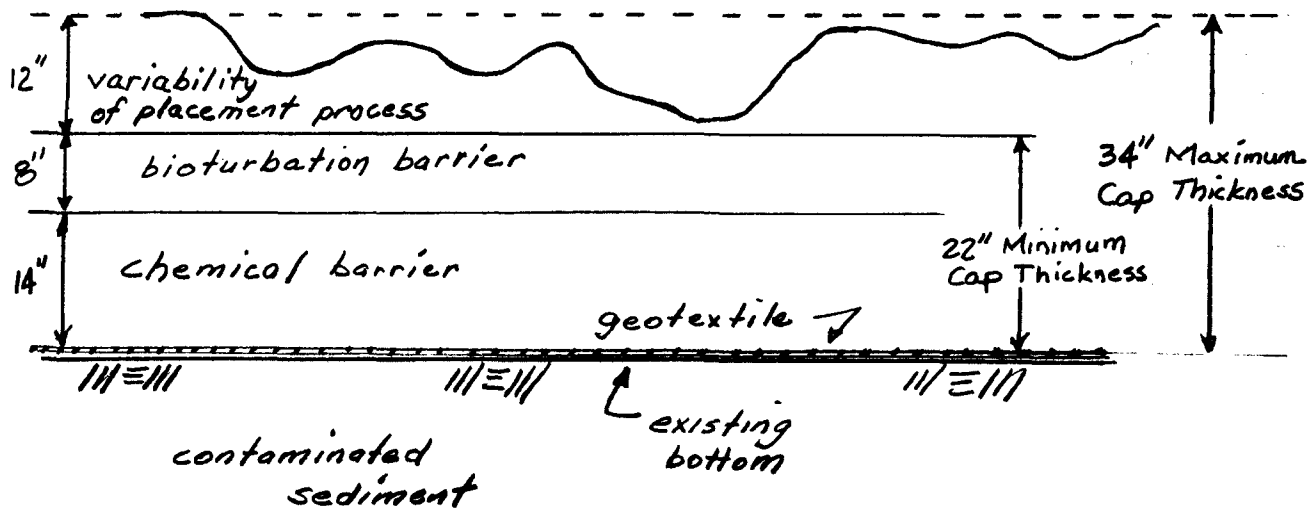

TYPICAL CROSS SECTION
AFTER CAPPING

FIGURE 1

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CONSTRUCTION SEQUENCE

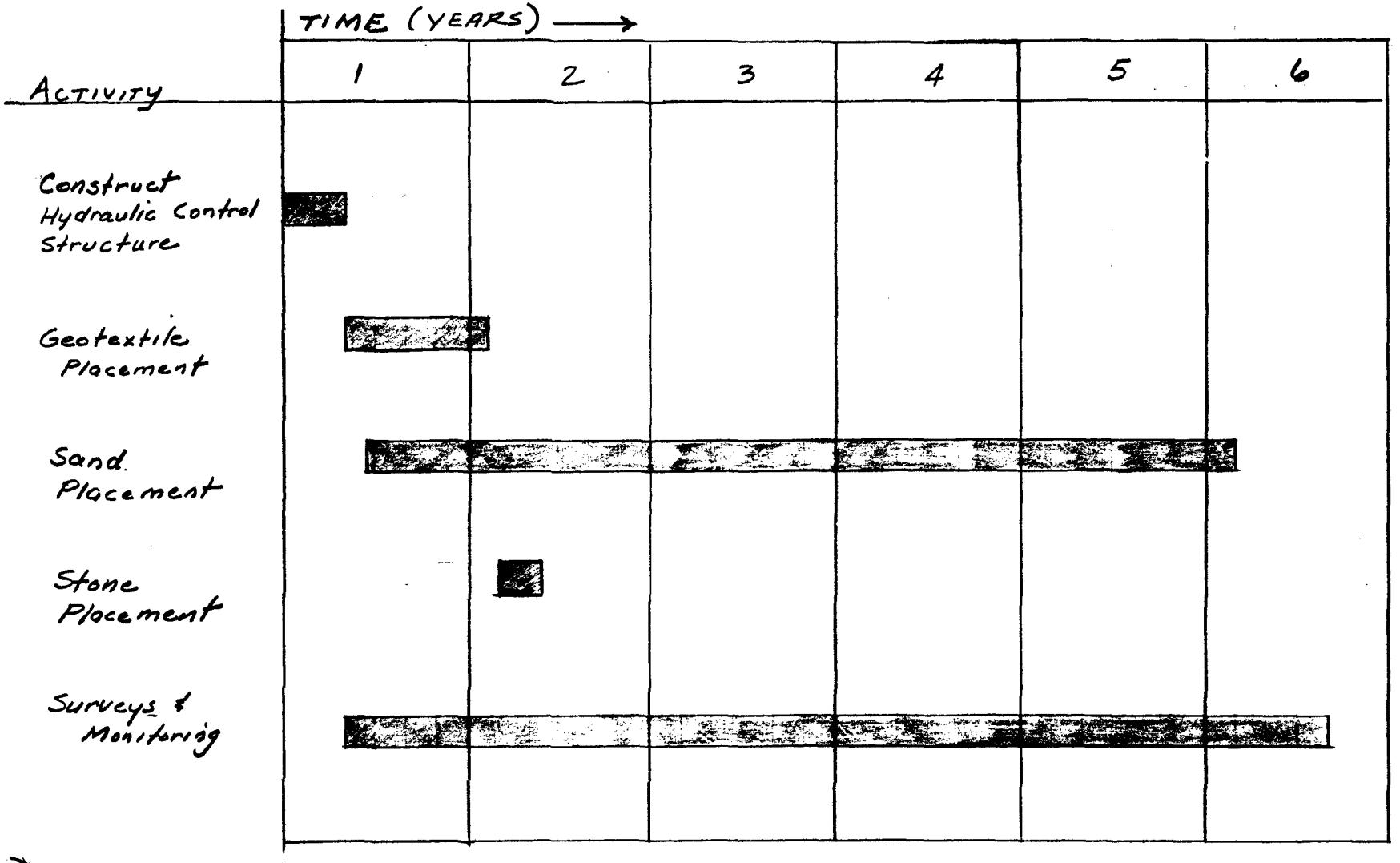

FIGURE 2

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NEW BEDFORD HARBOR SUPERFUND SITE
UPPER ESTUARY CAPPING ALTERNATIVE

ITEM		COST
1. Geotextile Placement		$6,900,000
2. Sand Cap		$18,538,000
3. Stone Cap		$666,600
	SUBTOTAL	$25,204,600
contingency (30%)		7,561,380
	SUBTOTAL	$32,765,980
4. Hydraulic Control Structure (contingency included)		$ 975,000
5. Survey and Monitoring Costs		$ 575,000
		$34,315,980
	say	$34,300,000

• Note: Costs are not included for the removal of the hydraulic control structure.

ATTACHMENT 1

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COST ITEM #1 GEOTEXTILE PLACEMENT

Estimated Square yardage of fabric (209 acres x 43,560) / 9 =	1,011,560 s.y.
10% more fabric for overlap	101,156 s.y.
Total square yardage of fabric	1,112,716 s.y.
Geotextile Placement Rate (150 x 400) / 9 =	6,667 s.y./day
Total Placement Time	167 days
Estimated days lost per month (1 holiday, 2 weather)	3 days
Total Estimated Working Days per month	19 days
Time required to complete work	8.8 months
Time for Mobilization & Demobilization	10 days
Total Time to place Geotextile	9.3 months

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1. Preparation of approximately 7500 feet of western shoreline using a D-8 to grade the area to allow the placement of the geotextile rolls. Gravel will also be placed to create an access road.

a) Equipment - D-8
7500ft @ 150 feet/day = 50 days × $320/day = $16,000

b) Operator $30.60/hr (Includes taxes, insurance, etc) × 400 hrs = $12,240

c) Gravel Roadway (20' wide)
7500ft × 20ft × 0.5ft = 75000/27 = 2778 cy × $7.50/cy = $20,800

TOTAL $49,040 say $50,000

2. Equipment Costs

Equipment	Quantity	Ownership & Operating Costs
Work Tug	1	$6,025
Crane Barge	1	$5,555
18 Ft launch with 75 HP	1	$1,425
Crane	2	$12,280
Flatbed trailer	1	$1,108

TOTAL MONTHLY EQUIPMENT COST $26,400

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3. Personnel Costs

Engineer	1	18.00	
Craneman	1	16.98	
Tug Operator	1	17.50	
Mate	2	16.14	32.28
Deckhand	2	14.75	29.50
Shoreman	2	14.24	28.48
Crane Operator	2	20.41	40.82
Truck Driver	1	15.87	
Crew Total	12 Men		$199.43 per hour

Taxes, insurance and fringes on labor:

Social Security		7.6%
Workmans Compensation		20.0%
State Unemployment Comp.		3.7%
Federal Unemployment Comp.		1.0%
Fringes	$2.59/hr +8%	35.0%
	8 paid holiday	2.2%
	8.6% vacation	8.6%
		78%

WAGES (UNION) 1-10hr shift

Work	50 hrs/wk	
Pay	55 hrs/wk @ 22 days/month	$46,068
Taxes, Insurance, Fringe... 78%		35,933
	MONTHLY PAYROLL	$82,000

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4. Material Cost

905,080 s.y. x $5/sy = $4,525,400

106,480 s.y. x $4/sy = $ 425,920

$4,951,320

5. TOTAL JOB COST

Preparation of shoreline		$50,000
Material		$4,951,320
Equipment	$26,400 x 9.3 =	$245,520
Personnel	$82,000 9.3 =	$762,600
		$6,009,440 say
		$6,000,000

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COST ITEM #2 Furnish & Place Sand Cap

Cap Thickness	34"
Estimated Quantity of cap material	(165 x 43,560 x 2.83)/27 = 753,346 cy (22 x 43,560 x 1.83)/27 = 64,953 cy 818,300 cy
Production (hourly)	65 cy/hr
Operating hrs/day	10 hours
Operating days/month	22 days
Monthly Production	14,300 cy/month
Dredge Time	57.2 months

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1. Plant Ownership

	No.	Total Value	Depreciation Rate %	Depreciation Amount	Interest Rate %	Interest Amount
Dredge	1	$300,000	4.75	$14,250	4.06	$12,182
Tugs.	1	$80,000	4.50	$3,600	4.24	$3,389
Derrick Barge	1	$65,000	4.50	$2,925	4.24	$2,754
Work Barge	1	$40,000	4.75	$1,900	4.06	$1,624
Fuel/Water Barge	1	$60,000	4.75	$2,850	4.06	$2,436
Yard Equipment	1	$30,000	10.56	$3,167	4.28	$1,283
Crew Workboat	1	$20,000	9.50	$1,900	4.24	$847
Skiff w/Motor	1	$3,000	7.92	$238	4.18	$125
				$30,829		$24,641

$55,470 / 7 months/year = $7,924 per month

2. Operating Costs

Personnel

Payroll	No.	Rate	Amount
Project Mgr.	1		$4,000
Chief Engr.	1		$4,000
Office Personnel	1		$2,000
		subtotal	$10,000
Taxes, Ins, Fringes		55.3%	$5,527

Management Payroll $15,527 per month

Taxes Insurance and Fringes on Labor

Social Security		7.6%
Workmans Compensation		20.0%
State Unemployment Comp.		3.7%
Federal Unemployment Comp.		1.0%
Fringes	$2.59/HR +8%	24.2%
	8 paid hol.	2.2%
	8.6% vacation	8.6%
Taxes, Ins, Fringes - Crew		67.3%
-(Benefit Differential)		12.0%

Taxes, Ins, Fringes Management 55.3%

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Payroll	No.	Rate	Amount
Leverman	1	18.—	18.—
Watch Engineer	1	17.48	17.48
Dredge Mate	1	16.14	16.14
Tugmaster	1	18.—	18.—
launchman	1	14.24	14.24
Maintenance Engineer	1	17.23	17.23
Welder	1	16.98	16.98
Deckhands	3	14.24	42.72
	10 Men		$160.79 per hour

Wages (Union)

Work 60 hours/week

Pay 70 hours/week @ 22 days/month $49,523

Taxes, Ins, Fringes 67.3% 33,329

$82,852 Crew Payroll

Total Payroll – $15,527 + $82,852 = $98,379 /month

Equipment

Fuel	$12,600
Water, Lube, supplies & small tools	$ 4,200
Dredge Wear (pump, pipe, cutter)	$ 2,900
Repair Costs	$ 3,600
Yard & Dry Docking Costs	$ 1,800
	$25,100

Monthly Operating Cost

Plant Cost	$25,100
Payroll	$98,379
	$123,479

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3. MATERIAL COST

818,300 c.y. of sand (@ $5.00 per c.y. (@ Pit F.O.B.) $4,091,500

4. TRANSPORTATION COST FOR SAND

Two sources of material 427,000 c.y. from 5 miles
427,000 c.y. from 15 miles

3 trucks used from 5 mile site
6 trucks used from 15 mile site

Personnel

Drivers: $25.10/hr x 40 hours/week x 22 days/month = $4418 /month

3 drivers work 57.2 months = $758,729
3 drivers work 28.6 months = 379,064

Equipment Operator $33.94/hr x 40 hours/week x 22 days/month = $5973 /month

$5973 x 57.2 months = $341,656

TOTAL PERSONNEL COST $1,478,849

Equipment

24 cy trailer dumps - $2500/month x 3 trucks x 57.2 months = $429,000
$2500/month x 3 trucks x 28.6 months = 214,500

Earthmover $10,000/month x 57.2 = $572,000

TOTAL EQUIPMENT COST $1,215,500

TOTAL COST $2,694,349

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Plant Ownership Cost		$7,924 /month
Operating Costs		$123,479 /month
Floating Pipeline (4,000 ft @ 4.70 L.F/month)		$18,800 /month
Partially Utilized Pipeline (3,900 ft @ $1.58 L.F/month)		$6,175 /month
Total Monthly Cost		$156,378
Dredge Time		57.2 months
Subtotal		$8,944,822
Additional Cost (Transportation of Sand)		$2,694,349
Subtotal		$11,639,171
Overhead (12%)	+	$1,396,701
Profit (10%)	+	$1,163,917
Bond (1%)	+	$116,392
TOTAL		$14,316,181

TOTAL COST

MATERIAL	$4,091,500
Mobilization & Demobilization	$130,000
Sand Placement	$14,316,181
	$18,538,000

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COST ITEM #3 STONE CAP

Estimated Tonnage of Stone	31,944 tons
Stone Placement Rate	100 tons/hr
Total time of Placement	320 hours
Estimated time lost per day	3 hours
Effective Production Time per day	7 hours
Total Production per Day	700 tons/day
Estimated Days Lost per Month	2 days
Total Estimated working days per Month	20 days
Total Estimated Production per month	14,000 Tons/mo
Time to complete work	2.28 months
Time for Mob & Demob	7 days
Total time for Placing Stone	2.43 months

STOCKPILE STONE

24 cy truck - 32.4 tons/load × 10 loads/day = 324 tons per day per truck

Use 4 trucks - 1.12 months

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1. Equipment Costs

Equipment	Quantity	Ownership & Operating Costs per Month
Barge with crawler type crane	1	crane $5,200 barge $1,875
4.5 c.y. front end loader	1	$6,760
Supply Barge (56' x 20' x 4')	2	$3,890
Work Tug (30' x 12' x 3.5' 100hp)	1	$6,025
24 cy dump truck each @ $2500	4	$10,000

Total Monthly Equipment Cost $33,750 /month

2. Personnel Costs

Engineer	1	$17.83	
Operator	1	18.31	
Tug Operator	1	18.00	
Mate	1	16.14	
Deckhand	1	14.75	
Welder	1	16.98	
Drivers	4	15.00	$60.00
Equipment Operator	1	16.80	
	11 men		$178.81 /hr

Taxes, insurance and fringes

Social Security		7.6%
Workmans Compensation		20%
State Unemployment Comp.		3.7%
Federal Unemployment Comp.		1.0%
Fringes	$2.59/hr + 8%	23.5%
	8 paid holiday	2.2%
	vacation	8.6%

Taxes, Ins, Fringes Crew 66.6%

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Crew total - 10 hour shift

Wages (Union)

Work 50 hours/week
Pay 55 hours/week @ 22 days month = $28,752 -
Taxes, Ins, Fringes 66.6% 19,149

$47,901 - crew payroll without truck drivers

Truck drivers
Work 40 hours/week
Pay 40 hours/week @ 22 days month = $10,560
Taxes, Ins, Fringes 66.6% 7,033

$17,593

TOTAL MONTHLY COST OF OPERATION

Equipment	$23,750
Personnel	$47,901
	$71,651

Trucking Operation

Equipment	$10,000
Drivers.	$17,593
	$27,593

3. Material Cost

$14.00/TON (f.o.b.) - Tilcon in Acushnet

$31,944 tons × $14 = $447,216

4. TOTAL COST

Material		$447,216
Placement	$71,651 × 2.63	$188,442
Trucking	27,593 × 1.12	$30,904
		$666,562

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Cost Item #4 Hydraulic Control Structure @ Coggeshall Street

1. Material - PZ38 sheeting - 45' long
1100 LF @ 45' = 49,500 sf

2. Installation Rates - use 2 rates

$$\frac{49{,}500\ SF \times 38\ \#/SF}{2000\ \#/TON} = 940.5 \quad \text{use } 940 \text{ TONS}$$

Assume rate of 50 tons/day = 940/50 = 18.8 use 20 DAYS

Assume rate of 21.2 tons/day = 940/21.2 = 44.3 use 45 DAYS

3. Crew and Equipment

Tug Crew & Vessel	Captain	$260/day
	Mate	$205/day
		$465
	Vessel (250 HP)	$430/day

Pile Driver: Crew & Equip

	Foreman	$310/day
4	laborers	$1125/day
2	Equipment Operators	$532/day
1	Equipment Oiler	$220/day
		$2187 use $2190/day

1	50 TON CRANE	$740/day
1	Barge (400 Ton)	$390/day
1	Hammer (15K)	$260/day
1	15K - 60 LF LEAD	$55/day
1	AIR COMPRESSOR	$280/day
2	50' AIR HOSES	$25
		$1750/day

DAILY CREW AND EQUIPMENT COST $4835

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4. Material Cost

Assume pull & salvage will be accomplished after project life & only 40% will be salvagable:

60% of 940 TONS = 564 TONS × $655/TON = $369,420
40% of 940 " = 376 " × $165/TON = $62,040
$431,836

431,836/940 = $459.40 use $460/TON

MATERIAL COST 940 TONS × $460 = $432,400

5. Installation Rate #1

Equipment & Crew	$4835/DAY × 20 =	$96,700
Material		$432,400
		$529,100
Contingency	50%	$264,550
	TOTAL	$793,650

Installation Rate #2

Equipment & Crew	$4835/DAY × 45 =	$217,575
Material		$432,400
		$649,975
Contingency	50%	324,988
	TOTAL	$974,963

Use Installation Rate #2 $975,000

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COST ITEM #5 SURVEY AND MONITORING COSTS

1. Initial survey to establish control for geotextile placement

20 days @ $1500/day = $30,000

2. Survey support during during geotextile placement

1 day per week = 36 days @ $1500/day = $54,000

3. Initial Hydrographic Survey of Upper Estuary

15 days @ $1500/day = $22,500

4. Survey support during cap placement

2 surveys per month @ 2 days per survey

57 months x 4 days = 228 days @ $1500/day = $342,000

5. Monitoring of Cap Thickness (sediment cores)

2 sampling efforts per month for first 6 months = 12 days

1 sampling effort per month for remainder of project = 51 days

63 days @ $2000/day = $126,000

TOTAL $575,000

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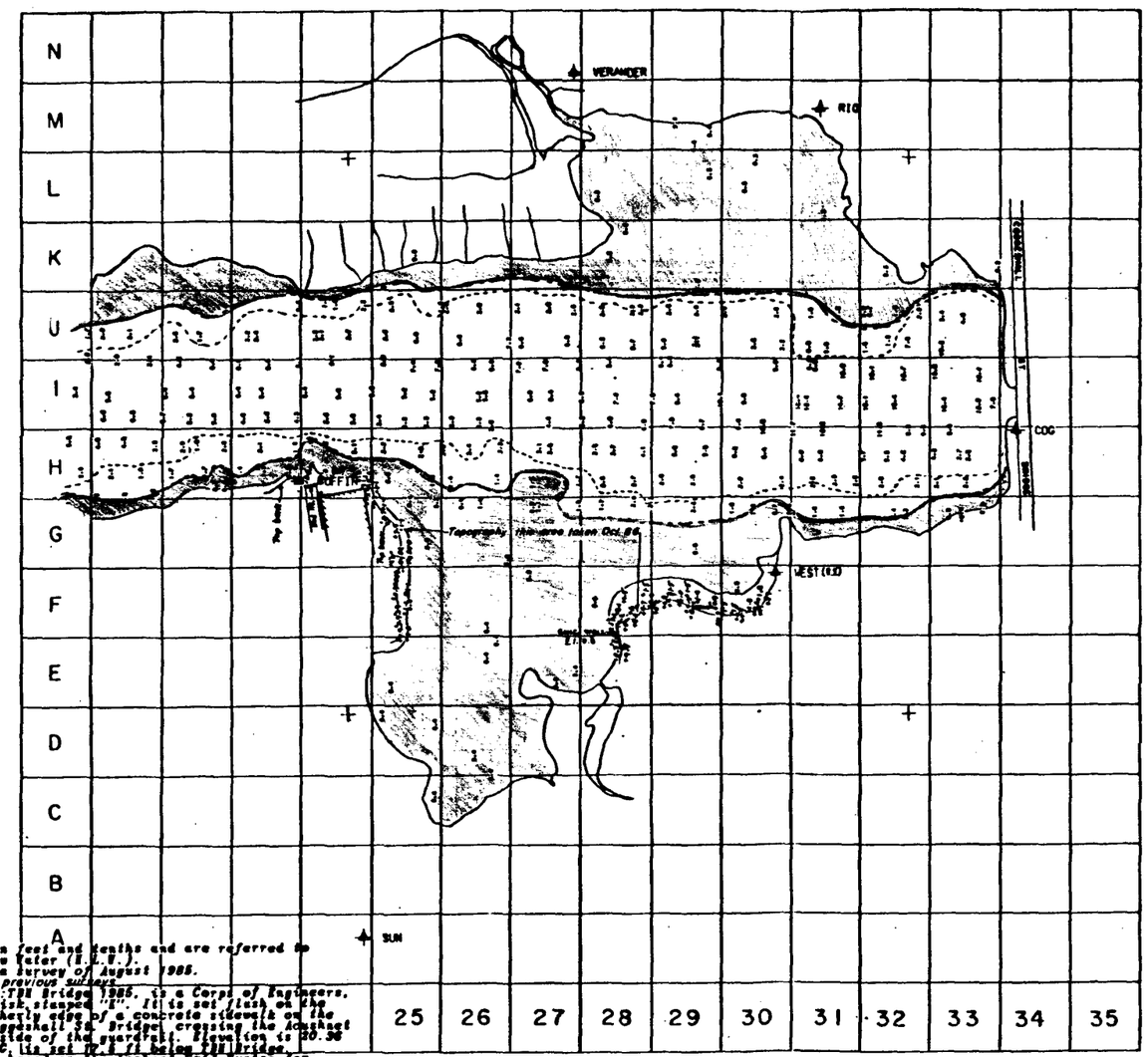
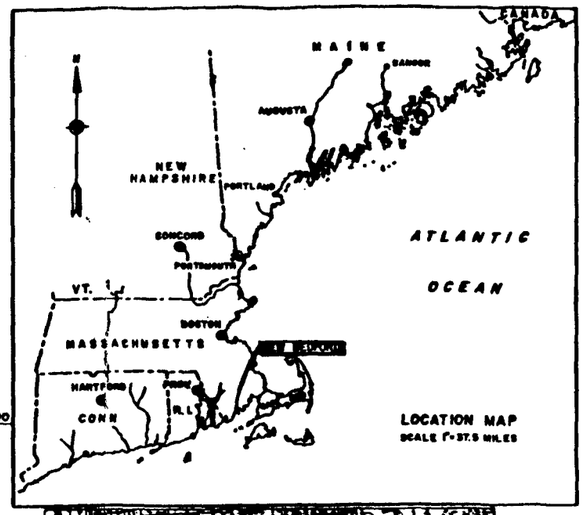
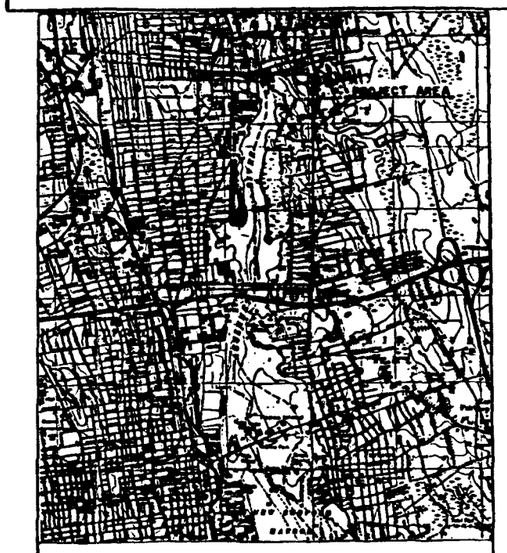






VICINITY MAP

NOT TO SCALE

GENERAL NOTES:

Soundings are in feet and tenths and are referred to the plane of Mean Low Water (M.L.W.).
Hydrography from survey of August 1985.
Topography from previous surveys.
Bench Mark Data: TPH Bridge 1985, is a Corps of Engineers, U.S. Army standard disk stamped "K". It is set flush on the top of the most northerly edge of a concrete sidewalk on the north side of the Coggeshall St. Bridge, crossing the Acushnet River and on the outside of the guardrail. Elevation is 20.36 ft. above M.L.W. T.C. is set 19.8 ft below TPH Bridge.
Coordinates are based on the Lambert Grid System for the State of Massachusetts.
"The sounding information depicted on these maps represents the SHOALEST soundings of those obtained from hydrographic surveys conducted during August 1985. This information should NOT be used to determine volumes."
"The information depicted on these maps represents the results of surveys made on the dates indicated and can only be considered as indicating the general conditions existing at that time."
Fieldbooks: KH 2309 & 2967
Depthsounder Rolls: 85-64, 65, 66, 67, 63

• SEE SHEET 2 FOR DISCUSSION OF SHADED AREAS

GRAPHIC SCALES
1"=37.5 MI. — 25 0 25 50 75 MI.
1"=2000'T. — 2000' 0 2000' 4000'

SAFETY PAYS

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY T.G.S. — DR. BY E.J.K. — DES. BY

PROJECT ENGINEER
CHIEF, PROJ. MANAGEMENT BRANCH
CHIEF, PLANNING DIVISION
APPROVAL RECOMMENDED
CHIEF, ENGINEERING DIVISION
CHIEF, DESIGN BRANCH

PROJECT NO. 110

NEW BEDFORD, MA
ENGINEERING FEASIBILITY STUDY
HYDROGRAPHIC SURVEY
UPPER ACHUSNET RIVER ESTUARY

APPROVED — DATE APRIL 1988

CHIEF, ENGINEERING DIVISION

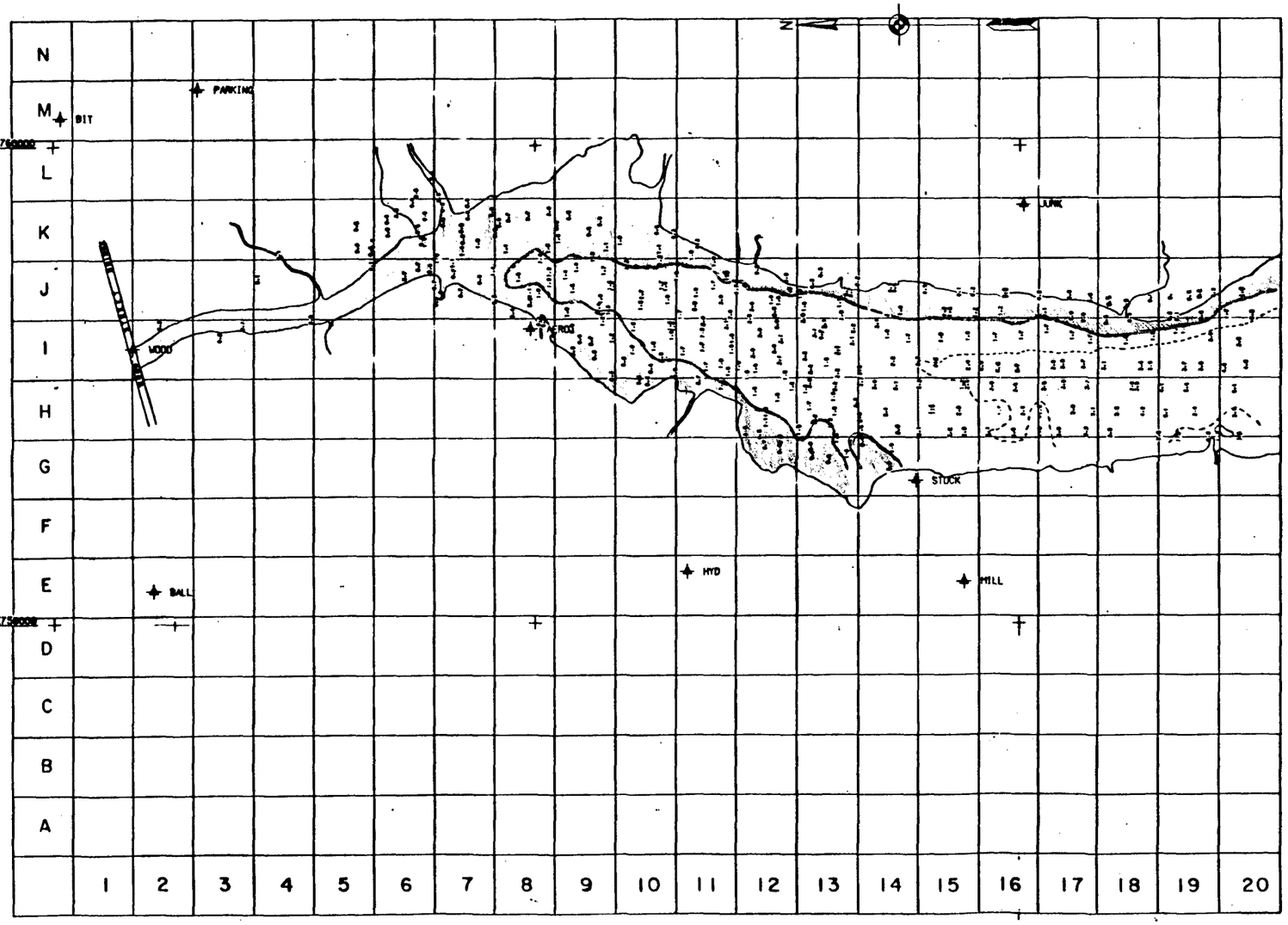
SCALE 1"= 200' — SPEC. NO. DACW 33
DRAWING NUMBER NB-343
SHEET 1 OF 2

SEE NOAA CHART NO. 13230

ATTACHMENT 2

CORPS OF ENGINEERS

U. S. ARMY



- RED SHADING INDICATES THE INTERTIDAL AREA CREATED BY RAISING THE BOTTOM ELEVATION BY 16 INCHES
- YELLOW SHADING INDICATES THE INTERTIDAL AREA CREATED BY RAISING THE BOTTOM ELEVATION AN ADDITIONAL 12 INCHES FOR A TOTAL OF 28 INCHES.

GRAPHIC SCALE

1"=200'FT.

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

NEW BEDFORD, MA
ENGINEERING FEASIBILITY STUDY
HYDROGRAPHIC SURVEY
UPPER ACHUSNET RIVER ESTUARY

PROJECT NO. 110

APPROVED

DATE APRIL 1988

SCALE 1"=200'

SPEC. NO. DACW 33

DRAWING NUMBER NB-343

SHEET 2 OF 2

SEE NOAA CHART NO. 13230

ES-3, paragraph 2 - The entire alternative is based on the supposition that after 1000 years the cap would deteriorate and allow 1,300 g/yr. flux. This requires extensive sensitivity analyses to all parameters applicable, then a risk acceptability determination by all agencies involved.

ES-4, paragraph 3 - The 50 ppm cleanup level is not as appropriate for this sensitive estuary as the Lake Michigan site. Tidal dynamics and resource use of the harbor may require a lower cleanup threshold level remidial action should not solely be aimed at water quality, this basis for setting cleanup thresholds ignore bioaccumalats factors associated with benthic based trophic systems.

Section 1.1

Last paragraph page 1-5) - The definition of this alternative as "achieving an environmentally preferred result" has an inherent conflict. While it would "minimize environmental receptor exposure" it would maximize "potential impacts to the estuarine environment" due to direct subtidal habitat loss.

Paragraphs 2 page 1-9 - Tidal currents of "(1 to 3 cm per second)" seem to be averaged and present an unrealistically low net energy regime. One to three knot currents would be more likely in which case the 28cm/sec erosional velocity. for Upper Estuary areas do not incorporate biological cohesion and surficial armouring. One knot (51.44 cm/sec) velocities are most probable. Cap grain size would need to be coarse sand (1-phi). The coarser material however will allow interstitial flux of contaminants, increasing the requisite chemical barrier thickness. Additionally this coarseness would alter the biological resources of the area from a silt/clay mudflat habitat (benthic forage species and finfish/shellfish spawning preferences) to a sandflat intertidal environment. The use of a less previous (to chemical diffusion) and more persistent geotextile or layers of geotextiles must be incorporated into this alternative.

Section 2.2,

Page 2-3, paragraph 2 - The USACE study of cap dynamics was for a subtidal environment, there was no potential for vegetation to disturb the cap. The benthic flora and fauna were reviewed for potential bioturbation depths. The creation of vegetated wetlands recommended here to stabilize the cap must have a review of the flora that may colonize the area. Rhizomes and root system depths must be documented to assure cap stability.

ATTACHMENT 3

Page 2-4 - The potential exists for lateral extrusion of PCB under the geotextile. The tie-in for the fabric should be upland, therefore destroying all wetlands in the system. The tie-in should be under the existing shoreland grade, requiring real estate and excavation costs as well as associated environmental costs to be evaluated.

Page 2-5 - The summary of the suitability of this alternative does not discuss the extensive loss of subtidal productivity through fill and substrate alternation of the mudflat to sandflat habitat.

Section 3.1.1.3

Page 3-6 - Certain species of benthic organisms (e.g. Diapatra cuprea) that could penetrate to 50-60 cm may colonize the cap when it changes the substrate from silt/clay to sand. They are often numeric dominants in intertidal sandflats. Therefore the bioturbation zone should be increased to 50-60 cm to assure cap integrity.

Section 3.4.6.1

We suggest that reliance on seeds for establishment of marsh plants be minimized by using transplants in the upper half of the range of naturally occurring plants in the area. Nursery propagated stock should be derived from seed gathered at or nearby the site.

Section 3.4.6.2

Detailed landscape plans have not been presented; they should be made available for review if the plan continues.

Page 3-8 - The citation discussing the Sturgis and Gunnison (1988) conclusion for a 20cm bioturbation layer is inappropriate. The difference here is that the proposed sand cap will have a different community and the increased intertidal area will also drive burrowers deeper to avoid desiccation at low tides. The citation dealt primarily with bioturbation for subtidal, fine grained sediments.

Page 3-10 - Although the desorption solubility of PCB in the 12 to 88 ppb ranges are accurate, they have little bearing on the capping discussion since EPA Water Quality Criteria are set at 0.03 ppb. Additionally the general discussion cites the affinity of PCB for high organic carbon. This will not be

present in a sandy cap and therefore the geotextile barrier should be either impervions or above the chemical diffusion layer to prevent bioturbative interaction.

Page 3-15 - The 300 to 3,500 kg/year (660 to 7,700 lbs/yr) of PCB estimated as moving through the water column may be low, especially under conditions of low evaporation.

Section 3.2 - The sensitive estuarine nature of New Bedford Harbor would require consideration of restoring ecological health to the system. The 50 ppm level would preclude normal dredging and most disposal options and therefore discussions on page 3-18 conflict with current dredged material management practices in the state. Therefore, the cleanup should be targeted to the 1 to 10 ppm range, significantly increasing the extent of capping for this option. Calculations should be presented comparing the economic and environmental costs of all cleanup levels.

Section 3.3.1

The use of only a 50-year storm run-off event for cap design then ignores the probabilities of greater events. It is essential to determine the cap stability for 75, 100, 500, 1000 year events. Since, for example, the 100 year event will occur ten (10) times over the predicted 1000 year cap (remediation) life.

Section 3.3.21

Prior to closing the Coggeshall Street Bridge to traffic for four weeks, barge based construction and alternate weir designs should be investigated.

Sections 3.3.2.1 and 3.3.2.2

Any potential hydraulic controls proposed for the New Bedford Harbor system must be approved by New England Divisions Water Control Branch to assure integrity of the flood storage area behind the New Bedford Hurricane Barrier.

Section 3.4

The cap thickness and extent should be considerably greater than proposed here. An array of alternative thicknesses, acreage, marsh plantings, and costs should be displayed to allow an optimized selection

Section 3.4.2.2

Sandbag anchoring of the geotextile would be insufficient for the 1000 year project life. The geotextile should be buried under the shoreland.

Section 3.4.4.1

The local supply of appropriately 300K cy to 1mcy of sorted coarse and requires investigation. The use of barge transported sand from coastal quarries would eliminate staging and truck traffic impacts. This alternative source requires evaluation.

Section 3.4.5

Again, cap stability discussion are only restricted to a 50 year storm event. Given the 1000 year project life all event potential should be investigated and the cap design should accommodate the SPN (Standard Project Northeaster) that is defined as worst case.

Section 5.1.2.2.1

The discussion fails to identify the overall loss of subtidal habitat, potential restrictions to fisheries migrations and change of forage species available from mudbanks and mudflats to sandflats.

Section 5.1.2.2.1

It is our understanding that the newly created intertidal area will be of sand composition and, therefore, should not be refereed to as a mudflat.

Section 5.1.2.2.1, impacts on Normal Water Fluctuation - Longterm impacts on tidal amplitude will be very important to the future condition of the existing salt marsh. An effort should be made to more precisely predict the effect of the project on tidal regime to ensure that the marsh is not significantly effected. This is very important if there is no significant change in tidal regime, water chemistry, or sediment characteristics we would have no reason to expect a significant impact on the salt marsh.

Section 5.1.2.2.3

Impacts on Existing Wetlands - This section should describe impacts to wetlands in greater detail. Specifically it should

address expected changes in vegetation and sedimentation with the project area. A more precise prediction of future tidal regime would be required to do this, including sensitivities to Sea Level Rise Case I-III.

Section 5.1.2.2.4

The presentation does not appear to require fish passage devices as a project feature. These should be a definite project feature to mitigate the impact described.

Section 5.1.2.2.5

This section defines the cap material as being obtained from an offshore borrow area while previous sections discuss local upland sources with truck transport. The impacts of offshore sand mining should be evaluated to determine the feasibility and costs of this project feature.

Section 5.1.2.4

This review of CWA Section 404 criteria is inadequate. Dredging impacts are not germaine (deminimus discharge). The proposed capping alternative is a permanent alteration of habitat with associated biological implications, requiring full analysis under CWA 404(b)1; guidelines.

Section 5.3

The section entitled "Long Term Effectiveness and Permanence" need revision. The entire section is based on a 50 year level of protection, without acknowledgment of Sea Level Rise (e.g. 1 foot versus 3 feet).

Section 5.5.3

Environmental impacts associated with salinity alterations must be evaluated for upsteam shifts in an anadromous, spawning areas. Wetlands should be monitored during construction for soil moisture and a sprinkler watering system provided to assure existing wetland viability.

Section 5.5.3

Paragraph 5 - In addition to maintaining soil salinities below 50 ppt, an effort must be made to avoid radical changes in salinity levels over short periods of time.

Section 5.5.3

A soil water/vegetation monitoring system should be developed to ensure that weir dam operation is consistent with preservation of the salt marsh.

Section 5.7

Cost estimates required a matrix comparison for 50 to 1000 yr (or SPN) quent protection levels, PCB cleanup to 1 -10 ppm levels, sea level rise of 1-3 feet, and various cap thickness. Environmental costs, in terms of mitigation expenses, should also be displayed.

Attachment C

Recolonization Dynamics and Bioturbation process in marine sediments: Relationship to proposed capping of New Bedford Harbor Superfund Site.

No Comment - well done analysis