RETURN TO 1998 ROD AR INDEX

SITE FILE COPY

New Bedford Harbor
4.4
220995

Draft Phase 2 Cost Estimates
(Received from FW 6/14/96 - DTD)

ARCS I PROGRAM

* - Costs Listed Herein Were Basis for RRB Brief

Remedial Planning Activities at Selected Uncontrolled Hazardous Substance Disposal Sites Within EPA Region I (ME, VT, NH, MA, CT, RI)

[redacted]

Superfund
SITE: [illegible]
BREAK: 4.4
OTHER: [illegible]

EPA Contract 68-W9-0034

SDMS DocID 000220995

FOSTER WHEELER
FOSTER WHEELER ENVIRONMENTAL CORPORATION

rec'd 6/21/96 from FW -DAD

Table 1 - Revised FS Cost Estimate Summary
New Bedford Harbor

ALTERNATIVE	DESCRIPTION	EST	FS COST LHB	TOTAL	REVISED COST	
1	Minimal No-Action	$4,092,000	$3,386,000	$7,478,000	$9,438,325	1.
2	Capping	$46,121,000	$59,792,000	$105,913,000	$143,848,160	5.
3	Removal and On-Site Disposal	$55,723,000	$47,675,000	$103,398,000	$159,816,326	6
3d	Removal, Dewatering & On-site Disposal	$86,240,000	$77,811,000	$164,051,000	$197,620,366	8
4	Removal, Solidification & On-Site Disposal	$170,740,000	$137,092,000	$307,832,000	$308,695,876	9.
5	Removal, Solvent Extraction & On-Site Disposal	$292,193,000	$237,391,000	$529,584,000	$540,323,641	10.
6	Removal, Incineration & On-Site Disposal	$346,740,000	$280,196,000	$626,936,000	$582,324,287	11
7	Removal and Capping	--	--	$36,164,000	$82,605,420	2.
8	Removal and On-Site Disposal	--	--	$33,274,000	$92,623,360	3
9	Removal, Solvent Extraction & On-Site Disposal	--	--	$92,999,000	$176,582,623	7
9a	Removal, Incineration & On-Site Disposal	--	--	$80,634,000	$177,497,562	7.
10	Preferred Alternative	--	--	--	$126,650,497	4
11	Old Preferred Alternative	--	--	--	$128,560,916	

Table 1
COST ESTIMATE: ALTERNATIVE - 1
MINIMAL NO ACTION
NEW BEDFORD HARBOR

ACTIVITY	COST
I. DIRECT COSTS	
A. Fencing	$300,020
TOTAL DIRECT COST (TDC)	$300,020
II. INDIRECT COSTS	
A. Health & Safety (@ 5% of TDC) Level D Protection	$15,001
B. Legal, Administration, Permitting (@ 10% of TDC)	$30,002
C. Engineering (@ 10% of TDC)	$30,002
D. Services During Construction (@ 10% of TDC)	$30,002
E. Turnkey Contractor Fee (@ 15% of TDC)	$45,003
TOTAL INDIRECT COST (TIC)	$150,010
SUBTOTAL COSTS	$450,030
CONTINGENCY (@ 20% of TDC + TIC)	$90,006
TOTAL CAPITAL COST	$540,036
MONITORING PROGRAM (present worth @ 5% for 30 years)	$8,695,122
O&M COST	
Fence Maintenance	$15,001
Site Inspections	$686
Institutional Controls	$686
TOTAL O&M COST (present worth @ 5% for 30 years)	$203,167
TOTAL COST - ALTERNATIVE -1	$9,438,325

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-20-96 SHEET 1 OF

CHKD. BY DATE OFS NO. DEPT. NO.

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT COST ESTIMATE FOR ALTERNATIVE #1

PURPOSE: - UPDATE FEASIBILITY STUDY COST ESTIMATE FROM 1989 TO 1996.
- COSTS WILL BE BASED ON NEW USACOE COST ESTIMATES OR SCALING FACTOR BASED ON CHEMICAL ENGINEERING PLANT COST INDEX.

CHEMICAL ENGINEERING PLANT COST INDEX

	ANNUAL INDEX
1989.	355.4
1996 (JAN)	380.8

$$\% \text{ INCREASE} = \frac{(380.8 - 355.4)}{(355.4)} \times 100 = 7.15\%$$

ALTERNATIVE #1: NO ACTION

I. DIRECT COSTS

A. FENCING $280,000 × (1.0715) = $300,020

TOTAL DIRECT COST (TDC) $300,020

II. INDIRECT COSTS

A. HEALTH & SAFETY (@ 5% OF TDC) $15,001
LEVEL D PROTECTION
[ACTIVITY: A]

B. LEGAL, ADMINISTRATION, PERMITTING (@ 10% OF TDC) $30,002

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-20-96 SHEET 2 OF ____

CHKD. BY ____ DATE ____ OFS NO. ____ DEPT. NO. ____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT COST ESTIMATE FOR ALTERNATIVE #1

II. INDIRECT COSTS (CONT.)

C. ENGINEERING (10% OF TDC)	$30,002
D. SERVICES DURING CONSTRUCTION (@10% OF TDC)	$30,002
E. TURNKEY CONTRACTOR FEE (@15% OF TDC)	$45,003
TOTAL INDIRECT COST (TIC)	$150,010
SUBTOTAL COSTS (TDC + TIC)	$450,030
CONTINGENCY (@20% OF TDC+TIC)	$90,006
TOTAL CAPITAL COSTS	$540,036

MONITORING PROGRAM

1. WATER + SEDIMENT COLLECTION	EST + LAB; EVENTS/YR	
• MOBILIZATION	(15,000)(4)(2)	= $120,000
• LABOR: 6 PERSONS, 2 WKS	($30/HR)(6 PERSONS)(80 HRS)(4)(2)	= $115,200
• EQUIPMENT RENTAL (BOAT)	($1,000)(10)(4)(2)	= 80,000
2. BIOTA COLLECTION	(30,000)(2)	= 60,000
		$375,200

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-20-95 SHEET 3 OF ____

CHKD. BY ____ DATE ____ OFS NO. ____ DEPT. NO. ____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT COST ESTIMATE FOR ALTERNATIVE #1

MONITORING PROGRAM (CONT.)

ESTUARY + LOWER HARBOR

EVENTS/YR

3. CHEMICAL ANALYSIS

• SEDIMENT SAMPLES	($175/SAMPLE)(25 SAMPLES)(4)(2)	= $35,000
• WATER SAMPLES	($150)(25)(4)(2)	= $30,000
• BIOTA SAMPLES	($200)(25)(4)(2)	= 40,000
		$105,000

4. DATA VALIDATION ($100/HR)(600 HRS)(2) $120,000

5. INTERPRETATION/REPORT WRITING ($50/HR)(400 HRS)(2) $40,000

TOTAL COST FOR YEAR $640,200

30 YEAR MONITORING PROGRAM (ANNUAL COST) ($640,200)(30) $19,206,000

PRESENT WORTH @ 30 YEARS, 7% (P/A, 7%, 30 YRS) = 12.4090 $7,944,242

6. 5 YEAR REVIEWS

• DATA ANALYSIS + REPORT WRITING	($25,000)(6)(2)	$300,000
• PUBLIC MEETINGS	($4,000)(6)(2)	$48,000

TOTAL FOR 5-YEAR REVIEWS $348,000

PRESENT WORTH @ 30 YEARS, 7% (5, 10, 15, 20, 25, 30) = $750,880

PRESENT WORTH OF MONITORING → $7,944,242 ~~+125,147~~ = $8,695,122

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BLINKMAN DATE 5-20-96 SHEET 4 OF

CHKD. BY DATE OFS NO. DEPT. NO.

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT COST ESTIMATE FOR ALTERNATIVE #1

O+M COSTS

1. FENCE MAINTENANCE
   - ASSUME 5% OF CAPITAL COST PER YEAR
     - (300,020)(0.05)(30 YEARS) = $450,020
   - PRESENT WORTH @ 30 YEARS, 7% = $186,147
     (P/A, 7%, 30) = 12.4090

2. SITE INSPECTIONS
   - ASSUME 2 PEOPLE @ $20/HR, 1 DAY/YEAR/SITE
     - (2)(20)(8) = $320 x 2 = $640 x 1.0715 = $686
   - PRESENT WORTH @ 30 YEARS, 7% = ~~$8,510~~ $8,513
     (P/A, 7%, 30) = 12.4090

3. INSTITUTIONAL CONTROLS
   - ASSUME COST EQUAL TO SITE INSPECTIONS
   - PRESENT WORTH @ 30 YEARS, 7% = $8,510

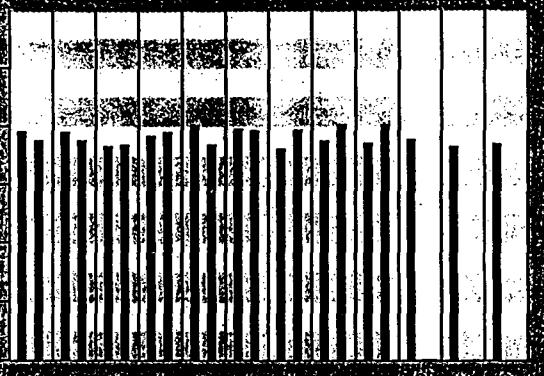
TOTAL O+M COST (PRESENT WORTH @ 7%, 30 YEARS $~~208,151~~ 1,151

TOTAL COST: ALTERNATIVE #1 $9,438,323

6

1992 1993

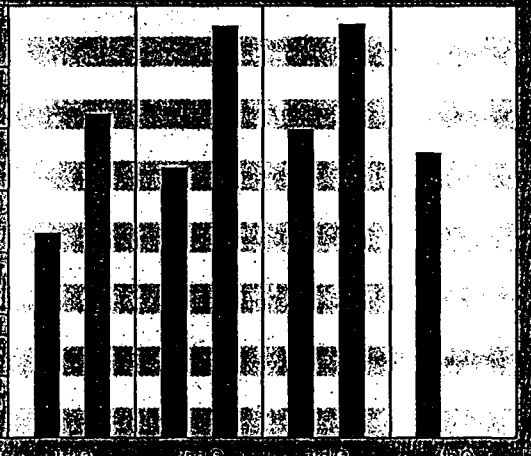
CHEMICAL ENGINEERING PLANT COST INDEX



	(1957-59=100)		
	Sept '93 Prelim	Aug '93 Final	Sept '92 Final
CE Index	360.4	360.4	357.1
Equipment	[illegible]	[illegible]	[illegible]
Heat exchangers & tanks	[illegible]	[illegible]	[illegible]
Process machinery	[illegible]	[illegible]	[illegible]
Pipe, valves & fittings	[illegible]	[illegible]	[illegible]
Process instruments	[illegible]	[illegible]	[illegible]
Pumps & compressors	[illegible]	[illegible]	[illegible]
Electrical equipment	[illegible]	[illegible]	[illegible]
Structural supports & misc.	[illegible]	[illegible]	[illegible]
Construction labor	272.5	273.0	273.8
Buildings	[illegible]	[illegible]	[illegible]
Engineering & supervision	352.0	352.1	353.2

Annual Index
1987 = 323.8
1988 = 342.5
1989 = 355.4
1990 = 357.6
1991 = 361.3
1992 = 358.2

MARSHALL & SWIFT EQUIPMENT COST INDEX



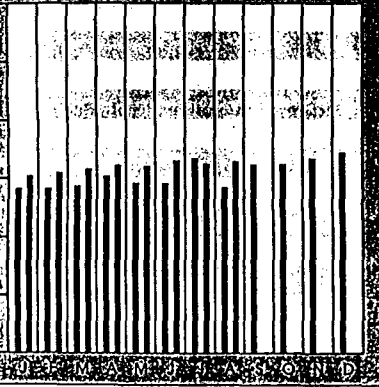
	(1926=100)		
	3rd Q 1993	2nd Q 1993	3rd Q 1992
M & S Index	965.9	966.6	949.7
Process industries, average	[illegible]	[illegible]	[illegible]
Cement	[illegible]	[illegible]	[illegible]
Chemical	[illegible]	[illegible]	[illegible]
Clay products	[illegible]	[illegible]	[illegible]
Glass	[illegible]	[illegible]	[illegible]
Paint	[illegible]	[illegible]	[illegible]
Paper	[illegible]	[illegible]	[illegible]
Petroleum products	[illegible]	[illegible]	[illegible]
Rubber	[illegible]	[illegible]	[illegible]
Related industries			
Electrical power	[illegible]	[illegible]	[illegible]
Mining, milling	[illegible]	[illegible]	[illegible]
Refrigerating	[illegible]	[illegible]	[illegible]
Steam power	[illegible]	[illegible]	[illegible]

Annual Index
1987 = 813.6
1988 = 852.0
1989 = 895.1
1990 = 915.1
1991 = 930.6
1992 = 943.1

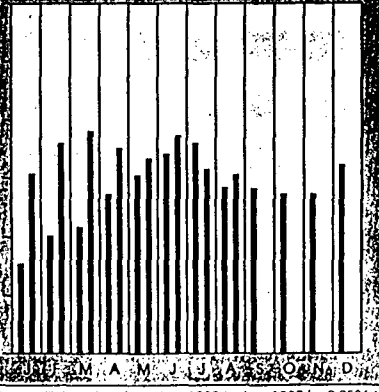
CURRENT BUSINESS INDICATORS

	LATEST	PREVIOUS		YEAR AGO
CPI output index (1987 = 100)	Aug '93=112.6	July '93=112.2	June '93=112.7	Aug '92=108.0
CPI value of output (billion $)	Aug '93=791.5	July '93=794.4	June '93=811.8	Aug '92=784.5
CPI operating rate (%)	Sept '93=84.0	Aug '93=83.9	July '93=83.0	Sept '92=82.1
Construction cost index (1987 = 100)	Oct '93=[illegible]	Sept '93=[illegible]	Aug '93=[illegible]	Oct '92=[illegible]
Producer prices, industrial chemicals (1982 = 100)	Sept '93=110.6	Aug '93=[illegible]	July '93=[illegible]	Sept '92=[illegible]
Index of industrial activity (1977 = 100)	Oct '93=[illegible]	Sept '93=[illegible]	Sept '93=[illegible]	Oct '92=[illegible]
Equity earnings index, chemical and allied products (1977 = 100)	Sept '93=[illegible]	Aug '93=[illegible]	July '93=[illegible]	Sept '92=[illegible]
Productivity index, chemicals and allied products (1987 = 100)**	Sept '93=[illegible]	Aug '93=[illegible]	July '93=[illegible]	Sept '92=[illegible]

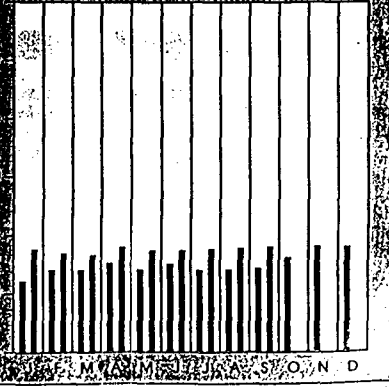
CPI OUTPUT INDEX (1977 = 100)



CPI OUTPUT VALUE ($ Billions)



CPI OPERATING RATE (%)



*To convert to 1977 = 100 base, multiply by 1.356. †Revised as of Jan. 1987 — multiply values from Jan. 1982 to Jan. 1987 by 0.9586 to convert to values starting with Jan. 1987; ‡To convert to 1977 = 100 base, multiply by 1.9224. **To convert to 1977 = 100 base, multiply by 1.478; P = Preliminary; R = Revised. For an explanation and additional information call: (212) 512-6931.

1995 1996

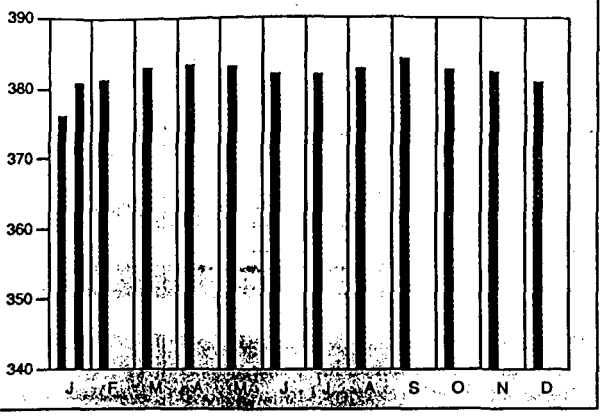
CHEMICAL ENGINEERING PLANT COST INDEX

(1957-59=100)

	Jan. '96 Prelim.	Dec. '95 Final	Jan. '95 Final
CE INDEX	380.8	380.9	376.1
Equipment	426.4	426.3	420.6
Heat exchangers & tanks	389.1	392.1	381.0
Process machinery	412.8	414.7	400.6
Pipe, valves & fittings	507.3	501.9	521.5
Process instruments	376.6	376.9	376.0
Pumps & compressors	610.2	607.5	593.2
Electrical equipment	331.3	331.7	327.7
Structural supports & misc.	377.7	377.6	345.6
Construction labor	276.9	277.3	269.1
Buildings	342.4	343.5	329.8
Engineering & supervision	344.5	344.5	350.4

Annual Index

1990 = 357.6
1991 = 361.3
1992 = 358.2
1993 = 359.2
1994 = 368.1
1995 = 381.9



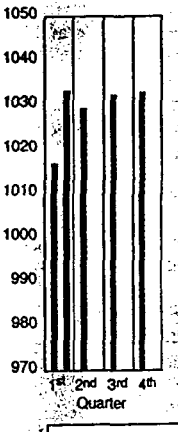
VATAVUK AIR POLLUTION CONTROL COST INDEXES (VAPCCI)

(1st Quarter 1994 = 100.0)

CONTROL DEVICE	1994 (Avg.)	1st	2nd	3rd	4th	1st Q '95
Carbon adsorbers	101.2	106.6	110.7	113.5	111.9	
Catalytic incinerators	102.0	106.5	107.6	107.5	107.8	
Electrostatic precipitators	102.8	108.1	108.6	108.1	107.8	
Fabric filters[2]	100.5	102.2	102.1	103.3	103.4	
Flares	100.5	105.5	103.0	106.1	106.6	
Gas absorbers	100.8	104.0	105.3	106.1	106.2	
Mechanical collectors[3]	100.3	102.1	103.0	103.2	103.4	
Refrigeration systems	100.6	102.2	102.6	103.6	103.7	
Regenerative thermal oxidizers	101.4	103.8	104.1	104.7	105.4	
Thermal incinerators	101.3	104.2	105.3	106.5	107.2	
Wet scrubbers	101.3	109.2	112.5	114.7	113.5	

All third and fourth quarter 1995 indexes are preliminary.
[2] For fabric filters, each quarterly value shown is the average of the Producer Price Indexes for the three months in the quarter multiplied by the average of the PPI for January, February and March 1994 (1st quarter 1994).
[3] For mechanical collectors each quarterly value shown is the average of the Producer Price Indexes for the three months in the quarter multiplied by the average of the PPI for January, February and March 1994 (1st quarter 1994).
Note: For a detailed explanation of the VAPCCI and its components, see *Chem. Eng.*, December 1995, pp. 88-95.

MARSHALL & SWIFT EQUIPMENT COST INDEX



(1926=100)

	1st Q 1996	4th Q 1995	1st Q 1995
M & S INDEX	1,032.9	1,032.6	1,016.6
Process industries, average	1,046.3	1,044.9	1,024.1
Cement	1,039.0	1,037.6	1,018.7
Chemical	1,031.8	1,030.6	1,009.0
Clay products	1,032.1	1,029.7	1,011.4
Glass	966.3	965.8	947.8
Paint	1,049.8	1,049.3	1,028.9
Paper	995.3	995.5	981.8
Petroleum products	1,086.7	1,084.2	1,061.4
Rubber	1,119.5	1,117.5	1,095.5
Related industries			
Electrical power	961.3	965.4	950.3
Mining, milling	1,064.0	1,063.9	1,048.8
Refrigerating	1,227.5	1,227.1	1,203.9
Steam power	1,017.8	1,017.7	998.6

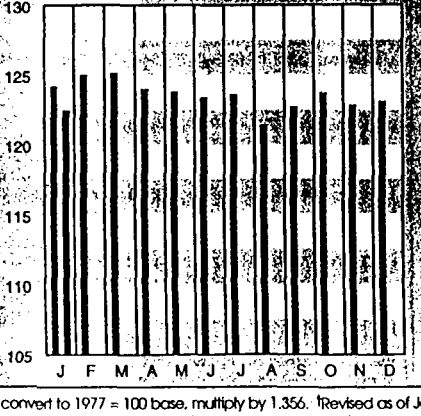
Annual Index

1990 = 915.1
1991 = 930.6
1992 = 943.1
1993 = 964.2
1994 = 993.4
1995 = 1,027.5

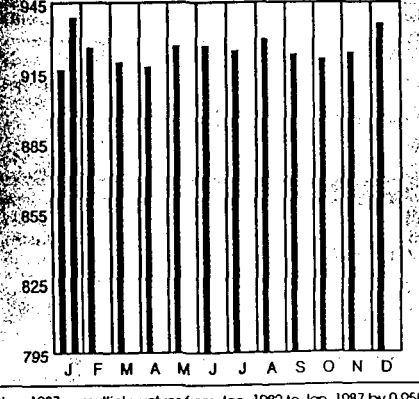
CURRENT BUSINESS INDICATORS

	LATEST	PREVIOUS	YEAR AGO
CPI output index (1987=100)	Jan. '96=122.4	Dec. '95=123.0	Nov. '95=122.7	Jan. '95=124.1
CPI value of output, billion $†	Jan. '96=938.3	Dec. '95=935.4	Nov. '95=922.9	Jan. '95=915.6
CPI operating rate, %	Feb. '96=84.0	Jan. '96=83.6	Dec. '95=84.2	Feb. '95=86.6
Construction cost index (1967=100)	Mar. '96=515.0	Feb. '96=515.0	Jan. '96=514.2	Mar. '95=505.9
Producer prices, industrial chemicals (1982=100)	Feb. '96=124.1	Jan. '96=123.3	Dec. '95=123.0	Feb. '95=127.9
Index of industrial activity (1992=100)	Mar. 2, '96=126.1	Feb. 24, '96=125.2	Feb. 17, '96=124.7	Mar. 1, '95=123.2
Hourly earnings index, chemical & allied products (1977=100)‡	Feb. '96=129.8	Jan. '96=130.7	Dec. '95=130.1	Feb. '95=124.7
Productivity index, chemicals & allied products (1987=100)**	Feb. '96=122.2	Jan. '96=124.7	Dec. '95=122.9	Feb. '95=121.3

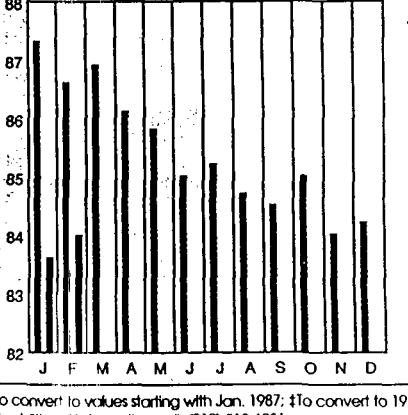
CPI OUTPUT INDEX (1987=100)



CPI OUTPUT VALUE ($ Billions)



CPI OPERATING RATE (%)



*To convert to 1977 = 100 base, multiply by 1.356. †Revised as of Jan. 1987 — multiply values from Jan. 1982 to Jan. 1987 by 0.9586 to convert to values starting with Jan. 1987; ‡To convert to 1977 = 100 base, multiply by 1.9224. **To convert to 1977 = 100 base, multiply by 1.478; P = Preliminary; R = Revised. For an explanation and additional information call: (212) 512-6931.

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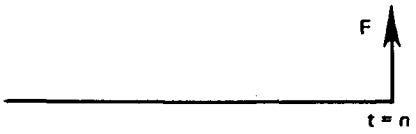
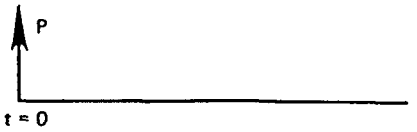
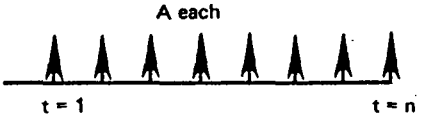
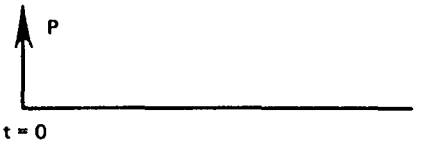
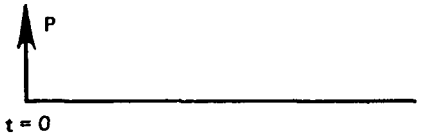
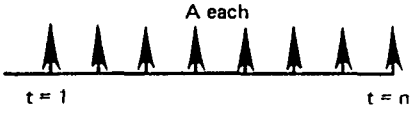
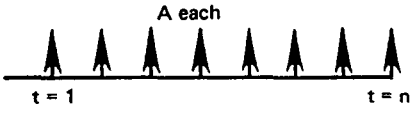
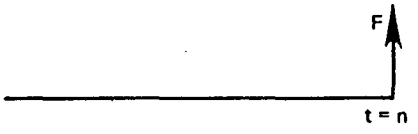
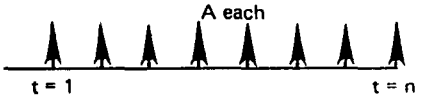
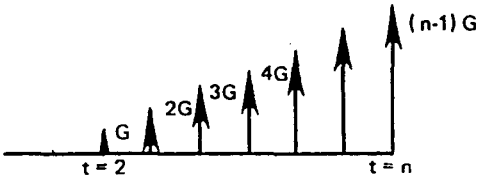
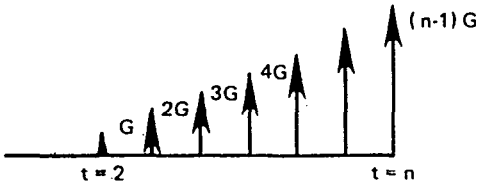
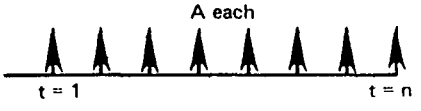
STANDARD CASH FLOW FACTORS

MULTIPLY	BY	TO OBTAIN
	F (P/F, i%, n)	P 
	P (F/P, i%, n)	F
	A (P/A, i%, n)	P 
	P (A/P, i%, n)	A 
	A (F/A, i%, n)	F
	F (A/F, i%, n)	A 
	G (P/G, i%, n)	P
	G (A/G, i%, n)	A 

9

I = 7.00 %

N	(P/F)	(P/A)	(P/G)	(F/P)	(F/A)	(A/P)	(A/F)	(A/G)	N
1	.9346	0.9346	-0.0000	1.0700	1.0000	1.0700	1.0000	-0.0000	1
2	.8734	1.8080	0.8734	1.1449	2.0700	0.5531	0.4831	0.4831	2
3	.8163	2.6243	2.5060	1.2250	3.2149	0.3811	0.3111	0.9549	3
4	.7629	3.3872	4.7947	1.3108	4.4399	0.2952	0.2252	1.4155	4
5	.7130	4.1002	7.6467	1.4026	5.7507	0.2439	0.1739	1.8650	5
6	.6663	4.7665	10.9784	1.5007	7.1533	0.2098	0.1398	2.3032	6
7	.6227	5.3893	14.7149	1.6058	8.6540	0.1856	0.1156	2.7304	7
8	.5820	5.9713	18.7889	1.7182	10.2598	0.1675	0.0975	3.1465	8
9	.5439	6.5152	23.1404	1.8385	11.9780	0.1535	0.0835	3.5517	9
10	.5083	7.0236	27.7156	1.9672	13.8164	0.1424	0.0724	3.9461	10
11	.4751	7.4987	32.4665	2.1049	15.7836	0.1334	0.0634	4.3296	11
12	.4440	7.9427	37.3506	2.2522	17.8885	0.1259	0.0559	4.7025	12
13	.4150	8.3577	42.3302	2.4098	20.1406	0.1197	0.0497	5.0648	13
14	.3878	8.7455	47.3718	2.5785	22.5505	0.1143	0.0443	5.4167	14
15	.3624	9.1079	52.4461	2.7590	25.1290	0.1098	0.0398	5.7583	15
16	.3387	9.4466	57.5271	2.9522	27.8881	0.1059	0.0359	6.0897	16
17	.3166	9.7632	62.5923	3.1588	30.8402	0.1024	0.0324	6.4110	17
18	.2959	10.0591	67.6219	3.3799	33.9990	0.0994	0.0294	6.7225	18
19	.2765	10.3356	72.5991	3.6165	37.3790	0.0968	0.0268	7.0242	19
20	.2584	10.5940	77.5091	3.8697	40.9955	0.0944	0.0244	7.3163	20
21	.2415	10.8355	82.3393	4.1406	44.8652	0.0923	0.0223	7.5990	21
22	.2257	11.0612	87.0793	4.4304	49.0057	0.0904	0.0204	7.8725	22
23	.2109	11.2722	91.7201	4.7405	53.4361	0.0887	0.0187	8.1369	23
24	.1971	11.4693	96.2545	5.0724	58.1767	0.0872	0.0172	8.3923	24
25	.1842	11.6536	100.6765	5.4274	63.2490	0.0858	0.0158	8.6391	25
26	.1722	11.8258	104.9814	5.8074	68.6765	0.0846	0.0146	8.8773	26
27	.1609	11.9867	109.1656	6.2139	74.4838	0.0834	0.0134	9.1072	27
28	.1504	12.1371	113.2264	6.6488	80.6977	0.0824	0.0124	9.3289	28
29	.1406	12.2777	117.1622	7.1143	87.3465	0.0814	0.0114	9.5427	29
30	.1314	12.4090	120.9718	7.6123	94.4608	0.0806	0.0106	9.7487	30
31	.1228	12.5318	124.6550	8.1451	102.0730	0.0798	0.0098	9.9471	31
32	.1147	12.6466	128.2120	8.7153	110.2182	0.0791	0.0091	10.1381	32
33	.1072	12.7538	131.6435	9.3253	118.9334	0.0784	0.0084	10.3219	33
34	.1002	12.8540	134.9507	9.9781	128.2588	0.0778	0.0078	10.4987	34
35	.0937	12.9477	138.1353	10.6766	138.2369	0.0772	0.0072	10.6687	35
36	.0875	13.0352	141.1990	11.4239	148.9135	0.0767	0.0067	10.8321	36
37	.0818	13.1170	144.1441	12.2236	160.3374	0.0762	0.0062	10.9891	37
38	.0765	13.1935	146.9730	13.0793	172.5610	0.0758	0.0058	11.1398	38
39	.0715	13.2649	149.6883	13.9948	185.6403	0.0754	0.0054	11.2845	39
40	.0668	13.3317	152.2928	14.9745	199.6351	0.0750	0.0050	11.4233	40
41	.0624	13.3941	154.7892	16.0227	214.6096	0.0747	0.0047	11.5565	41
42	.0583	13.4524	157.1807	17.1443	230.6322	0.0743	0.0043	11.6842	42
43	.0545	13.5070	159.4702	18.3444	247.7765	0.0740	0.0040	11.8065	43
44	.0509	13.5579	161.6609	19.6285	266.1209	0.0738	0.0038	11.9237	44
45	.0476	13.6055	163.7559	21.0025	285.7493	0.0735	0.0035	12.0360	45
46	.0445	13.6500	165.7584	22.4726	306.7518	0.0733	0.0033	12.1435	46
47	.0416	13.6916	167.6714	24.0457	329.2244	0.0730	0.0030	12.2463	47
48	.0389	13.7305	169.4981	25.7289	353.2701	0.0728	0.0028	12.3447	48
49	.0363	13.7668	171.2417	27.5299	378.9990	0.0726	0.0026	12.4387	49
50	.0339	13.8007	172.9051	29.4570	406.5289	0.0725	0.0025	12.5287	50
51	.0317	13.8325	174.4915	31.5190	435.9860	0.0723	0.0023	12.6146	51
52	.0297	13.8621	176.0037	33.7253	467.5050	0.0721	0.0021	12.6967	52
53	.0277	13.8898	177.4447	36.0861	501.2303	0.0720	0.0020	12.7751	53
54	.0259	13.9157	178.8173	38.6122	537.3164	0.0719	0.0019	12.8500	54
55	.0242	13.9399	180.1243	41.3150	575.9286	0.0717	0.0017	12.9215	55
60	.0173	14.0392	185.7677	57.9464	813.5204	0.0712	0.0012	13.2321	60
65	.0123	14.1099	190.1452	81.2729	1146.7552	0.0709	0.0009	13.4760	65
70	.0088	14.1604	193.5185	113.9894	1614.1342	0.0706	0.0006	13.6662	70
75	.0063	14.1964	196.1035	159.8760	2269.6574	0.0704	0.0004	13.8136	75
80	.0045	14.2220	198.0748	224.2344	3189.0627	0.0703	0.0003	13.9273	80
85	.0032	14.2403	199.5717	314.5003	4478.5761	0.0702	0.0002	14.0146	85
90	.0023	14.2533	200.7042	441.1030	6287.1854	0.0702	0.0002	14.0812	90
95	.0016	14.2626	201.5581	618.6697	8823.8535	0.0701	0.0001	14.1319	95
100	.0012	14.2693	202.2001	867.7163	12381.6618	0.0701	0.0001	14.1703	100

Table 2
COST ESTIMATE: ALTERNATIVE - 2
CAPPING - > 10 ppm
NEW BEDFORD HARBOR

ACTIVITY	COST
I. DIRECT COSTS	
A. Hydraulic Control Structure	$1,044,713
B. Geotextile Placement	$11,501,687
C. Sand Placement	$36,948,741
D. Stone Placement	$634,431
E. Surveying & Monitoring	$1,202,223
F. Ship Channel Dredging	$6,250,688
G. Dewatering/Water Treatment	$13,007,483
H. Material Hauling	$0
I. CDF Construction	$9,148,969
J. Air Monitoring	$3,544,000
TOTAL DIRECT COST (TDC)	$83,282,935
II. INDIRECT COSTS	
A. Health & Safety (@ 5% of TDC) Level D Protection	$4,164,147
B. Legal, Administration, Permitting (@ 10% of TDC)	$8,328,293
C. Engineering (@ 10% of TDC)	$8,328,293
D. Services During Construction (@ 10% of TDC)	$8,328,293
E. Turnkey Contractor Fee (@ 15% of TDC)	$12,492,440
TOTAL INDIRECT COST (TIC)	$41,641,467
SUBTOTAL COSTS	$124,924,402
CONTINGENCY (@ 20% of TDC + TIC)	$24,984,880
TOTAL CAPITAL COST	$149,909,282
PRESENT WORTH - 1996 (@ 7% for 2 years for dredging, 6 years for cap)	$125,392,795
O&M COST (Cap & CDFs) (Present Worth @ 7% for 30 years upon completion)	$9,760,243
MONITORING PROGRAM (Present Worth @ 7% for 30 years)	$8,695,122
TOTAL COST - ALTERNATIVE - 2	$143,848,160

cap	dredging
$1,044,713	
$11,501,687	
$36,948,741	
$634,431	
$1,202,223	
$0	$6,250,688
$0	$13,007,483
$0	$0
$0	$9,148,969
$0	$3,544,000
$51,331,795	$31,951,140
$2,566,590	$1,597,557
$5,133,179	$3,195,114
$5,133,179	$3,195,114
$5,133,179	$3,195,114
$7,699,769	$4,792,671
$25,665,897	$15,975,570
$76,997,692	$47,926,710
$15,399,538	$9,585,342
$92,397,230	$57,512,052

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-13-96 SHEET 1 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DIRECT COST FOR CAPPING - ALTERNATIVE #2

A. HYDRAULIC CONTROL STRUCTURE

FS COST (SW-7) = $975,000 × 1.0715 = $1,044,713

COST ADJUSTMENT SEE ALT. #1

B. GEOTEXTILE PLACEMENT (EST-2 + LNB-2)

- NEED TO ADJUST FOR CDF B&C FOOTPRINTS

$= \left[(30{,}100\ yd^3 + 38{,}000\ yd^3)(27\ FT^3/yd^3)\right] / 2\ FT \left(\frac{1\ ACRE}{45{,}560\ FT^2}\right) \cong 21$ ACRES

DEPTH OF SEDIMENT

$\therefore \left[\$6{,}009{,}000\left(\frac{187-21}{187}\right) + \$5{,}400{,}000\right] \times 1.0715 = \$11{,}501{,}687$

EST-2 LNB-2

C. SAND PLACEMENT (EST-2 + LNB-2)

- NEED TO ADJUST FOR FOOT PRINTS OF CDFs B&C

$\therefore \left[\$18{,}538{,}000\left(\frac{187-21}{187}\right) + 18{,}027{,}000\right](1.0715) = \$36{,}948{,}741$

D. STONE PLACEMENT

- NEED TO ADJUST FOR FOOTPRINTS OF CDFs B&C

$\therefore \left[\$667{,}000\left(\frac{187-21}{187}\right)\right](1.0715) = \$634{,}431$

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-13-96 SHEET 2 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DIRECT COSTS FOR CAPPING - ALTERNATIVE #2

E. SURVEYING AND MONITORING (EST-2 + LHB-2)

(575,000 + 547,000)(1.0715) = $1,202,223

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMANN DATE 5-28-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING COST ESTIMATE: ALTERNATIVE #2

- ANTICIPATED VOLUME OF DREDGED MATERIAL = 122,685 yd^3

- ASSUME SAME DREDGING RATE AS SOUTHERN 1/3 OF ESTUARY

1) MOBILIZATION = $850,000
2) DREDGE EQUIPMENT COST = $800,000
3) OPERATING COST = 4,600,688
   - $12,000/DAY
   - 320 yd^3/DAY

TOTAL = $6,250,688

4) DREDGE DAYS = $122{,}685\ yd^3 \times \frac{1\ DAY}{320\ yd^3} \times \frac{1\ YEAR}{259\ DAYS} = 1.48$ YEARS

- SEE ALTERNATIVE #3 FOR ASSUMPTIONS & DETAILS CONCERNING DREDGING

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-13-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT WATER TREATMENT - ALTERNATIVE #2

CAPITAL COST

- AVG OF COST FOR FS AND ACTUAL ACOE COSTS
- SEE ALTERNATIVE #3 FOR ASSUMPTIONS + DETAILS

= $8,685,510

O+M COST

- AVG OF COST FOR FS AND ACOE ACTUALS
- SEE ALTERNATIVE #3 FOR ASSUMPTIONS + DETAILS

AVG COST = $265,608/MONTH

TOTAL DREDGE MONTHS = 1.48 YEARS (12) = 17.76 MONTHS (SAY 18)

∴ (265,608)(18) = $4,780,944

PRESENT WORTH FOR O+M (2 yrs, 7%) = $\left(\frac{4,780,944}{2}\right)(1.8080)$

(P/A, 7%, 2)

= $4,321,973

TOTAL WATER TREATMENT COST = 8,685,510 + 4321973

= $13,007,483

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-13-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT AIR MONITORING - ALTERNATIVE #2

I. DREDGING

- SEE ALTERNATIVE #3 FOR ASSUMPTIONS AND DETAILS

A. INITIAL 6 MONTHS

= $920,000

B. MONTHS 7 - 12

- $624,000

C. MONTHS 13 - 18

= (26 WEEKS)(2)(10)(800) = $416,000

II CDFs

- SEE ALT. #3 FOR ASSUMPTIONS & DETAILS

A. CDF B

- 152 EVENTS

B. CDF C

- 178 EVENTS

CDF COST = (152+178)(6)(800) = $1,584,000

TOTAL AIR MONITORING = $3,544,000

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-13-96 SHEET 1 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT CAP + CDF O+M - ALTERNATIVE #2

I. CAP

A. ESTUARY

- MOB/DEMOB = 130,000 (1.0715) = $139,295 EVERY 5 YEARS
- SAND MATERIAL
  - 10% EVERY 5 YEARS = $409,150 $\left(\frac{187-21}{187}\right)$(1.0715) = $389,172

    FS COST — FOOT PRINT ADJUSTMENT
- SAND PLACEMENT = 1,451,616 $\left(\frac{187-21}{187}\right)$(1.0715) = $1,361,714
- HYDROGRAPHIC SURVEY = $22,500 (1.0715) = $24,109/YR
- MONITOR CAP THICKNESS = $4,000/YR (1.0715) = $4,286

∴ O+M (ESTUARY) EVERY 5 YRS = $1,890,181

O+M (ESTUARY) YEARLY = $28,795

B. LOWER HARBOR

- MOB/DEMOB = $139,295
- SAND MATERIAL = 390,000 (1.0715) = $417,885
- SAND PLACEMENT = $1,399,784 (1.0715) = $1,449,869
- HYDROGRAPHIC SURVEY = $21,000 (1.0715) = $22,502/YR
- MONITOR CAP THICKNESS = 4,286/YR

∴ O+M (LHB) EVERY 5 YEARS = $2,007,049

O+M (LHB) YEARLY = $26,788

TOTAL O+M (5 YRS) = $3,897,230

O+M (YEARLY) = $55,183

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-13-96 SHEET 2 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT CAP + CDF O+M - ALTERNATIVE #2

II CDF

- SEE ALTERNATIVE #3 FOR ASSUMPTIONS + DETAILS

O+M (EVERY 10 YEARS) = $603,868

O+M (ANNUALLY) = 5,000/CDF = $10,000

(probably low?

III O+M PRESENT WORTH

$$\left[\$3,897,230(0.7130 + 0.5083 + 0.3624 + 0.2584 + 0.1842 + 0.1314) + 55,183(12.4090)\right] + 603,868(0.5083 + 0.2584 + 0.1314) + 10,000(12.4090)$$

$$= \$9,760,243$$

Table 3
COST ESTIMATE: ALTERNATIVE - 3/ 3d
DREDGE/DISPOSE
NEW BEDFORD HARBOR

ACTIVITY	COST ALT-3	ALT-3d
I. DIRECT COSTS		
A. Dredging	$34,190,903	$32,977,497
B. Dewatering/Water Treatment	$34,001,246	$69,425,570
C. Material Handling	$0	$3,795,155
D. CDF Construction	$42,184,424	$32,678,872
E. Air Monitoring	$14,958,400	$14,030,400
TOTAL DIRECT COST (TDC)	$125,334,973	$152,907,494
II. INDIRECT COSTS		
A. Health & Safety (@ 5% of TDC) Level D Protection	$6,266,749	$7,645,375
B. Legal, Administration, Permitting (@ 10% of TDC)	$12,533,497	$15,290,749
C. Engineering (@ 10% of TDC)	$12,533,497	$15,290,749
D. Services During Construction (@ 10% of TDC)	$12,533,497	$15,290,749
E. Turnkey Contractor Fee (@ 15% of TDC)	$18,800,246	$22,936,124
TOTAL INDIRECT COST (TIC)	$62,667,486	$76,453,747
SUBTOTAL COSTS	$188,002,459	$229,361,241
CONTINGENCY (@ 20% of TDC + TIC)	$37,600,492	$45,872,248
TOTAL CAPITAL COST	$225,602,951	$275,233,489
PRESENT WORTH - 1996 (@ 7% for 12 years for 3 & 11 years for 3d)	$149,324,713	$187,626,670
O&M COST (CDFs) (Present Worth @ 7% for 30 years upon completion)	$1,796,491	$1,298,574
MONITORING PROGRAMS (Present Worth @ 7% for 30 years)	$8,695,122	$8,695,122
TOTAL COST - ALTERNATIVE - 3/ 3d	$159,816,326	$197,620,366

NEW BEDFORD HARBOR PHASE II
DREDGING VOLUME AND CDF STORAGE CAPACITIES
ALTERNATIVE - 3 : Dredge/Dispose

Volume of Contaminated Sediment

Estuary	527,777 yd^3
Lower Harbor	398,148 yd^3
Total Volume of Contaminated Sediment	**925,925 yd^3**

CDF Foot-Print Corrections

CDF A (Formerly CDF 1B - Northern Half)	26,800 yd^3
CDF B (Formerly CDF 1B - Southern Half)	30,100 yd^3
CDF C (Formerly CDF 1A)	38,000 yd^3
CDF D (Formerly CDF 7)	31,200 yd^3
Island 1	31,100 yd^3
Total Foot-Print Correction	**157,200 yd^3**

Dredging Volume

Dredging Volume = Contaminated Sediment Volume - Foot-Print Correction
Dredging Volume = 925,925 yd^3 - 157,200 yd^3 = **768,725 yd^3**

Required Storage Volume

Required CDF Storage Volume = Dredged Volume x Bulking Factor
Required CDF Storage Volume = 768,725 yd^3 x 1.4 = **1,076,215 yd^3**

CDF Storage Volumes

CDF A	56,400 yd^3
CDF B	50,700 yd^3
CDF C	93,800 yd^3
CDF D	435,300 yd^3
Island 1	435,300 yd^3
Total Available Storage Volume =	**1,071,500 yd^3**

NEW BEDFORD HARBOR PHASE II
DREDGING VOLUME AND CDF STORAGE CAPACITIES
ALTERNATIVE - 3d : Dredge/Dewater/Dispose

Volume of Contaminated Sediment

Estuary	527,777 yd^3
Lower Harbor	398,148 yd^3
Total Volume of Contaminated Sediment	**925,925 yd^3**

CDF Foot-Print Corrections

CDF A (Formerly CDF 1B - Northern Half)	26,800 yd^3
CDF B (Formerly CDF 1B - Southern Half)	30,100 yd^3
CDF C (Formerly CDF 1A)	38,000 yd^3
CDF D (Formerly CDF 7)	31,200 yd^3
CDF 3	56,300 yd^3
Total Foot-Print Correction	**182,400 yd^3**

Dredging Volume

Dredging Volume = Contaminated Sediment Volume - Foot-Print Correction
Dredging Volume = 925,925 yd^3 - 182,400 yd^3 = **743,525 yd^3**

Required Storage Volume

Required CDF Storage Volume = Dredged Volume x Bulking Factor
Required CDF Storage Volume = 743,525 yd^3 = **743,525 yd^3**

CDF Storage Volumes

CDF A	56,400 yd^3
CDF B	50,700 yd^3
CDF C	93,800 yd^3
CDF D	435,300 yd^3
CDF 3	134,000 yd^3
Total Available Storage Volume =	**770,200 yd^3**

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-29-96 SHEET 1 OF 3

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING COST ESTIMATE - ALTERNATIVES # 3, #4

ANTICIPATED VOLUME OF DREDGED MATERIAL

ESTUARY = 527,777 yd^3 - 94,900 yd^3 = 432,877 yd^3

CDF FOOTPRINT CORRECTION FOR A, B, & C

LOWER HARBOR = 398,148 yd^3 - 62,300 yd^3 = 335,848

CDF FOOTPRINT CORRECTION FOR CDF DEER ISLAND

TOTAL = 768,725 yd^3

ASSUME ESTUARY AND LOWER HARBOR WILL BE DIVIDED INTO 3 SECTIONS WITH A DIFFERENT DREDGE PRODUCTION RATE ASSIGNED TO EACH. THE 3 SECTIONS ARE:

- NORTHERN 1/3 OF ESTUARY
- MIDDLE 1/3 OF ESTUARY
- SOUTHERN 1/3 OF ESTUARY AND ALL AREAS BETWEEN COGGESHALL ST. BRIDGE AND HURRICANE BARRIER.

[illegible] ASSUMPTIONS [illegible] DREDGING RATES AND COST BASED ON ACOE COST ESTIMATE (SEE ATTACHMENT #1)

ASSUME ESTUARY VOLUME IS DIVIDED INTO 3 EQUAL VOLUMES

[illegible]

NORTHERN 1/3 OF ESTUARY

1) MOBILIZATION = $850,000
2) DREDGE EQUIPMENT COST = $800,000 = $8,092,820
3) OPERATING COST = $6,442,820
   - 9,600
   - 215 yd^3/day

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-29-96 SHEET 2 OF 3

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING COST ESTIMATE - ALTERNATIVE #3

4) DREDGE ~~DAYS~~ YEARS $= \left(\frac{432{,}877\ yd^3}{3}\right)\left(\frac{1\ DAY}{215\ yd^3}\right) \times \left(\frac{1\ YEAR}{229\ DAYS\ of\ dredging}\right) = 2.93$ YEARS

2.75

1.74

7.42

MIDDLE 1/3 OF ESTUARY

1. MOBILIZATION = $0 > INCLUDED IN NORTHERN 1/3 COSTS
2. DREDGING EQUIPMENT COSTS = $0
3. OPERATING COST = $6,442,820
   - $9,600
   - 215 yd^3/DAY

TOTAL = $6,442,820

4. DREDGE ~~DAYS~~ YEARS $= \left(\frac{432{,}877}{3}\right)\left(\frac{1}{215}\right)\left(\frac{1}{244}\right) = 2.75$ YEARS

SOUTHERN 1/3 OF ESTUARY

1. MOBILIZATION = $850,000
2. DREDGE EQUIPMENT COSTS = $800,000
3. OPERATING COSTS = $5,410,963 ✓
   - $12,000/DAY
   - 320 yd^3/DAY

TOTAL : $7,060,963

4. DREDGE ~~DAYS~~ YEARS $= \left(\frac{432{,}877}{3}\right)\left(\frac{1}{320}\right)\left(\frac{1}{259}\right) = 1.74$ YEARS

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-29-96 SHEET 3 OF 3

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING COST ESTIMATE - ALTERNATIVE #3

LOWER HARBOR

1. MOBILIZATION = $0 > INCLUDED IN SOUTHERN 1/3 COSTS
2. DREDGE EQUIPMENT COSTS = $0
3. OPERATING COST = $12,594,300
   - $12,000/DAY
   - 320 yd³/DAY

TOTAL = $12,594,300

4. DREDGE ~~DAYS~~ YEARS = 335,848 yd³ x (1/320)(1/259) = 4.05 YEARS
   7.42
   11.47

TOTAL COST

NORTHERN 1/3	= $8,092,820
MIDDLE 1/3	= $6,442,820
SOUTHERN 1/3	= 7,060,963
LOWER HARBOR	= 12,594,300
	$34,190,903

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NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT "Hot Spot" Dredging Summary

COMPUTATION

COMPUTED BY MARK OTIS CHECKED BY DATE 3/18/96

Dredge Mobilization / De-Mobilization & Misc	$196,666
Sediment Dredging & Disposal 80 hrs @ $525/hr	$420,525
Sediment Dredging & Disposal 1211.5 hrs @ $569.19/hr	$689,574
Shutdown Time 28 days @ $1,800	$ 50,400
Incidental Dredge Equipment	$452,535
Oil Absorbent Booms	$ 3,309
	$1,813,009

SUMMARY OF DREDGING ACTIVITY

TOTAL AVAILABLE WORK DAYS		345
" DREDGING DAYS		261
" SHUTDOWN DAYS		32
OTHER NON-DREDGE DAYS		52
TOTAL CUBIC YARDS DREDGED		14,000 c.y.
Required	8428 c.y.	
Overdredged	5568 c.y.	
Square feet dredged	189,742 s.f.	
" " redredged	22,760 s.f.	

1) Average dredge time (payment) per day 2012.5/261 = 7.7 hrs/day

2) Average dredge time (production) per day 4.0 hrs/day

3) Average hourly production 14000 c.y. / 1044 hrs 13.4 CY/hr

4) % of available time working 261/345 75%

5) Shutdown time as a % of available dredging days 10%

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NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT Estuary / Lower Harbor & Bay
COMPUTATION Revised dredging cost estimate
COMPUTED BY Mark Otis CHECKED BY DATE 18 March 96

Approach

The harbor will be divided into 3 sections with a different dredge production rate assigned to each. The 3 sections are -

- Northern 1/3 of Estuary
- Middle 1/3 of Estuary
- Southern 1/3 of Estuary and all areas between Coggeshall St. bridge and hurricane barrier.

Northern 1/3 of Estuary

* The "hot spot" production rates will be used in this area. Two (2) dredges will be used to complete the area in a reasonable period of time. Assume each dredge operates 2 shifts per day for a total dredging time of 8 hours/day per dredge. Based on the "hot spot" production rate of 13.4 cy/hr per dredge this operation would result in a total production rate of 215 cy/day. This production estimate assumes that their would be no restrictions caused by CDF capacity or Water Treatment Plant operations.

1) Mobilization / Demobilization which includes pipeline costs. Pumping distance for this area is approximately 1/2 mile max. $850,000

2) Dredge Equipment Cost - Because of the length of time associated with dredging these areas the dredges would be purchased. Assume $400K per dredge. $800,000

3) Operating cost (includes labor) $2400/shift $9,600 day
$2400 x 4 shifts per day =

4) Dredge Days per year (assume 6 day work week)

365 days/year - 52 Sundays - 8 holidays = 305 available

305 available days x 75% = 229 days/yr.

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NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT Estuary / Lower Harbor & Bay
COMPUTATION Revised dredging cost estimate
COMPUTED BY Mark Otis CHECKED BY DATE 18 March 96

Middle 1/3 of Estuary

* Contamination levels are lower and water depths greater in this area so production rates can increase (based on longer dredging time per shift) and the availability can increase.

Average dredge time per day per shift	6 hours
Average hourly production	13.4 CY / hr
Daily production (2 shifts & 2 dredges)	320 CY / day

1) Assume dredges & incidental equipment used in the northern part of the Estuary would also be used in this section so there would be no additional Mob / De Mob or equipment cost

2) Operating cost would remain the same $9,600 day

3) Dredge days per year (assume 6 day work week)

305 available days × 80% = 244 days/yr.
(up from 75%)

NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT Estuary / Lower Harbor & Bay
COMPUTATION Revised dredging cost estimate
COMPUTED BY Mark Otis CHECKED BY DATE 18 March 96

Southern 1/3 of Estuary and areas between Coggeshall Street Bridge and Hurricane Barrier

* Contamination levels are lower and water depths greater in this area so production rates can increase considerably. Two (2) dredges will be used, each operating for 2, 10 hour shifts per day.

Average dredging time per day per shift	8 hours
Average hourly production (increase 50%)	20.1 cy/hr
Daily production (2 shifts & 2 dredges)	643 cy/day

1) Mobilization / Demobilization which includes pipeline costs. The majority of material from this area will go to CDF 7 (0.5 mile) — $850,000

2) Dredge Equipment Cost: Assume the purchase price of the dredges due to the duration of the project. — $800,000

3) Operating cost $3000/shift/dredge — $12,000 day

4) Dredge days per year (assume 6 day work week)
305 available × 85% = 259 days/yr

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-13-96 SHEET 1 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING COST ESTIMATE - ALT. #3d

ANTICIPATED VOLUME OF DREDGED MATERIAL

ESTUARY = 527,777 yd³ - 151,200 = 376,577 yd³

FOOTPRINT CDFs A, B, C & 3

LOWER HARBOR = 398,146 yd³ - 31,200 = 366,946 yd³

CDF D

TOTAL = 743,525 yd³

NORTHERN 1/3 OF ESTUARY

1) MOBILIZATION = $850,000
2) EQUIPMENT = 800,000
3) OPERATING COST = $5,604,867

TOTAL $7,254,867

4) DREDGE DAYS = $\left(\frac{376,577}{3}\right)\left(\frac{1}{215}\right)\left(\frac{1}{229}\right)$ = 2.55 years

MIDDLE 1/3 OF ESTUARY

1) MOBILIZATION = $0
2) EQUIPMENT = $0
3) OPERATING COST = $5,604,867

INCLUDED IN NORTHERN 1/3

TOTAL $5,604,867

4) DREDGE DAYS $\left(\frac{376,577}{3}\right)\left(\frac{1}{215}\right)\left(\frac{1}{244}\right)$ = 2.39 yrs

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-13-96 SHEET 2 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING COST ESTIMATE - ALT #3d

SOUTHERN 1/3 OF ESTUARY

1) MOBILIZATION = $850,000
2) EQUIPMENT = $800,000
3) OPERATING COST = $4,707,213

TOTAL = $6,357,213

4) DREDGE DAYS

$$= \left(\frac{376,577}{3}\right)\left(\frac{1}{320}\right)\left(\frac{1}{259}\right) = 1.51 \text{ YEARS}$$

LOWER HARBOR

1) MOBILIZATION = $0
2) EQUIPMENT = $0
3) OPERATING COST = $13,760,550

TOTAL = $13,760,550

4) DREDGE DAYS $= 366,948 \left(\frac{1}{320}\right)\left(\frac{1}{259}\right) = 4.43$ year

TOTAL COST

= $32,977,497

DAYS = 10.88 years ✓

2.55
2.39
1.51
4.43
10.88

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-29-96 SHEET 1 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT WATER TREATMENT COST ESTIMATE ; ALTERNATIVE #3

WATER BALANCE

DREDGE FLOWRATE

SHIFT 1 — DREDGE #1 : 4 hours/SHIFT (60 MIN/HR)(2,100 GAL/HR) = 504,000 gal/SHIFT
DREDGE #2 : (4)(60)(2,100) = 504,000

SHIFT 2 — DREDGE 1 : (4)(60)(2,100) = 504,000
DREDGE 2 : (4)(60)(2,100) = 504,000

TOTAL = 2,016,000 gal/DAY

- ASSUME 6 DAYS/WK FOR DREDGING
- ASSUME 7 DAYS/WK FOR TREATMENT

∴ 2,016,000 (6/7) = 1,728,000 gal/DAY ⇐ REQUIRED TREATMENT PLANT FLOWRATE

- ASSUME WTP FLOWRATE = 350 gpm = 504,000 gal/day

∴ 1,728,000 gal/day (1/504,000) = 3.43 SAY 4 ← # OF WTP REQUIRED

EXISTING WTP WILL BE UTILIZED THEREFORE 3 NEW PLANTS [illegible] BE [illegible]

CAPITAL COST

A. FS COST [illegible]

- WATER TREATMENT = $3,64[illegible] = $3,901,332
- ASSUME COST OF 2 MM DAY PLANT IS 50% GREATER THAN 1 MM DAY WTP

∴ WATER TREATMENT = 3,901,332 [illegible]) = $5,851,998

B. ACOE COST
- $3,839,674 FOR 1 - 350 gpm WTP

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-29-96 SHEET 2 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT WATER TREATMENT COST ESTIMATE ; ALTERNATIVE #3

∴ COST = 3 x 3,839,674 = $11,519,022

- ASSUME CAPITAL COST FOR WTP = AVG OF FS & ACOE COST

∴ TOTAL CAPITAL COST = $\frac{(11,519,022 + 5,851,998)}{2}$ = $8,685,510

O+M COST

- ASSUME AVG OF FS + ACOE

A. FS

- 2,041/DAY (1.0715)(30 DAYS/MONTH) = 65,608/WTP ⇒ $131,216

B. ACOE

- $100,000/MONTH/WTP = $400,000

AVG O+M COST/MONTH = $265,608

TOTAL DREDGE MONTHS = 144 MONTHS

∴ O+M = $38,247,552

O+M PRESENT WORTH (12,78) = $25,315,736
(P/A @ 2 = 7.9427

TOTAL WATER TREATMENT = $34,001,246

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-29-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DEWATERING/WATER TREATMENT COST ESTIMATE: ALTERNATIVE # 3d

WATER BALANCE

- SAME AS ALTERNATIVE #3

CAPITAL COST

- WATER TREATMENT = $8,685,510 (SEE ALT. #3) AVG FS+ACOE

- DEWATERING = (4,921,000 - 3,641,000)(1.0715) = $1,371,520 FOR 1MM/DAY WPF (FS)

- TOTAL CAPITAL COST = 8,685,510 + (1,371,520)(1.5)

= $10,742,790

O+M COST

- WATER TREATMENT = $265,608 /MONTH (SEE ALT. #3)

- DEWATERING = (3874/DAY - 2.04/DAY)(30)(2)(1.0715) = $117,843 /2MM (2 x 1MM)

- PLATE & FRAME FILTER = (45)(1.0715)(743,525) = $35,850,917

TOTAL DREDGE MONTHS = 131

∴ O+M = ($265,608 + 117,843)(131) + 35,850,917 = $86,082,998

O+M PRESENT WORTH (11%, 7%) = $58,682,780
(P/A, 7%, 11) = 7.4987

TOTAL DEWATERING/WATER TREATMENT = $69,425,570

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-30-96 SHEET 1 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT MATERIAL HANDLING - ALTERNATIVE #3d

I. ESTUARY

1. COST/HAUL/DAY
   - 14 ROLLOFFS/TRIP/DAY @ $44.3/ROLLOFF/TRIP/DAY
   - 2 ROLL OFFS REQUIRED @ $16.20/ROLLOFF

∴ (14)(44.32) + (16.20)(2) = 652.88/HAUL/DAY

MAX. AMOUNT OF SEDIMENT REMOVED/DAY = 215 yd^3 N & M 1/3
320 yd^3 S 1/3 & LA

∴ COST/yd^3 = 652.88/215 = $3.03/$yd^3$
652.88/320 = $2.04/$yd^3$

2. CONTAINER & MATERIAL HANDLING
   - ASSUME 1 LOADER @ 8 hrs/DAY
   - 1.5 yd^3 LOADER WITH 1 OPERATOR MOVE 280 yd^3/DAY
   - $2.73/$yd^3$

3. CLEANUP VOLUME

= 376,577 yd^3

TOTAL EST COST = (3.03 + 2.73)(376,577)(2/3) + (2.04 + 2.73)(376,577)(1/3)
= $2,044,813

II LOWER HARBOR

1. COST/HAUL/DAY
   - $652.88/HAUL/DAY
   - MAX. AMOUNT OF SEDIMENT REMOVED/DAY = 320 yd^3

∴ COST/yd^3 = 652.88/320 = 2.04/yd^3

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-30-96 SHEET 2 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT MATERIAL HANDLING - ALTERNATIVE #3d

2. CONTAINER & MATERIAL HANDLING
- SAME AS ALT. #3 = $2.73/yd³

3. VOLUME = 366,948

TOTAL LHB = (2.04 + 2.73)(366,948) = $1,750,342

TOTAL = 2,044,813 + 1,750,342 = $3,795,155

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-29-96 SHEET 1 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT CDF CONSTRUCTION COST ESTIMATE

1) CDF A (FORMERLY 1B NORTH)

- CONSIST OF CONSTRUCTION AND CAPPING
- COSTS DO NOT INCLUDE HOME OFFICE OVERHEAD, PROFIT, OR BONDING
- DETAILS PROVIDED WITH ALTERNATIVE #10 ESTIMATE.

TOTAL COST CDF A = $5,276,701

2) CDF B (FORMERLY 1B SOUTH)

- SAME ASSUMPTIONS AS CDF A

TOTAL COST = $4,505,919

3) CDF C (FORMERLY 1A)

- SAME ASSUMPTION AS CDF A

TOTAL COST = $4,693,050

4) CDF D (FORMERLY CDF 7)

- ASSUMPTIONS PROVIDED WITH ALTERNATIVE #10 ESTIMATE

TOTAL COST = $12,695,648

5) ISLAND #1 CDF

- VOLUME OF ISLAND 1 = 354,000
- REQUIRED VOLUME = 435,000
- AS COST CAN BE FACTORED AT 1% INCREASE IN SIZE

$\therefore$ COST = $11,440,272(1.0115)\left(\frac{435,000}{354,000}\right) = \$15,063,106$

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-29-96 SHEET 2 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT CDF CONSTRUCTION COST ESTIMATE

TOTAL CAPITAL CDF COST = $2,184,424

6) O+M

- REPLACE ALL STONE PROTECTION EVERY 10 YEARS @ ($50.50)(1.0715) = $54.11/yd³
- ANNUAL INSPECTIONS + MONITORING @ $5,000/CDF/yr

CDF

A	4,678 yd³
B	4,475
C	6,065
D	0
ISLAND	$12{,}000\left(\frac{435{,}000}{359{,}000}\right) = 14{,}746$
	30,584

∴ (30,584)(54.11/yd³) = 1,654,900 ← EVERY 10 yrs

PRESENT WORTH = 1,654,900 [0.5083 + 0.2584 + 0.1314] + (5,000)(5)(12.4090)

(P/F, 7%, 10 yr) (P/F, 7%, 20 yr) (P/F, 7%, 30 yr) (P/A, 7%, 30)

= $1,796,991

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-13-95 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT CDF CONSTRUCTION - ALT. #3d

1. CDF A $5,276,701

- SEE ALT. #3

2. CDF B $4,505,919

- SEE ALT. #3

3. CDF C $4,643,050

- SEE ALT. #3

4. CDF D $12,695,648

- SEE ALT. #3

5. CDF 3

- BASED ON FS COST X ESCALATION FACTOR

- (1.0715)($5,186,705) = $5,557,554

6. O+M COST

CDF

	STORE
A	4,678 yd³
B	4495
C	6665
D	0
3	4,500 yd³
	20,338 yd³

20,338 (54.11) = $1,100,489

PRESENT WORTH = (1,100,489)(0.8981) + 25,000(42.4096)
= $1,298,574

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-29-96 SHEET 1 OF 3

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT AIR MONITORING COST ESTIMATE : ALTERNATIVE #3

- ESTIMATE BASED ON ACOE AIR MONITORING ESTIMATE (ATTACHMENT #1)

I. DREDGING

- DREDGING AREA #1 = NORTHERN + MIDDLE 1/3 OF ESTUARY
- DREDGING AREA #2 = SOUTHERN 1/3 OF ESTUARY & LOWER HARBOR
- 10 AIR SAMPLERS FOR DREDGE AREA #1
- 10 AIR SAMPLERS FOR DREDGE AREA #2
- ALL SAMPLES TO BE 24-hour DURATION
- FREQUENCY OF SAMPLING
  - DAILY FOR FIRST 6 MONTHS
  - 3 DAYS/WK FOR NEXT 6 MONTHS
  - 2 DAYS/WK AFTER 1 YEAR
- COST/EVENT/SAMPLER = $800

A. INITIAL 6 MONTHS

- 10 MONITORS SET-UP AROUND DREDGING AREAS 1 & 2
- 115 DREDGE DAYS

∴ (115)(10)(800) = $920,000

B. MONTHS 7-12

- 10 MONITORS AT DREDGING AREAS 1 & 2
- 26 WEEKS/6 MONTHS
- SAMPLE 3 DAYS/WK
- 78 SAMPLING EVENTS

∴ (78)(10)(800) = $624,000

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-29-96 SHEET 2 OF 3

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT AIR MONITORING COST ESTIMATE: ALTERNATIVE #3

c. MONTHS 13 – 144

- 10 MONITORS
- 2 DAYS/WEEK; 52 WEEK/YEAR
- 1,144 EVENTS

∴ (1,144)(10)(800) = $9,152,000

SUBTOTAL ONGOING = $18,696,000

II. CDFs

- ASSUME 6 AIR SAMPLERS/CDF (A, B, C, D, + EX. AND 1)
- FREQUENCY OF SAMPLING @ EACH CDF
  - 2 DAYS/WK DURING DREDGING
  - ½ DAY/MONTH DURING INITIAL SETTLING (1 YEAR)
  - 1 DAY/MONTH UNTIL FINAL CAP IS IN PLACE (2 YEARS)
- COST PER EVENT PER SAMPLER = $800 ~ some CDF events were in $540 – $640 range

A. CDF A

- APPROXIMATELY 56,000 yd³ CAPACITY
- TAKES APPROXIMATELY 57 WEEKS TO FILL
- 162 EVENTS

(57)(2) + (2)(2) + (1)(2)(2) = 162 EVENTS

B. CDF B

- APPROX. 51,000 yd³ CAPACITY
- TAKES APPROX. 52 WEEKS TO FILL

= (52)(2) + (2)(1) + (1)(2)(2) = 152 EVENTS

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-29-94 SHEET 3 OF 3

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT AIR MONITORING COST ESTIMATE - ALTERNATIVE #3

C. CDFC
- APPROX 93,800 yd^3 CAPACITY
- TAKE APPROXIMATELY 65 WEEKS TO FILL

$\therefore$ (65)(2) + (2)(12) + (1)(12)(2) = 178 EVENTS

D. CDF D
- APPROX. 435,300 yd^3
- TAKES APPROXIMATELY 75 WEEKS TO FILL

$\therefore$ (75)(2) + (2)(12) + (1)(12)(2) = 198

E. ISLAND 1 CDF
- APPROX. 354,000 yd^3 CAPACITY
- TAKES APPROXIMATELY 75 WEEKS TO FILL (SAME AS CDF D)

$\therefore$ 198 EVENTS

TOTAL EVENTS = 888 EVENTS

AIR MONITORING COST FOR CDF = (888)(6)(800) = $4,262,400

TOTAL AIR MONITORING COST = $4,262,400 + $10,696,000 = $14,958,400.

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NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT "Hot Spot" AIR MONITORING SUMMARY

COMPUTATION

COMPUTED BY MARK OTIS CHECKED BY DATE 3/18/96

The following line items are representative of the cost of individual sampling events during the "Hot Spot" dredging operation.

Item 3.2 Sample and Analyze, Offsite Monitors (8) around the dredging area: 75 events @ $6,348 = $476,100
÷ 8 = 800

Note: Offsite Monitors in the dredge area were sampled daily so the per diem cost of the sampling crew is included. Crew was on-site for the entire week with dredging conducted Monday-Friday. Samples were 8 hour samples.

The cost per event / per sampler = $793.50

Item 3.6 Sample and Analyze, On-Site Monitors (7) around the CDF: 120 events @ $5,687 = $682,440

Note: This sampling was conducted 2 days per week (~~back to back days~~), 24 hour samples separated by at least a day

The cost per event / per sampler = $812.43

Item 3.7 Sample & Analyze - Off Site Monitors around CDF (3): 57 events @ $1,653 = $94,221

Note: These were 24 hour samples taken once a week. The 1 day coincided with the on-site CDF sampling

The cost per event / per sampler = $551

Low then $800

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NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT "Hot Spot" AIR MONITORING SUMMARY

COMPUTATION

COMPUTED BY MARK OTIS CHECKED BY DATE 3/18/96

Item 3.8 Sample & Analyze - offsite Monitors (8) around the dredging area: 245 events @ $4,306 = $1,055,08

Note: Monitors were sampled daily, 8 hour samples.

The cost per event / per sampler = $538.25 ($80

TOTAL COST OF "Hot Spot" AIR MONITORING EFFORT $3,110,982

Air Monitoring Costs Associated with 1 year O&M effort are shown below:

On-site sample/analyze (5 monitors / 40 events)	$127,357
Off-site sample/analyze (3 monitors / 10 events) Note: sampling conducted at the same time as on-site sampling	$7,420
Equipment Rental (8 samplers and Met Station)	$16,430
Equipment Audits including MET station	$32,125
QA -	$9,502

Cost per event / per sampler (127,357 / 40) / 5 =	$636.79
Equipment Rental $5000 / 40 = $125 / 5 =	25.-
Equipment Audits (15,000 / 40) / 5 =	75.-
QA (4,000 / 40) / 5 =	20.-

Cost per event / per sampler = $756.79

NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT ESTUARY / LOWER HARBOR & BAY
COMPUTATION AIR MONITORING ESTIMATE
COMPUTED BY MACK OTIS CHECKED BY DATE 3/18/96

AIR MONITORING STATION LOCATIONS

CDF 1B (6 samplers): Approximately 75,000 c.y. capacity in this CDF which will take 1.5 years (76 weeks) to fill.

CDF 1B extension (6 samplers): Approximately 75,000 cy capacity in this CDF which will take 1.5 years (76 weeks) to fill.

CDF 1A (6 samplers): Approximately 75,000 cy capacity in this CDF which will take 1 year (52 weeks) to fill.

CDF 7 (6 samplers): Approximately 400,000 cy capacity in this CDF which will take ~~2 years~~ (~~104 weeks~~) to fill.
15 Months (69 weeks)

Dredging Area #1: Northern 2/3 of Estuary - 10 samplers

Dredging Area # 2: Southern 1/3 of Estuary and area south of Coggeshall Street - 10 samplers

NOTE: 1) All samples to be 24-hour duration
2) Frequency @ CDF locations:
- twice a week during dredging
- 2 times per month during initial settling (1 year)
- Monthly until final cap is in place (2 years)

3) Frequency during dredging:
- daily for the first six months
- 3 day/week for the next 6 months
- 2 day/week after 1 year

4) Cost per event per sampler = $800

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27 Sept 49

NEW ENGLAND DIVISION
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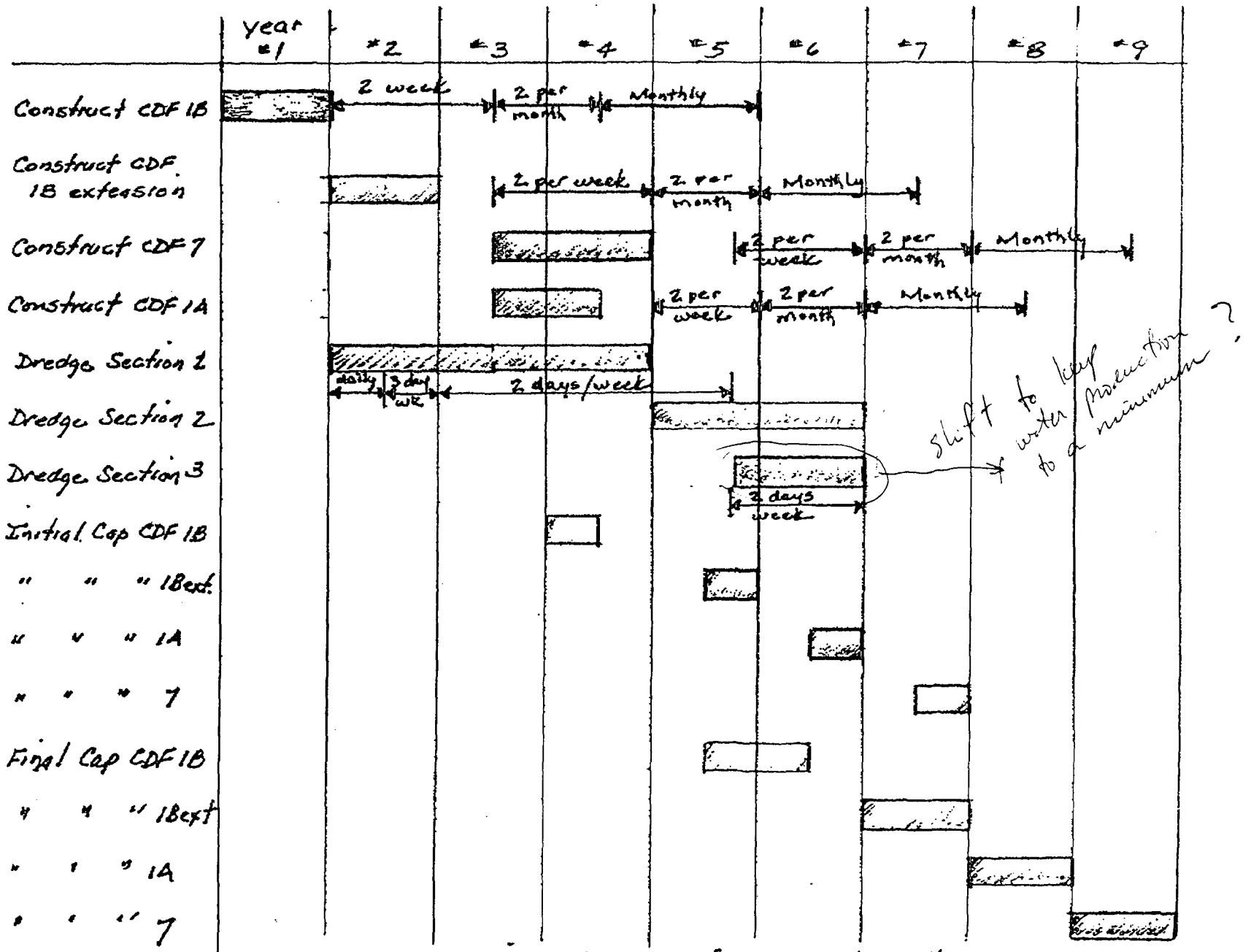
SUBJECT _____ PAGE 4 of 5
COMPUTATION _____
COMPUTED BY _____ DATE _____ CHECKED BY _____

PROJECT CONSTRUCTION SEQUENCE



Assumptions: 1) Dredge from North to South
2) Keep the most contaminated material in the estuary

NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT Estuary / Lower Harbor & Bay
COMPUTATION Air Monitoring Estimate
COMPUTED BY Mark Otis CHECKED BY DATE

Dredging

1) Initial 6 Months: 10 Monitors set-up around dredging Sections 1 & 2 with 115 dredging days.

115 events x 10 monitors x $800 per monitor = $920,000

2) Months 7 - 12: 10 Monitors @ dredging section 1 & 2 with 78 sampling events.

78 events x 10 monitors x $800 per monitor = $624,000

3) Months 13 - 60: 10 Monitors sampled @ one time with 416 sampling events.

416 x 10 x $800 = $3,328,000

SUBTOTAL (DREDGING) $4,872,000

CDF Locations

CDF 1B:	~~198~~ 198	events
CDF 1B extension:	198	"
CDF 1A:	146	"
CDF 7:	154	"

TOTAL EVENTS: 696 events

696 x 6 monitors x $800 monitor = $3,340,800

TOTAL AIR MONITORING $8,212,800

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-14-96 SHEET 1 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT AIR MONITORING - ALT #3d

I. DREDGING

A. INITIAL 6 MONTHS $920,000

- SAME AS ALT #3

B. MONTHS 6-12 $624,000

- SAME AS ALT #3

C. MONTHS 13-132

= (10 YEARS)(52 WKS/YR)(2)(10)(800) $8,320,000

SUBTOTAL DREDGING = $9,864,000

II CDFs

A. CDF A

- SAME AS ALT. #3 = 162 EVENTS

B. CDF B

- SAME AS ALT #3 = 152 EVENTS

C. CDF C

- SAME AS ALT #3 = 178 EVENTS

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-14-96 SHEET 2 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT AIR MONITORING - ALTERNATIVE #3d

D. CDF D

- SAME AS ALT. #3 = 198

E. CDF 3

- ASSUME THE SAME AS CDF C = 178 EVENTS

TOTAL EVENTS = 868

SUBTOTAL CDFs = 868 (6)(800) = $4,166,400

TOTAL AIR MONITORING COST = $14,030,400

Table 4
COST ESTIMATE: ALTERNATIVE - 4
DREDGE/SOLIDIFY/DISPOSE
NEW BEDFORD HARBOR

ACTIVITY	COST
I. DIRECT COSTS	
A. Dredging	$34,190,903
B. Dewater/Water Treatment	$71,824,100
C. Sediment Treatment	$82,253,575
D. Material Hauling	$5,111,521
E. CDF Construction	$42,184,424
F. Air Monitoring	$14,958,400
TOTAL DIRECT COST (TDC)	$250,522,923
II. INDIRECT COSTS	
A. Health & Safety (@ 5% of TDC) Level D Protection	$12,526,146
B. Legal, Administration, Permitting (@ 10% of TDC)	$25,052,292
C. Engineering (@ 10% of TDC)	$25,052,292
D. Services During Construction (@ 10% of TDC)	$25,052,292
E. Turnkey Contractor Fee (@ 15% of TDC)	$37,578,438
TOTAL INDIRECT COST (TIC)	$125,261,462
SUBTOTAL COSTS	$375,784,385
CONTINGENCY (@ 20% of TDC + TIC)	$75,156,877
TOTAL CAPITAL COST	$450,941,262
PRESENT WORTH - 1996 (@ 7% for 12 years)	$298,474,263
O&M COST (CDFs) (Present Worth @ 7% for 30 years upon completion)	$1,796,491
MONITORING PROGRAM (Present Worth @ 7% for 30 years)	$8,695,122
TOTAL COST - ALTERNATIVE - 4	$308,965,876

NEW BEDFORD HARBOR PHASE II
DREDGING VOLUME AND CDF STORAGE CAPACITIES
ALTERNATIVE - 4: Dredge/Solidify/Dispose

Volume of Contaminated Sediment

Estuary	527,777 yd^3
Lower Harbor	398,148 yd^3
Total Volume of Contaminated Sediment	**925,925 yd^3**

CDF Foot-Print Corrections

CDF A (Formerly CDF 1B - Northern Half)	26,800 yd^3
CDF B (Formerly CDF 1B - Southern Half)	30,100 yd^3
CDF C (Formerly CDF 1A)	38,000 yd^3
CDF D (Formerly CDF 7)	31,200 yd^3
Island 1	31,100 yd^3
Total Foot-Print Correction	**157,200 yd^3**

Dredging Volume

Dredging Volume = Contaminated Sediment Volume - Foot-Print Correction
Dredging Volume = 925,925 yd^3 - 157,200 yd^3 = **768,725 yd^3**

Required Storage Volume

Required CDF Storage Volume = Dredged Volume x Bulking Factor
Required CDF Storage Volume = 768,725 yd^3 x 1.314 = **1,010,105 yd^3**

CDF Storage Volumes

CDF A	56,400 yd^3
CDF B	50,700 yd^3
CDF C	93,800 yd^3
CDF D	435,300 yd^3
Island 1	435,300 yd^3
Total Available Storage Volume =	**1,071,500 yd^3**

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-13-96 SHEET 1 OF

CHKD. BY DATE OFS NO. DEPT. NO.

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DIRECT COSTS - ALTERNATIVE #4

A. DREDGING

- SAME AS ALT. #3

B. DEWATER/WATER TREATMENT

- COSTS BASED ALT. #3d ASSUMPTIONS + DETAILS
- VOLUME = 768,725 VS. 743525 yd^3 FOR #3d

$82,253,575

C. SEDIMENT TREATMENT

- $100/$yd^3$ (1.0715) = $107/$yd^3$
- 768,725 yd^3

D. MATERIAL HANDLING

- CALCULATIONS ATTACHED

E. CDF CONSTRUCTION

- SAME AS ALT #3

F. AIR MONITORING

- SAME AS ALT #3

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-30-96 SHEET 1 OF 2

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CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT MATERIAL HAULING – ALTERNATIVE #4

I. ESTUARY

1. COST/HAUL/DAY
   - 18 ROLL OFF TRIPS/DAY @ $41.36/ROLL-OFF (1.0715) = $44.32/ROLL-OFF
   - ROLLOFFS REQUIRED PER DAY = 2 @ 15.12(1.0715) = $16.20/ROLL-OFF
   -

$\therefore$ (18)(44.32) + (2)(16.20) = $830.16/HAUL/DAY

- MAX. AMOUNT OF SEDIMENT REMOVED PER DAY = 215 FOR NORTHERN & MIDDLE
  320 FOR SOUTHERN & LOWER HARBOR

215 (1.314) = 282.51 yd³/DAY
320 (1.314) = 420.48 yd³/DAY
↑ BULKING FACTOR

$\therefore$ COST/yd³ = 830.16/282.51 = $2.93/yd³ ← NORTHERN & MIDDLE 1/3's
830.16/420.48 = $1.97/yd³ ← SOUTHERN & LOWER HARBOR

2. CONTAINER & MATERIAL HANDLING
   - ASSUME LOADER @ 8 hrs/DAY
   - 1.5 yd³ LOADER WITH 1 OPERATOR MOVES 280 yd³/DAY
   - $2.55/yd³ (1.0715) = $2.73/yd³

3. CLEAN UP VOLUME

432,877 (1.314) = 568,800 yd³

TOTAL TRUCKING COSTS (T) = (568,800)(2/3)(2.93 + 2.73) + (568,800)(1/3)(1.97 + 2.73)
= $3,037,392

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-30-96 SHEET 2 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT MATERIAL HAULING - ALTERNATIVE #4

II. LOWER HARBOR

1. COST/HAUL/DAY
   - $830.16/HAUL/DAY (SEE ESTIMATE ASSUMPTIONS
   - HAUL AMOUNT OF SEDIMENT REMOVED PER DAY = 320 yd^3

   320 yd^3 (1.314) = 420.48 yd^3/DAY

   COST/yd^3 = $1.97/yd^3

2. CONTAINER + MATERIAL HANDLING
   - $2.73/yd^3 (SEE ESTIMATE ASSUMPTIONS)

3. CLEANUP VOLUME

   335,848 yd^3 (1.314) = 441,304 yd^3

   TOTAL TRUCKING COST (LHB) = (1.97 + 2.73)(441,304) = $2,074,129

TOTAL = 3,037,392 + 2,074,129 = $5,111,521

Table 5
COST ESTIMATE: ALTERNATIVE - 5
DREDGE/SOLVENT EXTRACTION/DISPOSE
NEW BEDFORD HARBOR

ACTIVITY	COST
I. DIRECT COSTS	
A. Dredging	$37,762,171
B. Dewater/Water Treatment	$75,264,615
C. Sediment Treatment	$314,136,922
D. Material Hauling	$2,462,221
E. CDF Construction	$17,338,698
F. Air Monitoring	$12,436,800
TOTAL DIRECT COST (TDC)	$459,401,427
II. INDIRECT COSTS	
A. Health & Safety (@ 5% of TDC) Level D Protection	$22,970,071
B. Legal, Administration, Permitting (@ 10% of TDC)	$45,940,143
C. Engineering (@ 10% of TDC)	$45,940,143
D. Services During Construction (@ 10% of TDC)	$45,940,143
E. Turnkey Contractor Fee (@ 15% of TDC)	$68,910,214
TOTAL INDIRECT COST (TIC)	$229,700,713
SUBTOTAL COSTS	$689,102,140
CONTINGENCY (@ 20% of TDC + TIC)	$137,820,428
TOTAL CAPITAL COST	$826,922,569
PRESENT WORTH COST - 1996 (@ 7% for 13 years)	$531,628,519
O&M COST (CDFs) (Present Worth @ 7% for 30 years upon completion)	$447,983
MONITORING PROGRAM (Present Worth @ 7% for 30 years)	$8,695,122
TOTAL COST - ALTERNATIVE - 5	$540,323,641

NEW BEDFORD HARBOR PHASE II
DREDGING VOLUME AND CDF STORAGE CAPACITIES
ALTERNATIVE - 5: Dredge/Solvent Extraction/Dispose

Volume of Contaminated Sediment

Estuary	527,777 yd^3
Lower Harbor	398,148 yd^3
Total Volume of Contaminated Sediment	**925,925 yd^3**

CDF Foot-Print Corrections

CDF C (Formerly CDF 1A)	38,000 yd^3
CDF D (Formerly CDF 7)	31,200 yd^3
Total Foot-Print Correction	**69,200 yd^3**

Dredging Volume

Dredging Volume = Contaminated Sediment Volume - Foot-Print Correction
Dredging Volume = 925,925 yd^3 - 69,200 yd^3 = **856,725 yd^3**

Required Storage Volume

Required CDF Storage Volume
= Dredged Volume x Volume Reduction x Bulking Factor
Required CDF Storage Volume = 856,725 yd^3 x 0.418 x 1.314 = **470,558 yd^3**

CDF Storage Volumes

CDF C	93,800 yd^3
CDF D	435,300 yd^3
Total Available Storage Volume =	**529,100 yd^3**

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY N. BRINKMAN DATE 6-3-96 SHEET 1 OF 3

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING COST ESTIMATE - ALTERNATIVE #5

ANTICIPATED VOLUME OF DREDGED MATERIAL

ESTUARY = 527,777 - 38,000 yd^3 = 489,777 yd^3
↑ COF FOOTPRINT CORRECTION FOR C

LOWER HARBOR = 398,148 - 31,200 = 366,948 yd^3
↑ COF FOOTPRINT CORRECTION FOR COF D

TOTAL = 856,725 yd^3

ASSUME ESTUARY + LOWER HARBOR WILL BE DIVIDED INTO 3 SECTIONS WITH A DIFFERENT DREDGE PRODUCTION RATES ASSIGNED TO EACH. THE 3 SECTIONS ARE:

- NORTHERN 1/3 OF ESTUARY
- MIDDLE 1/3 OF ESTUARY
- SOUTHERN 1/3 OF ESTUARY AND ALL AREAS BETWEEN COGGESHALL ST. BRIDGE AND HURRICANE BARRIER.

ALL ASSUMPTIONS FOR DREDGING RATES + COST BASED ON ACOE COST ESTIMATE (SEE ATTACHMENT #1)

ASSUME ESTUARY VOLUME IS DIVIDED INTO 3 EQUAL VOLUMES

ASSUME THAT DUE TO WATER TREATMENT CONSTRAINTS THAT TOTAL DREDGE TIME PER DAY DOES NOT EXCEED 16 HOURS.

NORTHERN 1/3

1) MOBILIZATION = *850,000
2) DREDGE EQUIPMENT COST = *800,000
3) OPERATING COST = 7,289,704

→ $8,939,704

- 9,600/DAY
- 215 yd^3/DAY

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 6-3-96 SHEET 2 OF 3

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING COST ESTIMATE - ALTERNATIVE #5

4) DREDGE DAYS $= \left(\frac{489{,}777\ yd^3}{3}\right)\left(\frac{1\ DAY}{215\ yd^3}\right)\left(\frac{1\ YEAR}{229\ DAYS}\right) = 3.32$ YEARS

MIDDLE 1/3

1. MOBILIZATION = $0 → INCLUDED IN NORTHERN 1/3 COST
2. DREDGE EQUIPMENT COST = $0
3. OPERATING COST = $7,289,704
   - $9,600/DAY
   - 215 yd³/DAY

TOTAL = $7,289,704

4. DREDGE DAYS $= \left(\frac{489{,}777}{3}\right)\left(\frac{1}{215}\right)\left(\frac{1}{244}\right) = 3.11$ YEARS

SOUTHERN 1/3

1. MOBILIZATION = $850,000
2. DREDGE EQUIPMENT COSTS = $800,000
3. OPERATING COST = 6,122,213
   - $12,000/DAY
   - 320 yd³/DAY

TOTAL = $7,772,213

4. DREDGE DAYS $= \left(\frac{489{,}777}{3}\right)\left(\frac{1}{320}\right)\left(\frac{1}{259}\right) = 1.97$ YEARS

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 6-3-96 SHEET 3 OF 3

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING COST ESTIMATE + ALTERNATIVE #5

LOWER HARBOR

1. MOBILIZATION = $0
2. DREDGE EQUIPMENT COST = $0
3. OPERATING COST = $13,760,550
   - 12,000/DAY
   - 320 yd³/DAY

TOTAL = $13,760,550

4. DREDGE DAYS = $\frac{366,988 \text{ yd}^3}{320 \text{ yd}^3/\text{DAY}} \left(\frac{1}{259}\right) = 4.43$ YEARS

TOTAL COST

NORTHERN 1/3	8,939,704
MIDDLE 1/3	7,289,704
SOUTHERN 1/3	7,772,213
LOWER HARBOR	13,760,550
	$37,762,171

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 6-3-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DEWATERING/WATER TREATMENT - ALTERNATIVE #5

WATER BALANCE

- SAME AS ALTERNATIVE #3

CAPITAL COSTS

- SAME AS ALT. 3d = $10,742,790

O+M COST

- SAME AS ALT. #3d = $383,451/MONTH

- TOTAL DREDGE TIME = 12.83 YEARS ≈ 154 MONTHS

- PLATE + FRAME FILTER = (45)(1.0715)(856,725) = $41,309,138

∴ O+M = (383,451)(154) + 41,309,138 = $100,360,592

O+M PRESENT WORTH (13,7%) = $64,521,825
(P/A, 7%, 13) = 8.3577

TOTAL COST = $75,264,615

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-30-96 SHEET 1 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT MATERIAL HANDLING - ALTERNATIVE #5

I. ESTUARY

1. COST/HAUL/DAY

- 8 ROLLOFFS TRIPS/DAY @ $44.32/ROLLOFF
- ROLLOFFS REQUIRED = 1 @ $16.20/ROLLOFF

$\therefore$ (8)(44.32) + (1)(16.20) = $370.76

- MAX. AMOUNT OF SEDIMENT REMOVED/DAY = 215 yd^3 ← NORTHERN & MIDDLE 1/3's
  320 yd^3 ← SOUTHERN 1/3 & LN

- ASSUME 41.8% VOLUME REDUCTION DUE TO TREATMENT

(215)(1.314)(0.418) = 118 yd^3/DAY
(320)(1.314)(0.418) = 175 yd^3/DAY

$\therefore$ COST/yd^3 = (370.76)/(118) = $3.14
(370.76)/(175) = $2.11

2. CONTAINER + MATERIAL HANDLING
- SAME AS ALTERNATIVE #4 = 2.73/yd^3

3. CLEANUP VOLUME

489,777 yd^3 (1.314)(0.418) = 269,011 yd^3

TOTAL COST EST = (269,011)(2/3)(3.14 + 2.73) + (269,011)(1/3)(2.11 + 2.73)
= $1,486,734

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-30-96 SHEET 2 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT MATERIAL HAULING - ALTERNATIVE #5

II. LOWER HARBOR

A. COST/HAUL/DAY
- $370.76 /HAUL/DAY
- MAX. AMOUNT OF SEDIMENT REMOVED/DAY = 320 yd³

(320)(1.314)(0.416) = 176 yd³/DAY

∴ COST/yd³ = (370.76)/176 = $2.11

B. CONTAINER & MATERIAL HANDLING
- $2.73/yd³

C. CLEANUP VOLUME

356,948 yd³ (1.314)(0.416) = 201,547 yd³

TOTAL COST = (2.11 + 2.73)(201,547) = $975,887

TOTAL = 1,486,734 + 975,887 = $2,462,221

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FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 6-3-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT CDF CONSTRUCTION COST ESTIMATE - ALT. #5

1) CDF C - $4,643,050

2) CDF D - $12,695,648

TOTAL $17,338,698

3) O+M

(6,665 + 0)(54.11) = $360,643
C EVERY 10 YEARS

PRESENT WORTH = 360,643 (0.5083 + 0.2584 + 0.1314) + 5,000 (2)(12.4090)

= $447,983

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 6-3-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT AIR MONITORING - ALT. #5

I. DREDGING

A. INITIAL 6 MONTHS $920,000

- SAME AS ALT #3

B. MONTHS 7-12 $624,000

- SAME AS ALT #3

C. MONTHS 13-154

= (1.136)(10)(600) = $9,088,000

SUBTOTAL DREDGING = $10,632,000

II. CDFs

A. CDF C

- 178 EVENTS

B. CDF D

- 198 EVENTS

∴ COST = (178 + 198)(6)(600) = $1,804,800

TOTAL = 10,632,000 + 1,804,800 = $12,436,800

Table 6
COST ESTIMATE: ALTERNATIVE - 6
DREDGE/INCINERATE/DISPOSE
NEW BEDFORD HARBOR

ACTIVITY	COST
I. DIRECT COSTS	
A. Dredging	$37,762,171
B. Dewater/Water Treatment	$75,264,615
C. Sediment Treatment	$350,431,367
D. Material Hauling	$2,462,211
E. CDF Construction	$17,338,698
F. Air Monitoring	$12,436,800
TOTAL DIRECT COST (TDC)	$495,695,862
II. INDIRECT COSTS	
A. Health & Safety (@ 5% of TDC) Level D Protection	$24,784,793
B. Legal, Administration, Permitting (@ 10% of TDC)	$49,569,586
C. Engineering (@ 10% of TDC)	$49,569,586
D. Services During Construction (@ 10% of TDC)	$49,569,586
E. Turnkey Contractor Fee (@ 15% of TDC)	$74,354,379
TOTAL INDIRECT COST (TIC)	$247,847,931
SUBTOTAL COSTS	$743,543,793
CONTINGENCY (@ 20% of TDC + TIC)	$148,708,759
TOTAL CAPITAL COST	$892,252,551
PRESENT WORTH COST - 1996 (@ 7% for 13 years)	$573,629,165
O&M COST (CDFs) (Present Worth @ 7% for 30 years upon completion)	$447,983
MONITORING PROGRAM (present worth @ 7% for 30 years)	$8,695,122
TOTAL COST - ALTERNATIVE - 6	$582,324,287

NEW BEDFORD HARBOR PHASE II
DREDGING VOLUME AND CDF STORAGE CAPACITIES
ALTERNATIVE - 6: Dredge/Incineration/Dispose

Volume of Contaminated Sediment

Estuary	527,777 yd^3
Lower Harbor	398,148 yd^3
Total Volume of Contaminated Sediment	**925,925 yd^3**

CDF Foot-Print Corrections

CDF C (Formerly CDF 1A)	38,000 yd^3
CDF D (Formerly CDF 7)	31,200 yd^3
Total Foot-Print Correction	**69,200 yd^3**

Dredging Volume

Dredging Volume = Contaminated Sediment Volume - Foot-Print Correction
Dredging Volume = 925,925 yd^3 - 69,200 yd^3 = **856,725 yd^3**

Required Storage Volume

Required CDF Storage Volume
= Dredged Volume x Volume Reduction x Bulking Factor
Required CDF Storage Volume = 856,725 yd^3 x 0.418 x 1.314 = **470,558 yd^3**

CDF Storage Volumes

CDF C	93,800 yd^3
CDF D	435,300 yd^3
Total Available Storage Volume =	**529,100 yd^3**

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-13-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DIRECT COSTS - ALTERNATIVE # 6

A. DREDGING

- SAME AS ALT #5

B. DEWATER/WATER TREATMENT

- SAME AS ALT #5

C. SEDIMENT TREATMENT $350,431,367

- $340/yd³ (1.0715) = $364.31/yd³
- $107/yd³ STABILIZATION
- 0.418 VOLUME REDUCTION
- VOLUME OF SEDIMENT = 856,725 yd³

D. MATERIAL HANDLING

- SAME AS ALT #5

E. CDF CONSTRUCTION

- SAME AS ALT #5

F. AIR MONITORING

- SAME AS ALT #5

Table 7
COST ESTIMATE: ALTERNATIVE - 7
DREDGE/CAP ESTUARY
NEW BEDFORD HARBOR

ACTIVITY	COST
I. DIRECT COSTS	
A. Dredging > 500 ppm	$4,782,279
B. Capping 50 ppm < x < 500 ppm	$19,558,995
C. Water Treatment	$12,767,374
D. CDF Construction	$9,782,620
E. Air Monitoring	$3,371,200
TOTAL DIRECT COST (TDC)	$50,262,468
II. INDIRECT COSTS	
A. Health & Safety (@ 5% of TDC) Level D Protection	$2,513,123
B. Legal, Administration, Permitting (@ 10% of TDC)	$5,026,247
C. Engineering (@ 10% of TDC)	$5,026,247
D. Services During Construction (@ 10% of TDC)	$5,026,247
E. Turnkey Contractor Fee (@ 15% of TDC)	$7,539,370
TOTAL INDIRECT COST (TIC)	$25,131,234
SUBTOTAL COSTS	$75,393,702
CONTINGENCY (@ 20% of TDC + TIC)	$15,078,740
TOTAL CAPITAL COST	$90,472,442
PRESENT WORTH - 1996 (@ 7% for 6 years)	$71,872,816
O&M COST (Cap and CDFs) (Present Worth @ 7% for 30 years upon completion)	$2,037,482
MONITORING PROGRAM (Present Worth @ 7% for 30 years)	$8,695,122
TOTAL COST - ALTERNATIVE - 7	$82,605,420

NEW BEDFORD HARBOR PHASE II
DREDGING VOLUME AND CDF STORAGE CAPACITIES
ALTERNATIVE - 7: Dredge/Cap Estuary

Volume of Contaminated Sediment

Estuary	112,000 yd^3
Total Volume of Contaminated Sediment	**112,000 yd^3**

CDF Foot-Print Corrections

CDF A (Formerly CDF 1B - Northern Half)	26,800 yd^3
1/2 CDF B (Formerly CDF 1B - Southern Half)	15,050 yd^3
Total Foot-Print Correction	**41,850 yd^3**

Dredging Volume

Dredging Volume = Contaminated Sediment Volume - Foot-Print Correction
Dredging Volume = 112,000 yd^3 - 41,850 yd^3 = **70,150 yd^3**

Required Storage Volume

Required CDF Storage Volume = Dredged Volume x Bulking Factor
Required CDF Storage Volume = 70,150 yd^3 x 1.4 = **98,210 yd^3**

CDF Storage Volumes

CDF A*	56,400 yd^3
CDF B	50,700 yd^3
Total Available Storage Volume =	**107,100 yd^3**

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 6-4-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING ESTIMATE - ALT #7

ANTICIPATED VOLUME OF DREDGED MATERIAL

ESTUARY = 112,000 − 26,800 − (½)(30,100) = 70,150 yd³

COFA FOOTPRINT ½ COF6 FOOTPRINT

LOWER HARBOR = 0 yd³

TOTAL = 70,150 yd³

ASSUME DREDGING RATES AND COSTS BASED ON ACOE COST ESTIMATE

DREDGING RATE = 215 yd³/DAY

1. MOBILIZATION = $850,000
2. DREDGE EQUIPMENT COST = $800,000
3. OPERATING COST = $3,132,279
   - $9,600/DAY
   - 215 yd³/DAY

TOTAL = $4,782,279

4. DREDGE DAYS = $(70,150)\left(\frac{1}{215}\right)\left(\frac{1}{229}\right) = 1.42$ yrs

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 6-4-96 SHEET 1 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT CAPPING - ALT. #7

1. GEOTEXTILE PLACEMENT

$$\$2{,}500{,}000\,(1.0715)\left(\frac{77+29}{77}\right) = \$3{,}513{,}665$$

(29 = COFI ACRES; 77 = TOTAL ACRES TO CAP (FS))

2. SAND PLACEMENT

$$\$7{,}480{,}000\,(1.0715)\left(\frac{77+29}{77}\right) = \$10{,}512{,}946$$

3. STONE PLACEMENT = $0

SUBTOTAL = $14,026,631

CONTINGENCY (30%) = 4,207,989

SUBTOTAL = $18,234,620

4. HYDRAULIC CONTROL

$975{,}000\,(1.0715) = \$1{,}044{,}713$

5. SURVEY & MONITORING

$261{,}000\,(1.0715) = \$279{,}662$

CAPPING TOTAL = $19,558,995

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 6-4-96 SHEET 2 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT CAPPING - ALT #7

O&M

1. MOB + DEB $130,000 (1.0715) = $139,295

2. SAND MATERIAL
   - 10% EVERY 5 YEARS = $206,213 \left(\frac{77+24}{77}\right)(1.0715)$ = $289,827

3. SAND PLACEMENT = $62,438 \left(\frac{77+24}{77}\right)(1.0715)$ = $87,755
   - EVERY 5 YRS

SUBTOTAL = $516,877

4. HYDROGRAPHIC SURVEY
   225,000 (1.0715) = 24,109

5. MONITOR CAP THICKNESS
   - 4,000 (1.0715) = 4286

O&M EVERY 5 YRS = $516,877
O&M EVERY YEAR = 28,395

O&M PRESENT WORTH

= 516,877 (.7130 + 0.5083 + 0.3624 + 0.2584 + 0.1840 + 0.1319) +

28,395 (12.6030)

= $1,467,619

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 6-9-94 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT WATER TREATMENT - ALT #7

WATER BALANCE

- SEE ALT. #3

CAPITAL COST

- $8,685,510

- SEE ALT #3

O&M COST

- $265,608/MONTH (SEE ALT #3)
- 1.42 YRS TO DREDGE ≈ 17 MONTHS

∴ O&M = $4,515,336

PRESENT WORTH (2,78) = $4,081,864
(P/A, 78, 2) = 1.8080

TOTAL WATER TREATMENT = $12,767,374

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BAUKMAN DATE 6-4-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT CDF CONSTRUCTION - ALT #7

1) CDF A = $5,276,701

- SEE ALT #10

2) CDF B = $4,505,919

- SEE ALT. #10

TOTAL = $9,782,620

O+M

- REPLACE STONE PROTECTION EVERY 10 YEARS
- ANNUAL INSPECTIONS @ $5,000/CDF/YR

CDF	STONE
A	4,678
B	4,495

9,173 yd³ @ $54.11/yd³ = $496,351 @ EVERY 10 YRS

PRESENT WORTH = $496,351 (.5083 + .2584 + .1314) + 5,000(2)(12.4090)

= $569,863

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 6-4-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT AIR MONITORING - ALT #7

I. DREDGING

A. INITIAL 6 MONTHS — $920,000
- SEE ALT #3

B. MONTHS 7-12 — 624,000
- SEE ALT #3

C. MONTHS 13-17 — 320,000
- SEE ALT #3

(40)(10)(800) = $320,000

SUBTOTAL = $1,864,000

II. CDFs

A. CDF A
- 162 EVENTS (SEE ALT #3)

B. CDF B
- 152 EVENTS (SEE ALT #3)

CDF COSTS = (162+152)(6)(800) = $1,507,200

TOTAL AIR MONITORING = $3,371,200

Table 8
COST ESTIMATE: ALTERNATIVE - 8
DREDGE /DISPOSE
NEW BEDFORD HARBOR

ACTIVITY	COST
I. DIRECT COSTS	
A. Dredging (>50 ppm)	$17,103,954
B. Water Treatment	$22,611,736
C. CDF Construction	$12,695,648
D. Air Monitoring	$6,238,400
TOTAL DIRECT COST (TDC)	$58,649,738
II. INDIRECT COSTS	
A. Health & Safety (@ 5% of TDC) Level D Protection	$2,932,487
B. Legal, Administration, Permitting (@ 10% of TDC)	$5,864,974
C. Engineering (@ 10% of TDC)	$5,864,974
D. Services During Construction (@ 10% of TDC)	$5,864,974
E. Turnkey Contractor Fee (@ 15% of TDC)	$8,797,461
TOTAL INDIRECT COST (TIC)	$29,324,869
SUBTOTAL COSTS	$87,974,607
CONTINGENCY (@ 20% of TDC + TIC)	$17,594,921
TOTAL CAPITAL COST	$105,569,528
PRESENT WORTH - 1996 (@ 7% for 6 years)	$83,866,193
O&M COST (CDFs) (Present Worth @ 7% for 30 years upon completion)	$62,045
MONITORING PROGRAM (Present Worth @ 7% for 30 years)	$8,695,122
TOTAL COST - ALTERNATIVE - 8	$92,623,360

NEW BEDFORD HARBOR PHASE II
DREDGING VOLUME AND CDF STORAGE CAPACITIES
ALTERNATIVE - 8: Dredge/Dispose

Volume of Contaminated Sediment

Estuary	232,000 yd^3
CDF 1 Foot-Print	52,000 yd^3
Lower Harbor	48,000 yd^3
Total Volume of Contaminated Sediment	**332,000 yd^3**

CDF Foot-Print Corrections

No Corrections

Dredging Volume

Dredging Volume = Contaminated Sediment Volume - Foot-Print Correction
Dredging Volume = 332,000 yd^3 - 0 yd^3 = **332,000 yd^3**

Required Storage Volume

Required CDF Storage Volume = Dredged Volume x Bulking Factor
Required CDF Storage Volume = 332,000 yd^3 x 1.4 = **464,800 yd^3**

CDF Storage Volumes

CDF D	435,300 yd^3
Total Available Storage Volume =	**435,300 yd^3**

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 6-4-96 SHEET 1 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING - ALT #8

ANTICIPATED VOLUME OF DREDGED MATERIAL

ESTUARY = 232,000 yd^3 + 52,000 yd^3 (CDF 1) = 284,000 yd^3

LOWER HARBOR = 48,000 yd^3

TOTAL VOLUME = 332,000 yd^3

- UTILIZE SAME ASSUMPTIONS AS IN ALT #3

NORTHERN 1/3

1. MOBILIZATION	$850,000
2. EQUIPMENT	800,000
3. OPERATING COST	$4,226,977
	$5,876,977

4. DREDGE DAYS = $\left(\frac{284,000}{3}\right)\left(\frac{1}{215}\right)\left(\frac{1}{229}\right)$ = 1.92

MIDDLE 1/3

1. MOBILIZATION	$0
2. EQUIPMENT	$0
3. OPERATING COST	$4,226,977
	4,226,977

4. DREDGE DAYS = $\left(\frac{284,000}{3}\right)\left(\frac{1}{215}\right)\left(\frac{1}{244}\right)$ = 1.80 years

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-4-96 SHEET 2 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING - ALT #8

SOUTHERN 1/3

1. MOBILIZATION	$850,000
2. EQUIPMENT	$800,000
3. OPERATING COST	$3,550,000
	$5,200,000

4. DREDGE DAYS = $\left(\frac{284,000}{3}\right)\left(\frac{1}{320}\right)\left(\frac{1}{259}\right)$ = 1.14 years

LOWER HARBOR

1. MOBILIZATION	$0
2. EQUIPMENT	$0
3. OPERATING COSTS	$1,800,000
	$1,800,000

4. DREDGE DAYS = $48,000\left(\frac{1}{320}\right)\left(\frac{1}{259}\right)$ = 0.58 years

TOTAL COST = $17,103,954

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-4-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT WATER TREATMENT - ALT #8

WATER BALANCE

SEE ALT #3

CAPITAL COST

- SEE ALT #3 $8,685,510

O&M COST

- $265,608/MONTH (SEE ALT #3)
- 66 MONTHS

∴ O&M = $ 17,520,128

PRESENT WORTH (6, 7%) = $ 13,926,226
(P/A, 7%, 6) = 4.7665

TOTAL WATER TREATMENT = 22,611,736

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-4-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT AIR MONITORING - ALT #8

I. DREDGING

A. INITIAL 6 MONTHS — $ 920,000
- SEE ALT #3

B. MONTHS 7-12 — $ 624,000
- SEE ALT #3

C. MONTHS 13-66 — $ 3,744,000
- SEE ALT #3

(108)(10)(600)

SUBTOTAL $ 5,288,000

II. CDFs

A. CDF 7 = $ 950,400
- 198 EVENTS (198)(6)(600)
- SEE ALT #3

TOTAL AIR MONITORING COST = $ 6,238,400

Table 9
COST ESTIMATE: ALTERNATIVE - 9/9A
DREDGE/INCINERATE or SOLVENT EXTRACT/DISPOSE
NEW BEDFORD HARBOR

ACTIVITY	COST (Incineration)	(Solvent Extr.)
I. DIRECT COSTS		
A. Dredging	$17,103,954	$17,103,954
B. Dewater/Water Treatment	$35,137,837	$35,137,837
C. Sediment Treatment	$45,812,032	$46,451,872
D. Material Hauling	$376,691	$376,691
E. CDF Construction	$12,695,648	$12,695,648
F. Air Monitoring	$6,238,400	$6,238,400
TOTAL DIRECT COST (TDC)	$117,364,562	$118,004,402
II. INDIRECT COSTS		
A. Health & Safety (@ 5% of TDC) Level D Protection	$5,868,228	$5,900,220
B. Legal, Administration, Permitting (@ 10% of TDC)	$11,736,456	$11,800,440
C. Engineering (@ 10% of TDC)	$11,736,456	$11,800,440
D. Services During Construction (@ 10% of TDC)	$11,736,456	$11,800,440
E. Turnkey Contractor Fee (@ 15% of TDC)	$17,604,684	$17,700,660
TOTAL INDIRECT COST (TIC)	$58,682,281	$59,002,201
SUBTOTAL COSTS	$176,046,843	$177,006,603
CONTINGENCY (@ 20% of TDC + TIC)	$35,209,369	$35,401,321
TOTAL CAPITAL COST	$211,256,212	$212,407,924
PRESENT WORTH - 1996 (@ 7% for 6 years)	$167,825,456	$168,740,395
O&M COST (CDFs) (Present Worth @ 7% for 30 years upon completion)	$62,045	$62,045
MONITORING PROGRAM (Present Worth @ 7% for 30 years)	$8,695,122	$8,695,122
TOTAL COST - ALTERNATIVE - 9/9A	$176,582,623	$177,497,562

NEW BEDFORD HARBOR PHASE II
DREDGING VOLUME AND CDF STORAGE CAPACITIES
ALTERNATIVE - 9: Dredge/Solvent Extraction/Dispose

Volume of Contaminated Sediment

Estuary	232,000 yd^3
CDF 1 Foot-Print	52,000 yd^3
Lower Harbor	48,000 yd^3
Total Volume of Contaminated Sediment	**332,000 yd^3**

CDF Foot-Print Corrections

No Corrections

Dredging Volume

Dredging Volume = Contaminated Sediment Volume - Foot-Print Correction
Dredging Volume = 332,000 yd^3 - 0 yd^3 = **332,000 yd^3**

Required Storage Volume

Required CDF Storage Volume
= Dredged Volume x Volume Reduction and/or x Bulking Factor

Required CDF Storage Volume for Treated Sediment = 112,000 yd^3 x 0.418 x 1.4 =	46,816 yd^3
Required CDF Storage Volume for Dredged Sediment = 220,000 x 1.4 =	308,000 yd^3
Required Storage Volume	**354,816 yd^3**

CDF Storage Volumes

CDF D	435,300 yd^3
Total Available Storage Volume =	**435,300 yd^3**

NEW BEDFORD HARBOR PHASE II
DREDGING VOLUME AND CDF STORAGE CAPACITIES
ALTERNATIVE - 9A: Dredge/Incineration/Dispose

Volume of Contaminated Sediment

Estuary	232,000 yd^3
CDF 1 Foot-Print	52,000 yd^3
Lower Harbor	48,000 yd^3
Total Volume of Contaminated Sediment	**332,000 yd^3**

CDF Foot-Print Corrections

No Corrections

Dredging Volume

Dredging Volume = Contaminated Sediment Volume - Foot-Print Correction
Dredging Volume = 332,000 yd^3 - 0 yd^3 = **332,000 yd^3**

Required Storage Volume

Required CDF Storage Volume
= Dredged Volume x Volume Reduction and/or x Bulking Factor

Required CDF Storage Volume for Treated Sediment = 112,000 yd^3 x 0.418 x 1.4 =	46,816 yd^3
Required CDF Storage Volume for Dredged Sediment = 220,000 x 1.4 =	308,000 yd^3
Required Storage Volume	**354,816 yd^3**

CDF Storage Volumes

CDF D	435,300 yd^3
Total Available Storage Volume =	**435,300 yd^3**

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-19-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DIRECT COSTS - ALTERNATIVES 9/9A

A. DREDGING $17,103,954

- SAME AS ALT #8

B. DEWATER/WATER TREATMENT $35,137,837

- CALC. ATTACHED

C. SEDIMENT TREATMENT

- 112,000 yd³
- COSTS BASED ASSUMPTIONS & DETAILS PROVIDED IN ALT #5 & 6 FOR SOLVENT EXTRACTION & INCINERATION, RESPECTIVELY

D. MATERIAL HAULING $376,691

- CALC. ATTACHED

E. CDF CONSTRUCTION $12,695,648

- CDF 7
- SEE ALT. #3 AND ACOE COST ESTIMATE

F. AIR MONITORING $6,238,400

- SAME AS ALT #8

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-14-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DEWATER/WATER TREATMENT - ALTERNATIVE #9/9A

I. CAPITAL COST $10,742,790

- SAME AS ALT. #3d

II O&M COST = $24,395,270

- $383,451/MONTH (SAME AS ALT #3.d)
- 66 MONTHS

- $48.22/yd³ FOR PLATE & FRAME FILTER
- 112 yd³ TO BE DEWATERED & TREATED

O&M COST = $30,708,406

PRESENT WORTH = $24,395,270
(@7%, 6 yrs)

TOTAL = $35,138,060

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-22-96 SHEET 1 OF

CHKD. BY DATE OFS NO. DEPT. NO.

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT MATERIAL HAULING - ALTERNATIVE # SW-9

1. COST/HAUL/DAY
   - 8 ROLLOFF TRIPS/DAY @ $44.32/TRIP/ROLLOFF
   - # OF ROLLOFFS REQUIRED PER DAY = 8/12 HRS = 1
   - COST OF ROLLOFF = $16.20/ROLLOFF

$\therefore$ (8)(44.32) + (1)(16.20) = $370.76/HAUL/DAY

- MAX. AMOUNT OF SEDIMENT REMOVED PER DAY = 215 yd^3

- VOLUME REDUCTION DUE TO INCINERATION: 41.8%
- BULKING FACTOR = 1.316

215 yd^3 (.418)(1.316) = 118 yd^3

$\therefore$ COST/yd^3 = 370.76/118 = $3.14/yd^3

2. CONTAINER & MATERIAL HANDLING
   - ASSUME LOADER @ 8 HRS/DAY
   - 1.5 yd^3 LOADER WITH 1 OPERATOR HOLDS 280 yd^3/DAY
   - $2.73/yd^3

3. SEDIMENT VOLUME

112,000 yd^3(0.418)(1.316) = 61,610 yd^3

4. TRUCKING COSTS
   - 61,610 yd^3
   - DISTANCE = 1,000 FT = 0.38 MILES RT
   - COST/RT = $4.55(1.0715) = $4.88/RT/TRUCK
   - # TRIPS = 61,640/20 = 3,082
     (20 = # OF TRUCKS)

TOTAL COST = (3,082)(4.88) = $15,040

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BLINKMAN DATE 5-22-96 SHEET 2 OF

CHKD. BY DATE OFS NO. DEPT. NO.

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT MATERIAL HAULING - ALTERNATIVE #SW9

TOTAL TRUCKING COST = [(3.14 + 2.73)61,610] + 15,040

= $376,895

Table 10
COST ESTIMATE: ALTERNATIVE - 10
DREDGE/DISPOSE
NEW BEDFORD HARBOR

ACTIVITY	COST
I. DIRECT COSTS	
A. Dredging	$22,320,348
B. Dewater/Water Treatment	$27,123,051
C. CDF Construction	$27,121,318
D. Air Monitoring	$10,472,000
TOTAL DIRECT COST (TDC)	$87,036,717
II. INDIRECT COSTS	
A. Health & Safety (@ 5% of TDC) Level D Protection	$4,351,836
B. Legal, Administration, Permitting (@ 10% of TDC)	$8,703,672
C. Engineering (@ 10% of TDC)	$8,703,672
D. Services During Construction (@ 10% of TDC)	$8,703,672
E. Turnkey Contractor Fee (@ 15% of TDC)	$13,055,508
TOTAL INDIRECT COST (TIC)	$43,518,359
SUBTOTAL COSTS	$130,555,076
CONTINGENCY (@ 20% of TDC + TIC)	$26,111,015
TOTAL CAPITAL COST	$156,666,091
PRESENT WORTH - 1996 (@ 7% for 8 years)	$116,937,529
O&M COST (CDFs) (Present Worth @ 7% for 30 years upon completion)	$1,017,846
MONITORING PROGRAM (Present Worth @ 7% for 30 years)	$8,695,122
TOTAL COST - ALTERNATIVE - 10	$126,650,497

NEW BEDFORD HARBOR PHASE II
DREDGING VOLUME AND CDF STORAGE CAPACITIES

Volume of Contaminated Sediment

Estuary	527,777 yd^3
Lower Harbor	48,000 yd^3
Total Volume of Contaminated Sediment	**575,777 yd^3**

CDF Foot-Print Corrections

CDF 1B (Northern Half)	26,800 yd^3
CDF 1B (Southern Half)	30,100 yd^3
CDF 1A	38,000 yd^3
CDF 7	31,200 yd^3
Total Foot-Print Correction	**126,100 yd^3**

Dredging Volume

Dredging Volume = Contaminated Sediment Volume - Foot-Print Correction
Dredging Volume = 575,777 yd^3 - 126,100 yd^3 = **449,677 yd^3**

Required Storage Volume

Required CDF Storage Volume = Dredged Volume x Bulking Factor
Required CDF Storage Volume = 449,677 yd^3 x 1.4 = **629,548 yd^3**

CDF Storage Volumes

CDF 1B (Northern Half)	56,400 yd^3
CDF 1B (Southern Half)	50,700 yd^3
CDF 1A	93,800 yd^3
CDF 7	435,300 yd^3
Total Available Storage Volume =	**636,200 yd^3**

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-26-96 SHEET 1 OF ____

CHKD. BY ____ DATE ____ OFS NO. ____ DEPT. NO. ____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING COST ESTIMATE

ANTICIPATED VOLUME OF DREDGED MATERIAL = 449,~~900~~ 677 yd^3
(SEE ATTACHMENT #1) SAY 450,000 yd^3

ASSUME HARBOR WILL BE DIVIDED INTO 3 EQUAL SECTIONS:

- NORTERN 1/3 OF ESTUARY (150,000 yd^3)
- MIDDLE 1/3 OF ESTUARY (150,000 yd^3)
- SOUTHERN 1/3 OF ESTUARY AND ALL BETWEEN COGGESHALL ST. BRIDGE AND HURRICANE BARRIER. (150,000 yd^3

ALL ASSUMPTIONS FOR DREDGING RATES AND COSTS BASED ON [illegible] ESTIMATE (SEE ATTACHMENT #2)

DUE TO WATER TREATMENT CONSTRAINTS IT IS ASSUMED [illegible] DREDGING TIME WILL NOT EXCEED 16 HOURS PER DAY.

NORTHERN 1/3 OF ESTUARY

- 2 DREDGES
- 2 SHIFTS PER DAY PER DREDGE
- AVERAGE DREDGING TIME PER SHIFT = 4 HOURS

∴ TOTAL DREDGE TIME = 16 HOURS/DAY ✓

- PRODUCTION RATE = 13.4 yd^3/hr = 214.4 yd^3/DAY ⇒ SAY 215 yd^3/DAY

1) MOBILIZATION = $850,000
2) DREDGE EQUIPMENT COST = $800,000
3) OPERATING COST = $6,697,674 ✓
   - $9,600/DAY
   - 215 yd^3/DAY

TOTAL $8,347,674

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-26-96 SHEET 2 OF ____

CHKD. BY ____ DATE ____ OFS NO. ____ DEPT. NO. ____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING COST ESTIMATE

NORTHERN 1/3 OF ESTUARY (CONT.)

4) DREDGING ~~DAYS~~ time = $150{,}000\ yd^3 \times \frac{1\ DAY}{215\ yd^3} \times \frac{1\ YEAR}{229\ DAYS}$ = 3.05 YEARS
of dredging

MIDDLE 1/3 OF ESTUARY

- 2 DREDGES
- 2 SHIFTS PER DAY PER DREDGE
- AVERAGE DREDGING TIME PER SHIFT = 4 HOURS

∴ TOTAL DREDGE TIME = 16 HOURS/DAY

- PRODUCTION RATE = 13.4 yd^3/HR = 214.4 yd^3/DAY ⇒ SAY 215 yd^3/DAY

1) MOBILIZATION = $0 (INCLUDED IN NORTHERN 1/3 COSTS)
2) DREDGE EQUIPMENT COST = $0 (INCLUDED IN NORTHERN 1/3 COSTS)
3) OPERATING COST = $6,697,674
   - $9,600/DAY
   - 215 yd^3/DAY

TOTAL = $6,697,674

4) DREDGE ~~DAYS~~ = $150{,}000\ yd^3 \times \frac{1\ DAY}{215\ yd^3} \times \frac{1\ YEAR}{244\ DAYS}$ = 2.86 YEARS
3.05
5.91

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-26-96 SHEET 3 OF ____

CHKD. BY ____ DATE ____ OFS NO. ____ DEPT. NO. ____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING COST ESTIMATE

SOUTHERN 1/3 OF ESTUARY & LOWER

- 2 DREDGES
- 2 SHIFTS PER DAY PER DREDGE
- AVERAGE DREDGING TIME PER SHIFT = 4 HOURS
- PRODUCTION RATE = 20.1 yd³/HR = 321.6 ⇒ SAY 320 yd³/DAY

1) MOBILIZATION = $850,000
2) DREDGE EQUIPMENT COST = $800,000
3) OPERATING COST = $5,625,000
   - $12,000 / DAY
   - 320 yd³/DAY

TOTAL = $7,275,000

4) DREDGE DAYS = 150,000 yd³ × 1 DAY / 320 yd³ × 1 YEAR / 254 DAYS = 1.8 YEARS

TOTAL COST

NORTHERN 1/3	$8,347,674
MIDDLE 1/3	6,697,674
SOUTHERN 1/3	7,275,000
	$22,320,348

93

NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT "Hot Spot" Dredging Summary

COMPUTATION

COMPUTED BY MARK OTIS CHECKED BY DATE 3/18/96

Dredge Mobilization / De-Mobilization & Misc	$196,666
Sediment Dredging & Disposal 80 hrs @ $525/hr	$420,525
Sediment Dredging & Disposal 1211.5 hrs @ $569.17/hr	$689,574
Shutdown Time 28 days @ $1,800	$ 50,400
Incidental Dredge Equipment	$452,535
Oil Absorbent Booms	$ 3,309
	$1,813,009

SUMMARY OF DREDGING ACTIVITY

TOTAL AVAILABLE WORK DAYS		345
" DREDGING DAYS		261
" SHUTDOWN DAYS		32
OTHER NON-DREDGE DAYS		52
TOTAL CUBIC YARDS DREDGED		14,000 c.y.
Required	8428 c.y.	
Overdredged	5568 c.y.	
Square feet dredged	189,742 s.f.	
" " redredged	22,760 s.f.	

1) Average dredge time (payment) per day 2012.5/261 = 7.7 hrs/day
2) Average dredge time (production) per day 4.0 hrs/day
3) Average hourly production 14000 c.y./1044 hrs 13.4 CY/hr
4) % of available time working 261/345 75%
5) Shutdown time as a % of available dredging days 10%

94

NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT Estuary / Lower Harbor & Bay.
COMPUTATION Revised dredging cost estimates
COMPUTED BY Mark Otis CHECKED BY DATE 18 March 96

Approach

The harbor will be divided into 3 sections with a different dredge production rate assigned to each. The 3 sections are -

- Northern 1/3 of Estuary
- Middle 1/3 of Estuary
- Southern 1/3 of Estuary and all areas between Coggeshall St. bridge and hurricane barrier.

Northern 1/3 of Estuary

* The "hot spot" production rates will be used in this area. Two (2) dredges will be used to complete the area in a reasonable period of times. Assume each dredge operates 2 shifts per day for a total dredging time of 8 hours/day per dredge. Based on the "hot spot" production rate of 13.4 cy/hr per dredge this operation would result in a total production rate of 215 cy/day. This production estimate assumes that their would be no restrictions caused by CDF capacity or Water Treatment Plant operations.

1) Mobilization / Demobilization which includes pipeline costs. Pumping distance for this area is approximately 1/2 mile max. $850,000

2) Dredge Equipment Cost - Because of the length of time associated with dredging these areas the dredges would be purchased. Assume $400K per dredge. $800,000

3) Operating cost (includes labor) $2400/shift $9,600 day
$2400 x 4 shifts per day =

4) Dredge Days per year (assume 6 day work week)

365 days/year - 52 Sundays - 8 holidays = 305 available

305 available days x 75% = 229 days/yr.

95

NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT Estuary / Lower Harbor & Bay
COMPUTATION Revised dredging cost estimate
COMPUTED BY Mark Otis CHECKED BY DATE 18 March 96

Middle 1/3 of Estuary

* Contamination levels are lower and water depths greater in this area so production rates can increase (based on longer dredging time per shift) and the availability can increase.

Average dredge time per day per shift	6 hours
Average hourly production	13.4 CY / hr
Daily production (2 shifts & 2 dredges)	320 CY / day

1) Assume dredges & incidental equipment used in the northern part of the Estuary would also be used in this section so there would be no additional Mob / De Mob or equipment cost

2) Operating cost would remain the same $9,600 day

3) Dredge days per year (assume 6 day work week)

305 available days × 80% = 244 days/yr.

96

NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT Estuary / Lower Harbor & Bay
COMPUTATION Revised dredging cost estimate
COMPUTED BY Mark Otis CHECKED BY DATE 18 March 96

Southern 1/3 of Estuary and areas between Coggeshall Street Bridge and Hurricane Barrier

* Contamination levels are lower and water depths greater in this area so production rates can increase considerably. Two (2) dredges will be used, each operating for 2, 10 hour shifts per day.

Average dredging time per day per shift	8 hours
Average hourly production (increase 50%)	20.1 cy/hr
Daily production (2 shifts & 2 dredges)	643 cy/day

1) Mobilization / Demobilization which includes pipeline costs. The majority of material from this area will go to CDF 7 (0.5 mile) — $850,000

2) Dredge Equipment Cost: Assume the purchase price of the dredges due to the duration of the project. — $800,000

3) Operating cost $3000/shift/dredge — $12,000 day

4) Dredge days per year (assume 6 day work week)
305 available × 85% * — 259 days/yr

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BLINKMAN DATE 5-26-96 SHEET 1 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT WATER TREATMENT COST ESTIMATE

WATER BALANCE

DREDGING VOLUME

SHIFT 1 — DREDGE 1: 4 has/SHIFT × 60 MIN/HR × 2,100 gal/MIN = 504,000 gal/SHIFT

DREDGE 2: 4 has/SHIFT × 60 MIN/HR × 2,100 gal/MIN = 504,000 gal/SHIFT

SHIFT 2 — DREDGE 1: (4)(60)(2,100) = 504,000 gal

DREDGE # 2: (4)(60)(2,100) = 504,000 gal

TOTAL = 2,016,000 gal/DAY

- ASSUME 6 DAYS/WEEK FOR DREDGING
- ASSUME 7 DAYS/WEEK FOR WATER TREATMENT

∴ 2,016,000 $\left(\frac{6}{7}\right)$ = 1,728,000 gal/DAY ← REQUIRED TREATMENT PLANT FLOWRATE

- ASSUME TREATMENT PLANT FLOWRATE = 350 gpm = 504,000 gal/DAY

∴ 1,728,000 gal/DAY $\left(\frac{1 \text{ plant}}{504,000 \text{ gal}}\right)$ = 3.43 SAY 4 ← # OF TREATMENT PLANTS NEEDED

EXISTING WTP WILL BE UTILIZED THEREFORE 3 NEW PLANTS WILL BE NEEDED.

CAPITAL COSTS FOR WTP

- FOR WATER TREATMENT ONLY = $3,641,000 × 1.0715 = $3,901,332 (FS COSTS)
- FOR DEWATERING/WATER TREATMENT = $4,921,000 (1.0715) = $5,272,852

1996 $

~1,000,000 gal/DAY

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-26-96 SHEET 2 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT WATER TREATMENT COST ESTIMATE

- REQUIRED TREATMENT PLANT CAPACITY = 1,728,000 gal/DAY

- ASSUME COST OF 2,000,000 gal/DAY WTP IS 50% GREATER THAN 1,000,000 gal/DAY WTP COST

∴ WATER TREATMENT ONLY = $5,851,998
DEWATERING/WATER TREATMENT = $7,909,280

FOR ACTUAL WTP (350 gpm) CAPITAL COST = $3,839,674
↑ 504,000 gal/DAY

3 x $3,839,674 = $11,519,022

- ASSUME CAPITAL COST FOR WATER TREATMENT = AVG OF FS + ACOE COST

∴ WATER TREATMENT ONLY = $8,685,510
DEWATERING/WATER TREATMENT = $9,714,151

O&M COST

- O&M = $265,608/MONTH (SEE ALT #3)
- COST ACCORD [illegible]
- TOTAL [illegible] MONTHS = 93

∴ (93)(265,608) = $24,701,544

O&M PRESENT WORTH (8 YEARS, 7%) = 18,437,541
[illegible]

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-24-96 SHEET 1 OF 4

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT CDF CONSTRUCTION COST ESTIMATE, ALTERNATIVE #

1) CDF A (FORMERLY 1B NORTH)

- CONSIST OF CONSTRUCTION AND CAPPING
- COSTS DO NOT INCLUDE HOME OFFICE OVERHEAD, PROFIT OR BONDING

A) CONSTRUCTION ASSUMPTIONS:

- PLACE HIGH STRENGTH GEOTEXTILE ALONG THE DIKE ALIGNMENT
- CONSTRUCT GRANULAR FILL DIKE
- INSTALL A SILT CURTAIN IN THE HARBOR AROUND THE WORK AREA
- PROTECT THE OUTSIDE FACE OF THE DIKE WITH RIP-RAP
- LINE THE INTERIOR FACE OF THE DIKE WITH GEOMEMBRANE
- CONSTRUCT LANDSIDE OF THE CONTAINMENT BARRIER WITH SHEET PILE (SHEETS ASSUMED TO BE 22.5' IN LENGTH)
- CONSTRUCT OUTLET STRUCTURE CONSISTING OF A CONCRETE CHAMBER WITH PUMP(S) CAPABLE OF MOVING 400 GPM OF WATER TO A TREATMENT FACILITY.
- PIPELINE TO TREATMENT FACILITY IS TO BE TEMPORARY (EITHER FLOATING OR SUBMERGED ON THE HARBOR BOTTOM)
- INSTALL A 10 FOOT HIGH CHAINLINK FENCE AROUND THE FACILITY.

CONSTRUCTION COST = $ 2,759,537

B) CAPPING ASSUMPTION.

- PLACE HIGH STRENGTH GEOTEXTILE OVER DREDGED MATERIAL AND REMOVE OUTLET STRUCTURE
- CONSTRUCT CAP TO CONSIST OF 2' LAYER OF LOW HYDRAULIC CONDUCTIVITY MATERIAL, GEOMEMBRANE, 1' DRAINAGE LAYER, 18" OF COMMON FILL + 6" OF LOAM WITH SEED

CAPPING COST = $ 1,517,164

TOTAL COST CDF A = $5,276,701

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-24-96 SHEET 2 OF 4

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT CDF CONSTRUCTION COST ESTIMATE: ALTERNATIVE 4

2) CDF B (FORMERLY 1B SOUTH)

- SAME ASSUMPTIONS AS CDF A

A) CONSTRUCTION COST = $2,976,904

B) CAPPING COST = $1,529,015

TOTAL $4,505,919

3) CDF C (FORMERLY CDF 1A)

- SAME ASSUMPTIONS AS CDF A

A) CONSTRUCTION COST = $3,414,397

B) CAPPING COST = $1,228,653

TOTAL = $4,643,050

4) CDF D (FORMERLY CDF 7)

- CONSIST OF CONSTRUCTION & CAPPING
- COSTS DO NOT INCLUDE HOME OFFICE OVERHEAD, PROFIT OR BONDING

A) CONSTRUCTION ASSUMPTIONS

- REPLACE DRAIN/SEWER LINE IN STREET
- BACKFILL DRAINAGE TRENCHES
- CONSTRUCT SHEET PILE/PILE SUPPORTED WALL. THE INTERIOR OF THE WALL IS TO BE LINED
- CONSTRUCT THE LANDSIDE OF THE CONTAINMENT BARRIER WITH SHEETPILE (22.5' IN LENGTH) WITH ITS INTERIOR FACE LINED

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-24-96 SHEET 3 OF 4

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT CDF CONSTRUCTION COST ESTIMATE: ALTERNATIVE #

A) CDF D (CONT.)

- CONSTRUCT OUTLET STRUCTURE CONSISTING OF A CONCRETE CHAMBER WITH PUMP(S) CAPABLE OF MOVING 400 GPM OF WATER TO A TREATMENT FACILITY. PIPELINE TO TREATMENT FACILITY IS TO BE TEMPORARY.
- INSTALL 10' HIGH CHAIN LINK FENCE AROUND THE FACILITY

CONSTRUCTION COST = $6,267,716

B) CAPPING ASSUMPTIONS

- INSTALL HIGH STRENGTH GEOTEXTILE OVER DREDGED MATERIAL AND REMOVE OUTLET STRUCTURE.
- INSTALL WICK DRAINS (PLACE 2' OF CLEAN MATERIAL ON TOP OF GEOTEXTILE)
- CONSTRUCT CAP TO CONSIST OF A 2' LAYER OF LOW HYDRAULIC CONDUCTIVITY MATERIAL, GEOMEMBRANE, 1' FOOT DRAINAGE LAYER, 1' SUBGRADE MATERIAL & PAVEMENT

CAPPING COST = $6,427,932

TOTAL COST = $12,695,648

TOTAL CAPITAL CDF COST $ = $27,121,318

5) O+M

- REPLACE ALL STONE PROTECTION EVERY 10 YEARS @ ($50.50/yd³)(1.0715) = $54.11
- ANNUAL INSPECTIONS & MONITORING @ $5,000/CDF/yr

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-24-96 SHEET 4 OF 4

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT CDF CONSTRUCTION COST ESTIMATE : ALTERNATIVE 4

CDF	STONE (yd^3)
A	4,678
B	4495
C	6,665
D	0
	15,838 yd^3

$\therefore (15,838)(\$54.11/yd^3) = \$856,994$

EVERY 10 YRS.

PRESENT WORTH (STONE) = $[(856,994)(P/F, 7\%, 10)] + (856,994)(P/F, 7\%, 20) + (856,994)(P/F, 7\%, 30)$

$= (856,994)(0.5083) + (856,994)(0.2584) + (856,994)(0.1314)$

$= \$769,666$

PRESENT WORTH INSPECTIONS = $(\$5,000)(A)(P/A, 7\%, 30)$

$= (20,000)(12.4090) = \$248,180$

TOTAL O&M PRESENT WORTH = $\$248,180 + \$769,666 = \$1,017,846$

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINGMANN DATE 5-24-96 SHEET 1 OF 3

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT AIR MONITORING COST ESTIMATE - ALTERNATIVE #

- ESTIMATE BASED ON ACOE AIR MONITORING ESTIMATE (ATTACHMENT #1) AND ACOE REVISE DREDGING COST ESTIMATE (ATTACHMENT #2).

DREDGING

- DREDGING AREA #1 = NORTHERN + MIDDLE 1/3'S OF ESTUARY
- DREDGING AREA #2 = SOUTHERN 1/3 OF ESTUARY AND AREA SOUTH OF COGGESHALL STREET
- 10 AIR SAMPLERS FOR DREDGE AREA #1
- 10 AIR SAMPLERS FOR DREDGE AREA #2
- ALL SAMPLES TO BE 24-hour DURATION
- SCHEDULE OF SAMPLING
  - DAILY FOR FIRST 6 MONTHS
  - 3 DAYS PER WEEK FOR NEXT 6 MONTHS
  - 2 DAYS PER WEEK AFTER 1 YEAR
- COST PER EVENT PER SAMPLER = $800 (BASED ON "HOT SPOT" COSTS)

1) INITIAL 6 MONTHS
   - 10 MONITORS SET-UP AROUND DREDGING SECTIONS 1 & 2
   - 115 DREDGING DAYS

   ∴ (115 EVENTS)(10 MONITORS)($800/MONITOR) = $920,000

2) MONTHS 7-12
   - 10 MONITORS AT DREDGING SECTIONS 1 & 2
   - 26 WEEKS/6 MONTHS
   - SAMPLE 3 DAYS PER WEEK
   - 78 SAMPLING EVENTS

   ∴ (78 EVENTS)(10 MONITORS)($800/MONITOR) = $624,000

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-29-96 SHEET 2 OF 3

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT AIR MONITORING COST ESTIMATE - ALTERNATIVE #

DREDGING (CONT.)

3) MONTHS 13-93 — 172
- 10 MONITORS
- 2 DAYS/WEEK ; 52 WEEKS/YEAR
- 702 EVENTS

∴ (702 EVENTS)(10 MONITORS)($800) = $5,616,000

SUBTOTAL DREDGING = $7,160,000

CDFs

- ASSUME 6 AIR SAMPLERS PER CDF (A,B,C,D)
- FREQUENCY OF SAMPLING @ EACH CDF
  - 2 DAYS/WEEK DURING DREDGING
  - 2 DAYS/MONTH DURING INITIAL SETTLING (1 YEAR)
  - 1 DAY/MONTH UNTIL FINAL CAP IS IN PLACE (2 YEARS)
- COST PER EVENT PER SAMPLER = $800 (BASED ON "HOT SPOT" COSTS)

1) CDF A (FORMERLY CDF 1b NORTH)
- APPROXIMATELY 56,000 yd³ CAPACITY
- TAKES APPROXIMATELY 57 WEEKS TO FILL
- 162 EVENTS

(57)(2) + (2)(12) + (1)(12)(2) = 162 EVENTS

2) CDF B (FORMERLY CDF 1b SOUTH)
- APPROXIMATELY 51,000 yd³ CAPACITY
- TAKES APPROXIMATELY 52 WEEKS TO FILL

= (52)(2) + (2)(12) + (1)(12)(2) = 152 EVENTS

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY J. BRINKMAN DATE 5-24-96 SHEET 3 OF 3

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT AIR MONITORING COST ESTIMATE 1 ALTERNATIVE #

3) COF C (FORMERLY 1A)
- APPROXIMATELY 93,800 yd^3 CAPACITY
- TAKES APPROXIMATELY 65 WEEKS TO FILL

$\therefore (65)(2) + (2)(12) + (1)(12)(2) = 178$ EVENTS

4) COF D (FORMERLY 7)
- APPROXIMATELY 435,800 yd^3
- TAKES APPROXIMATELY 75 WEEKS TO FILL

$\therefore (75)(2) + (2)(12) + (1)(12)(2) = 198$

TOTAL EVENTS = 690 EVENTS

AIR MONITORING COST FOR COF = (690)(6)(800) = $3,312,000

TOTAL AIR MONITORING COST = $7,160,000 + $3,312,000

= $10,472,000

Table 11
COST ESTIMATE: ALTERNATIVE - 11 (OLD PROPOSED REMEDY)
DREDGE/DISPOSE
NEW BEDFORD HARBOR CDFs 18, 1 & 7

ACTIVITY	COST
I. DIRECT COSTS	
A. Dredging	$24,138,051
B. Dewater/Water Treatment	$28,312,570
C. CDF Construction	$26,198,186
D. Air Monitoring	$10,158,400
TOTAL DIRECT COST (TDC)	$88,807,207
II. INDIRECT COSTS	
A. Health & Safety (@ 5% of TDC) Level D Protection [Activities: B,D]	$4,440,360
B. Legal, Administration, Permitting (@ 10% of TDC)	$8,880,721
C. Engineering (@ 10% of TDC)	$8,880,721
D. Services During Construction (@ 10% of TDC)	$8,880,721
E. Turnkey Contractor Fee (@ 15% of TDC)	$13,321,081
TOTAL INDIRECT COST (TIC)	$44 403,603
SUBTOTAL COSTS	$133,210,810
CONTINGENCY (@ 20% of TDC + TIC)	$26,642,162
TOTAL CAPITAL COST	$159,852,973
PRESENT WORTH - 1996 (@ 7% for 8 years)	$119,316,257
O&M COST (CDFs) (Present Worth @ 7% for 30 years upon completion)	$549,537
MONITORING PROGRAM (Present Worth @ 7% for 30 years)	$8,695,122
TOTAL COST - ALTERNATIVE - 10	$128,560,916

NEW BEDFORD HARBOR PHASE II
DREDGING VOLUME AND CDF STORAGE CAPACITIES
Alternative #11

Volume of Contaminated Sediment

Estuary	527,777 yd^3
Lower Harbor	48,000 yd^3
Upper Buzzards Bay Adjacent to Hurricane Barrier	28,000 yd^3
Total Volume of Contaminated Sediment	**603,777 yd^3**

CDF Foot-Print Corrections

CDF A (Formerly CDF 1B)	26,800 yd^3
CDF 1	75,400 yd^3
CDF 7	17,000 yd^3
Total Foot-Print Correction	**119,900 yd^3**

Dredging Volume

Dredging Volume = Contaminated Sediment Volume - Foot-Print Correction
Dredging Volume = 603,777 yd^3 - 119,900 yd^3 = **483,877 yd^3**

Required Storage Volume

Required CDF Storage Volume = Dredged Volume x Bulking Factor
Required CDF Storage Volume = 483,877 yd^3 x 1.4 = **677,428 yd^3**

CDF Storage Volumes

CDF 1B	56,400 yd^3
CDF 1	407,300 yd^3
CDF 7	174,000 yd^3
Total Available Storage Volume =	**637,700 yd^3**

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-20-96 SHEET 1 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT UEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING - ALTERNATIVE #11

ANTICIPATED VOLUME OF DREDGED MATERIAL = 483,877 yd^3

WILL UTILIZE SAME ASSUMPTIONS AS THOSE PRESENT FOR ALT. #10

NORTHERN 1/3 OF ESTUARY

1) MOBILIZATION = 850,000
2) DREDGE EQUIPMENT COST = 800,000
3) OPERATING COST = $6,334,169
   - $9,600/DAY
   - 215 yd^3/DAY
   - (425,577)/3 = 141,859 yd^3

TOTAL $7,984,169

4) DREDGE DAYS

$$= 141{,}859\ yd^3 \left(\frac{1}{215}\right)\left(\frac{1}{229}\right) = 2.88 \text{ YEARS}$$

MIDDLE 1/3 OF ESTUARY

1) MOBILIZATION = $0
2) EQUIPMENT = 0
3) OPERATING COST = 6,334,169

TOTAL = $6,334,169

4) DREDGE DAYS

$$= 141{,}859 \left(\frac{1}{215}\right)\left(\frac{1}{244}\right) = 2.7 \text{ YEARS}$$

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-20-96 SHEET 2 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT DREDGING - ALTERNATIVE #11

SOUTHERN 1/3 OF ESTUARY

1) MOBILIZATION $850,000
2) EQUIPMENT $800,000
3) OPERATING COST $5,319,713
   - $12,000/DAY
   - 320 yd³/DAY

TOTAL $6,969,713

4) DREDGE DAYS

$= 141,859 \left(\frac{1}{320}\right)\left(\frac{1}{259}\right) = 1.71$ YEARS

LOWER HARBOR & BAY

1) MOBILIZATION = 0
2) EQUIPMENT = 0
3) OPERATING COST = $2,850,000
   - 320 yd³/DAY

$2850,000

4) DREDGE DAYS $= 76,000 \left(\frac{1}{320}\right)\left(\frac{1}{259}\right) = 0.92$ YEARS

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-20-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT WATER TREATMENT - ALTERNATIVE #1

WATER BALANCE

SEE ALT #10

CAPITAL COST

= $8,665,510

- SEE ALT. #10 FOR ASSUMPTIONS & DETAILS

O&M COST

$265,608/MONTH

- SEE ALT. #3 FOR ASSUMPTIONS & DETAILS

TOTAL DREDGE MONTHS = 99

∴ 99 (265,608) = $26,295,192

O&M PRESENT WORTH (8 YEARS, 7%) = $19,627,060

NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT New Bedford Harbor Superfund Site
COMPUTATION Cost Estimate
COMPUTED BY Mark Otis CHECKED BY DATE 17 June 96

SUMMARY

CDF	Construction	Cap	TOTAL
1A	$3,557,497	$1,952,535	$5,510,032
1	$4,316,470	$4,547,328	$8,863,798
7	$6,501,208	$5,323,148	$11,824,356
	$14,375,175	$11,823,011	$26,198,186

SUBJECT NEW BEDFORD HARBOR SUPERFUND SITE

COMPUTATION COST ESTIMATE

COMPUTED BY MARK OTIS CHECKED BY DATE 17 JUNE 96

1) CDF locations 1B, 1 and 7 were originally proposed for the Estuary / Lower Harbor & Bay portion of the site and a cost estimate was provided in January 1993. This estimate provides updated costs for these CDFs and accounts for the following modifications:

- CDF 1B has been replaced by CDF A (formerly 1B North) to avoid impacting the electrical cables which cross the harbor at this location.

- The original CDF 7 configuration (as presented in January 1993) has been expanded to provide capacity for 174,000 c.y. of material.

- The caps at CDFs A and 1 consist of the following:

  a) high strength geotextile over dredged material
  b) 2 foot layer of material with low hydraulic conductivity
  c) geomembrane
  d) 1 foot drainage layer
  e) 18 inches of common fill
  f) 6 inches of topsoil

- The cap at CDF 7 consists of the following:

  a) high strength geotextile
  b) 2 feet of clean material
  c) wick drains
  d) 2 feet of material with low hydraulic conductivity
  e) geomembrane
  f) 1 foot drainage layer
  g) 1 foot of subgrade material
  h) pavement

- The earthen dikes originally proposed for the landside of these disposal facilities have been replaced by sheetpile walls.

2) The unit prices were taken from the cost estimates prepared in April 96 for CDFs 1B North, 1B South, 1A and 7.

NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U.S. ARMY

SUBJECT New Bedford Harbor Superfund Site
COMPUTATION Cost Estimate
COMPUTED BY _____ CHECKED BY _____ DATE _____

1) CDF A cost estimate as previously presented in our estimate dated 4/30/96

construction	$3,557,497
cap	1,952,535
TOTAL	$5,510,032

2) CDF 1 Construction

- Mobilization & Preparatory Work — $70,000
- Site Work — $65,036
  - Fencing 2,400 feet @ 19.93 = 47,832
  - silt curtain 1,100 ft @ 15.64 = 17,204
- Dike — $2,400,389
  - granular fill 77,408 cy @ 20.56 = $1,593,057
  - geotextile 24,278 sy @ 27.08 = 657,448
  - slope protection 2,800 cy @ 53.53 = 149,884
- Geomembrane 13,150 sy @ 8.99 — $117,320
  - In-water dike 10,133 sy
  - sheetpile wall 2,917 sy
- Intake/outlet structure — $85,000
- Sheetpile wall 1,750 ft × 30 ft = 52,500 ft² @ 29.69 = $1,558,725
- Demobilization — $20,000

TOTAL $4,316,470

CDF 1 Capping

- Mobilization & preparatory work — $56,760
- Geotextile 103,000 sy @ 5.70 — $587,100
- Impervious Layer (2' thick) 86,667 cy @ 11.72 = $1,015,737
- Geomembrane 103,000 sy @ 7.20 = $741,600

SUBJECT New Bedford Harbor Superfund Site
COMPUTATION Cost Estimate
COMPUTED BY _____ CHECKED BY _____ DATE _____

CDF 1 Capping continued

- Granular Drainage Layer (1' thick) 43,333 cy @ $20.54 = $890,060
- Soil/Topsoil Cover Layer (2' thick) 86,667 cy @ $14.17 = 1,228,071
- Remove outlet structure 8,000
- Demobilization 20,000

TOTAL $4,547,328

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3) CDF 7 Construction

Note: The volume of this facility is increased by 55,000 cy by moving the in-water wall 70 feet east from the configuration presented in January 93.

- Mobilization & Prep $83,000
- Site Work $2,265,098
  - Fence 2,200 ft @ 19.53 = $42,966
  - Earthwork (fill 2 drainage trenches) approx. 14,000 cy @ 16.74 = $234,360
  - Sewer/Drain Line (Replace) = $1,987,772
- Geomembrane $427,356
  - Sheetpile wall waterside (rigid sheets) 1810 ft × 25' = 45,250 sf/9 = 5028 sy @ 79.26 = $398,519
  - Sheetpile wall landside
    - section 1 800' × 14' = 11,200
    - " 2 500' × 20' = 10,000
    - " 3 650' × 12' = 7,800
    - 29,000/9 = 3222 sy @ 8.95 = $28,837
- Intake/Outlet Structure $169,155

SUBJECT New Bedford Harbor Superfund Site
COMPUTATION Cost Estimate
COMPUTED BY _____ CHECKED BY _____ DATE _____

CDF 7 Construction continued

- sheetpile (landside)
  Section 1 21ft² x 800 = 16800 sf
  " 2 30ft² x 500 = 15,000 sf
  " 3 18ft² x 650 = 11,700 sf
  43,500 @ $28.09 = $1,221,915
- sheetpile (water) 1790' x 34' = 60,860 @ $37.54 = $2,284,684
- Dock/Sunken Vessel Removal $30,000
- Demobilization $20,000

TOTAL $6,501,208

CDF 7 Cap

Note: Surface Area 575,500 s.f.

- Mobilization & Preparatory Work $98,427
- Geotextile 63,944 sy @ $5.69 = $363,841
- Clean Fill Material (2 feet) 42,630 cy @ $7.60 = $323,988
- Wick Drains 1,363,600 l.f. @ $1.23 = $1,677,228
  (Quantity is 2/3 that of April 96 estimate for CDF 7)
- Impervious Layer 42,630 cy @ $11.71 = $499,197
- Geomembrane 63,944 sy @ 7.19 $459,757
- Granular Drainage Layer 21,315 cy @ $20.52 $437,384
- Subgrade Material 21,315 @ $30.86 $657,781
- Pavement 63,944 s.y. @ $12.41 $793,545
- Demobilization $12,000

TOTAL $5,323,148

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-20-96 SHEET 1 OF 1

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT CDF O&M – ALTERNATIVE #11

SEE ALT. #10 FOR ASSUMPTIONS & DETAILS

CDF	STONE (yd^3)
1	2,800
1B	4,678
7	6
	7,478

∴ 7,478 (54.11/yd^3) = 404,63$

every 10 yrs.

PRESENT WORTH (30 yrs, 7%) = $363,902

PRESENT WORTH INSPECTIONS = 5,000 (3)(12.4090)

= $186,135

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-20-96 SHEET 1 OF

CHKD. BY DATE OFS NO. DEPT. NO.

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT AIR MONITORING - ALTERNATIVE #11

BASED ON ASSUMPTIONS DEVELOPED FOR ALT. #10

DREDGING

1) INITIAL 6 MONTHS $920,000

2) MONTHS 7-12 $624,000

3) MONTHS 13-99 $6,032,000

- 754 EVENTS

CDFs

1) CDF 1B (CDF A)

- 162 EVENTS

2) CDF 1

- ASSUME SIMILAR TO CDF D

∴ 198 EVENTS

3) CDF 7

- ASSUME SIMILAR TO CDF C

∴ 178 EVENTS

FOSTER WHEELER ENVIRONMENTAL CORPORATION

BY JJB DATE 6-20-96 SHEET 2 OF 2

CHKD. BY _____ DATE _____ OFS NO. _____ DEPT. NO. _____

CLIENT USEPA

PROJECT NEW BEDFORD HARBOR

SUBJECT AIR MONITORING - ALT #11

TOTAL EVENTS = 538

TOTAL CDF COST = 538 (6)(800) = $2,582,400

TOTAL AIR MONITORING COST = 7,576,000 + 2,582,400

= $10,158,400