

Table 3.6-1: Shallow Boring Geotechnical Sample Results

Sample Number	Sample Depth (ft)	Sample Location	Wet Density (pcf)**	Dry Density (pcf)**	Moisture Content (%)	Specific Gravity	Total Porosity (%)**	% Sand	% Fines*	Sample description
RCM 1-1	0-1	Bottom	89.54	43.34	106.57	2.676	74.04	4	96	Gray clay (Bay Mud) with organics
RCM 1-2	1-2	Bottom	93.71	46.89	99.87	2.701	72.18	4	96	Gray clay (Bay Mud) with organics
RCM 2-1	0-1	Bottom	80.85	29.43	174.67	2.615	81.96	16	84	Gray lack clayey silt (Bay Mud) with organics
RCM 2-2	1-2	Bottom	66.50	13.66	386.78	2.133	89.74	63	37	Dark brown peat
RCM 3-1	0-1	Bank	67.31	15.03	347.77	2.307	89.56	53	47	Brown peat
RCM 3-2	1-2	Bank	70.45	16.82	318.90	2.269	88.12	64	36	Brown peat
RCM 4-1	0-1	Bank	69.54	16.35	325.33	2.408	89.12	51	49	Brown peat
RCM 4-2	1-2	Bank	71.35	17.62	304.89	2.150	86.87	46	54	Brown clayey peat
RCM 5-1	0-1	Bottom	82.83	34.30	141.51	2.768	80.14	27	73	Black clayey silt (Bay Mud) with organics
RCM 5-2	1-2	Bottom	81.15	34.14	137.70	2.722	79.90	13	87	Black clayey silt (Bay Mud) with petroleum odor
RCM 6-1	0-1	Bank	84.25	36.17	132.90	2.651	78.13	15	85	Black clayey silt (Bay Mud) organics & petroleum odor
RCM 6-2	1-2	Bank	86.35	40.24	114.60	2.659	75.75	10	90	Dark gray clay (Bay Mud) with organics
RCM 7-1	0-1	Bank	86.97	40.02	117.31	2.646	75.76	6	94	Dark gray clay (Bay Mud) with organics
RCM 7-2	1-2	Bank	86.01	40.23	113.79	2.705	76.16	7	93	Gray black clay (Bay Mud) with organics
NSCM-1	2-5	--	90	47	118.50	2.744	72	3	97	Gray silty clay with organics
NSCM-2	2-5	--	70	20	330.80	2.332	86	37	63	Dark Brown peaty clay/clayey peat
SPCM-1	--	--	--	--	40.30	2.613	--	16	84	Grayish Brown Silt with sand

* Passed #200 Sieve

** Calculated values based on measured data

Table 3.6-2: Summary of Consolidation Test Results

Boring	Depth (ft)	Soil Type	Soil Description	Moisture Content (%)	Total Density (pcf)	Dry Density (pcf)	In-Situ Effective Stress (psf)	Maximum Past Pressure (psf)	OCR	CR	RR	cv(virgin) (ft ² /day)	cv(rec) (ft ² /day)
URS-1	4.5-7	OH	Gr brn org silt/ clay	98.4	84.8	42.7	130	922	7.1	0.31	0.046	0.0126	0.0266
	9.5-12	OH	Dk brn clay org to org clay	247	74.1	21.4	210	758	3.6	0.55	0.087	0.0088	0.0467
	24.5-27	OH	Gr brn clay org to org clay	192.2	76.8	26.3	390	820	2.1	0.47	0.062	0.0134	0.1146
URS-2	39.5-42	CL	Gr si clay w tr org	59.4	102.4	64.3	790	1,415	1.8	0.22	0.047	0.0396	0.0145
	9.5-12	OH	Dk brn org clay	333.7	68.9	15.9	175	649	3.7	0.56	0.042	0.0075	0.0246
	24.5-27	OH	Dk brn org clay	240.9	72.5	21.3	300	666	2.2	0.5	0.043	0.0107	0.0283
URS-3	0-2.5	CH	Gr org clay	116.9	86	39.6	30	214	7.1	0.28	0.028	0.0096	0.0173
	5-7.5	CH	Gr sa si clay/sa cl silt w shells	67.6	99	59.1	150	283	1.9	0.19	0.018	0.0208	0.8913
	10-12.5	CH	Gr fi sa si clay/ cl fi sa silt w shells	31	120.9	92.3	350	9,835	>10	0.13	0.015	0.0218	0.0199
URS-4	0-2.5	OH	Gr si org clay	108.2	89.8	43.2	35	376	10.7	0.27	0.017	0.0143	2.7180
	5-7.5	OH	Gr org silt/ org clay	211.5	76.5	24.6	145	649	4.5	0.52	0.057	0.0112	0.0084
	15-17.5	OH	Br gr org clay	101.4	89	44.2	301	820	2.7	0.33	0.031	0.0153	0.0032
RCM-1	40-42.5	CL	Gr clayey si/si clay w tr org	50.0	105.6	70.4	1,050	1,834	1.7	0.20	0.027	0.0458	1.0480
	0-1	CH	Dk to lt gr fat clay w org	105.2	89.8	43.8	10	402	>10	0.24	0.018	0.0168	0.3450

Notes: OCR = overconsolidation ratio

CR = compression ratio

RR = recompression ratio

SR = swelling ratio

cv(virgin) = coefficient of consolidation during virgin compression

cv(rec) = coefficient of consolidation during recompression

Table 3.6-3: Sediment Chemical Sample Results

Sample Number	Sample Depth [ft]	Sample Location	General Chemistry				Metal Results			AVS-SEM Results [mg/Kg d.w.]			TCLP Results	
			pH	TOC [% d.w.]	Chloride [mg/Kg]	Solids [%]	Copper [mg/Kg d.w.]	Zinc [mg/Kg d.w.]	Sulfide, Acid Volatile	Copper	Zinc	Copper [mg/L]	Zinc [mg/L]	
RCM 1-1	0-1	Bottom	6.24	2.60	5940	45.5	865 J	6940	607	322	7410	<0.02	54.4	
RCM 1-2	1-2	Bottom	6.10	2.70		47.2	4010 J	10000	544	1110	8890			
RCM 2-1	0-1	Bottom	7.78	3.72	7380	32.7	7350 J	6120	5920	1790	6330	<0.02	0.70	
RCM 2-2	1-2	Bottom	7.82	16.7		21.0	220 J	347	122	119	272			
RCM 3-1	0-1	Bank	7.60	12.1		25.4	153 J	949	453	40.9	630			
RCM 3-2	1-2	Bank	7.68	16.9		19.8	32.5 J	458	81.4	2.1	320			
RCM 4-1	0-1	Bank	7.89	12.9		23.8	80.1 J	2110	1040	37.7	2170			
RCM 4-2	1-2	Bank	7.88	13.9		23.4	61.3 J	327	121	6.9	224			
RCM 5-1	0-1	Bottom	7.57	2.85	5300	41.3	9680 J	4710	2320	8810	4960			
RCM 5-2	1-2	Bottom	7.68	2.31		41.2	5150 J	3750	4180	4170	3850			
RCM 6-1	0-1	Bank	7.15	2.85		42.6	138 J	985	572	102	886			
RCM 6-2	1-2	Bank	7.60	1.45		51.4	209 J	731	413	183	762			
RCM 7-1	0-1	Bank	7.53	2.35		47.7	389 J	752	609	373	673			
RCM 7-2	1-2	Bank	7.67	2.26		46.9	2520 J	3780	5570	3220	4800			
RCM-9	0-1	Bottom	7.29	3.13		43.4	52000	18500	<0.4 R	20700	11400	0.03	35.0	
RCM-10	0-1	Bottom	7.68	4.39		37.8	93200	36300	<0.4 R	9690	32800	0.04	127	

Notes:
d.w. - dry weight
J - estimated value
R - rejected

Table 3.6-4: Sediment Chemical Sample Results for New Alignment

	Sample Number		Wetland Surface Material		Wetland Foundation Material	
	NSCM-1	NSCM-2	Concentration	Decision Basis	Concentration	Decision Basis
Sample Depth (ft)	2-5	2-5				
Anthracene	ND	ND	88	Ambient Values	1100	ER-M
Di-n-butyl Phthalate	ND	53				
Fluoranthene	33	14	514	Ambient Values	5100	ER-M
Pyrene	47	14	665	Ambient Values	2600	ER-M
Butyl Benzyl Phthalate	ND	ND				
3,3'-Dichlorobenzidine	ND	ND				
Benz(a)anthracene	19	11	412	Ambient Values	1600	ER-M
Chrysene	20	12				
Bis(2-ethylhexyl) Phthalate	320	1100				
Di-n-octyl Phthalate	ND	ND				
Benzo(b)fluoranthene	28	ND	371	Ambient Values		
Benzo(k)fluoranthene	9.5	ND	371	Ambient Values		
Benzo(a)pyrene	25	ND	371	Ambient Values	1600	ER-M
Indeno(1,2,3-cd)pyrene	21	ND	382	Ambient Values		
Dibenz(a,h)anthracene	ND	ND				
Benzo(g,h,i)perylene	26	ND	310	Ambient Values		

* Draft Staff Report - Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines, May 2000, San Francisco Bay Regional Water Quality Control Board Staff

** Chlordanes, sum

*** DDTs, sum

**** PCBs, sum

Table 3.6-4: Sediment Chemical Sample Results for New Alignment

	Sample Number		NSCM-2	Wetland Surface Material		Wetland Foundation Material	
	NSCM-1	2-5		Concentration	Decision Basis	Concentration	Decision Basis
Sample Depth (ft)	2-5	2-5	2-5				
Bis(2-chloroethoxy)methane	ND	ND	ND				
2,4-Dichlorophenol	ND	ND	ND				
Benzoic Acid	ND	120	120				
1,2,4-Trichlorobenzene	ND	ND	ND				
Naphthalene	ND	10	10	55.8	Ambient Values	2100	ER-M
4-Chloroaniline	ND	ND	ND				
Hexachlorobutadiene	ND	ND	ND				
4-Chloro-3-methylphenol	ND	ND	ND				
2-Methylnaphthalene	ND	ND	ND	19.4	Ambient Values	670	ER-M
Hexachlorocyclopentadiene	ND	ND	ND				
2,4,6-Trichlorophenol	ND	ND	ND				
2,4,5-Trichlorophenol	ND	ND	ND				
2-Chloronaphthalene	ND	ND	ND				
2-Nitroaniline	ND	ND	ND				
Acenaphthylene	ND	ND	ND	88	Ambient Values	640	ER-M
Dimethyl Phthalate	ND	ND	ND				
2,6-Dinitrotoluene	ND	ND	ND				
Acenaphthene	ND	ND	ND	26	Ambient Values	500	ER-M
3-Nitroaniline	ND	ND	ND				
2,4-Dinitrophenol	ND	ND	ND				
Dibenzofuran	ND	ND	ND				
4-Nitrophenol	ND	ND	ND				
2,4-Dinitrotoluene	ND	ND	ND				
Fluorene	ND	ND	ND	25.3	Ambient Values	540	ER-M
4-Chlorophenyl Phenyl Ether	ND	ND	ND				
Diethyl Phthalate	ND	17	17				
4-Nitroaniline	ND	ND	ND				
4,6-Dinitro-2-methylphenol	ND	ND	ND				
N-Nitrosodiphenylamine	5.8	5.8	5.8				
4-Bromophenyl Phenyl Ether	ND	ND	ND				
Hexachlorobenzene	ND	ND	ND				
Pentachlorophenol (PCP)	9.5	9.5	9.5				
Phenanthrene	12	12	14	237	Ambient Values	1500	ER-M

Table 3.6-4: Sediment Chemical Sample Results for New Alignment

	Sample Number		Wetland Surface Material		Wetland Foundation Material	
	NSCM-1	NSCM-2	Concentration	Decision Basis	Concentration	Decision Basis
Sample Depth (ft)	2-5	2-5				
Endosulfan II	ND	ND				
4,4' - DDD	ND	ND				
Endrin Aldehyde	ND	ND				
Endosulfan Sulfate	ND	ND				
4,4' - DDT	ND	ND	7***	Ambient Values	46.1***	ER-M
Endrin Ketone	ND	ND				
Methoxychlor	ND	7.9				
Toxaphene	ND	ND				
PCB Results (µg/Kg)						
Aroclor 1016	ND	ND	22.7****	ER-L	180****	ER-M
Aroclor 1221	ND	ND				
Aroclor 1232	ND	ND				
Aroclor 1242	ND	ND				
Aroclor 1248	ND	ND				
Aroclor 1254	ND	ND				
Aroclor 1260	ND	ND				
Semi-Volatile Results (µg/Kg)						
Bis(2-chloroethyl) Ether	ND	ND				
Phenol	9.6	ND				
2-Chlorophenol	ND	ND				
1,3-Dichlorobenzene	ND	ND				
1,4-Dichlorobenzene	ND	ND				
1,2-Dichlorobenzene	ND	ND				
Benzyl Alcohol	ND	14				
Bis(2-chloroisopropyl) Ether	ND	ND				
2-Methylphenol	ND	ND				
Hexachloroethane	ND	ND				
N-Nitrosodi-n-propylamine	ND	ND				
4-Methylphenol	ND	19				
Nitrobenzene	ND	ND				
Isophorone	ND	ND				
2-Nitrophenol	ND	ND				
2,4-Dimethylphenol	ND	ND				

Table 3.6-4: Sediment Chemical Sample Results for New Alignment

	Sample Number		Wetland Surface Material		Wetland Foundation Material	
	NSCM-1	NSCM-2	Concentration	Decision Basis	Concentration	Decision Basis
Sample Depth (ft)	2-5	2-5				
General Chemistry						
pH	7.82	6.78				
TOC (%)	1.57	12.2				
Solid (%)	43.9	23.5				
Metal Results (mg/Kg)						
Arsenic, Total	18.2	7.97	15.3	Ambient Values	70	ER-M
Cadmium, Total	1.19	1.26	0.33	Ambient Values	9.6	ER-M
Chromium, Total	68.5	61.5	112	Ambient Values	370	ER-M
Copper, Total	120	59	68.1	Ambient Values	270	ER-M
Lead, Total	32.3	9.85	43.2	Ambient Values	218	ER-M
Mercury, Total	0.58	0.05	0.43	Ambient Values	0.7	ER-M
Nickel, Total	65.8	63.7	112	Ambient Values	120	ER-M
Selenium, Total	1.7	1.5	0.64	Ambient Values		
Silver, Total	0.592	0.244	0.58	Ambient Values	3.7	ER-M
Zinc, Total	224	206	158	Ambient Values	410	ER-M
AVS-SEM Results (mg/Kg)						
Sulfide, Acid-Volatile	884	63.9				
Copper	127	7.4				
Zinc	148	146				
Pesticide Results (µg/Kg)						
alpha-BHC	ND	ND				
beta-BHC	0.45	ND				
gamma-BHC (Lindane)	ND	ND				
delta-BHC	ND	ND				
Heptachlor	ND	ND				
Aldrin	ND	ND				
Heptachlor Epoxide	ND	ND				
gamma-Chlordane	ND	ND	2.3**	TEL	4.8**	PEL
Endosulfan I	ND	ND				
alpha-Chlordane	ND	ND				
Dieldrin	ND	ND	0.72	TEL	4.3	PEL
4,4' - DDE	ND	ND				
Endrin	ND	ND				

Table 3.6-5: Summary of Existing Slough Bottom and Bank Data

Nearest Station	Sample	Depth (ft)	Cu (mg/kg)	Zn (mg/kg)	Location	Data Source
Slough Segment 1						
1+00	7	0	3,200	3,810	Bottom	HLA (1998/1999)
3+00	S5W	0	411	2,857	West Bank	URS (2001)
3+00	S5W	2	316	186	West Bank	URS (2001)
4+00	S5E	0	866	519	East Bank	URS (2001)
6+00	S4E	0	693	1,255	East Bank	URS (2001)
7+00	S4W	0	476	1,039	West Bank	URS (2001)
7+00	6	0	156	398	Bottom	HLA (1998/1999)
15+00	S3E	0	823	1,558	East Bank	URS (2001)
Slough Segment 2						
15+00	S3W	0	2,424	2,208	West Bank	URS (2001)
15+00	S3W	3	312	433	West Bank	URS (2001)
15+00	5	0	705	1,310	Bottom	HLA (1998/1999)
16+00	RA 10	0	1,900	1,400	West Bank	URS (2001)
16+00	RA 10	2	390	450	West Bank	URS (2001)
16+00	S3	0	280	360	West Bank	URS (2000)
18+00	RCM-3-1	0	153	949	West Bank	URS (2002)
18+00	RCM-3-2	1	32.5	458	West Bank	URS (2002)
18+00	RCM-2-1	0	7,350	6,120	Bottom	URS (2002)
18+00	RCM-2-2	1	220	347	Bottom	URS (2002)
18+00	RCM-4-1	0	80.1	2,110	East Bank	URS (2002)
18+00	RCM-4-2	1	61.3	327	East Bank	URS (2002)
19+00	S4	0	270	3,800	West Bank	URS (2000)
19+00	4	0	53,900	25,100	Bottom	HLA (1998/1999)
21+00	S2E	0	4,329	2,251	East Bank	URS (2001)
21+00	S2E	2	126	342	East Bank	URS (2001)
23+00	S2W	0	823	909	West Bank	URS (2001)
Slough Segment 3						
24+00	3	0	950	3,180	East Bank	HLA (1998/1999)
27+00	2	0	18,400	19,300	Bottom	HLA (1998/1999)
28+00	S1W	0	2,338	1,948	West Bank	URS (2001)
28+00	S1W	2	39.0	13,853	West Bank	URS (2001)
29+00	T-5	0.5	300	270	West Bank	URS (2001)
29+00	T-5	1	2,500	1,600	West Bank	URS (2001)
29+00	T-5	2	900	950	West Bank	URS (2001)
29+00	T-5	2.5	550	970	West Bank	URS (2001)
29+00	T-5	4	1,000	1,400	West Bank	URS (2001)
29+00	1	0	71,700	88,300	Bottom	HLA (1998/1999)
29+00	RCM-1-1	1	865	6,940	Bottom	URS (2002)
29+00	RCM-1-2	2	4,010	10,000	Bottom	URS (2002)
29+00	S1E	0	143	1,026	East Bank	URS (2001)
30+00	7	0	121,000	7,680	Bottom	HLA (1998/1999)
30+00	PP4	0	43	110	East Bank	URS (2001)
Slough Segment 4						
31+00	6	0	2980	1,220	Bottom	HLA (1998/1999)
31+00	8	0	99,000	12,000	Bottom	CH2M Hill (1986)
31+00	N9	0	5,900	910	East Bank	URS (2000)
31+00	PP5	0	36	96	East Bank	URS (2001)
32+00	N1W	0	157	501	West Bank	URS (2001)
32+00	7	0	9,000	13,000	Bottom	CH2M Hill (1986)
33+00	6	0	452,000	17,000	Bottom	CH2M Hill (1986)
33+00	N1E	0	2,714	4,175	East Bank	URS (2001)

Table 3.6-5: Summary of Existing Slough Bottom and Bank Data

Nearest Station	Sample	Depth (ft)	Cu (mg/kg)	Zn (mg/kg)	Location	Data Source
34+00	5	0	176,000	3,500	Bottom	CH2M Hill (1986)
34+00	RCM-9	0	52,000	93,200	Bottom	URS (2002)
35+00	RCM-10	0	18,500	36,300	Bottom	URS (2002)
35+00	5	0	61,100	21,700	Bottom	HLA (1998/1999)
Slough Segment 5						
36+00	N2E	0	163	205	East Bank	URS (2001)
37+00	N2W	0	157	230	West Bank	URS (2001)
38+00	4	0	10,300	7,260	Bottom	HLA (1998/1999)
39+00	RCM-7-1	0	389	752	West Bank	URS (2002)
39+00	RCM-7-2	1	2,520	3,780	West Bank	URS (2002)
39+00	RCM-5-1	0	9,680	4,710	Bottom	URS (2002)
39+00	RCM-5-2	1	5,150	3,750	Bottom	URS (2002)
39+00	RCM-6-1	0	138	985	East Bank	URS (2002)
39+00	RCM-6-2	1	209	731	East Bank	URS (2002)
40+00	4	0	4,000	4,000	West Bank	CH2M Hill (1986)
40+00	N3E	0	157	292	Bottom	URS (2001)
40+00	North SL1 Mouth	0	85	158	Bottom	URS (2000)
42+00	N3W	0	132	313	West Bank	URS (2001)
42+00	3	0	3,980	2,830	Bottom	HLA (1998/1999)
45+00	N4E	0	814	2,923	East Bank	URS (2001)
45+00	N4E	3	230	1,712	East Bank	URS (2001)
46+00	N4W	0	20.0	79	West Bank	URS (2001)
46+00	3	0	2,300	1,400	Bottom	CH2M Hill (1986)
Slough Segment 6						
50+00	2	0	501	1,640	Bottom	HLA (1998/1999)
52+00	N5W	0	171	689	West Bank	URS (2001)
52+00	2	0	100	200	Bottom	CH2M Hill (1986)
53+00	N5E	0	71	192	Bottom	URS (2001)
53+00	1	0	1,610	2,120	Bottom	HLA (1998/1999)

Table 3.6-6: Porewater Chemical Sample Results

Sample Number	Sample Depth [ft]	Sample Location	General Chemistry				Metal Results			
			pH	TOC [mg/L]	DOC [mg/L]	Salinity [ppt]	Copper		Zinc	
RCM 1-1	0-1	Bottom	6.75	34.2	34.0	9.7	Total [µg/L] 5.1 J	Dissolved [µg/L] <3.0	Total [µg/L] 73800	Dissolved [µg/L] 77500
RCM 1-2	1-2	Bottom	7.01	29.4	29.8	14.1	39.8	<3.0	166000	171000
RCM 2-1	0-1	Bottom	7.92	44.7	43.8	7.5	11.9	3.1 J	28.5	5.1 J
RCM 2-2	1-2	Bottom	7.86	71.5	67.0	11.8	35.9	<3.0	433	9.8 J
RCM 3-1	0-1	Bank	8.04	37.0	33.2	4.7	10.9	<3.0	17.7	3.3 J
RCM 3-2	1-2	Bank	7.61	59.4	62.3	6.2	<3.0	<3.0	9.8 J	<3.0
RCM 4-1	0-1	Bank	7.91	67.6	65.6	5.3	58.4	4.4 J	235	8.0 J
RCM 4-2	1-2	Bank	8.38	64.9	66.5	5.4	<3.0	<3.0	31.4	27.3
RCM 5-1	0-1	Bottom	7.96	220	226	5.5	1450	358	1150	319
RCM 5-2	1-2	Bottom	7.99	130	132	5.5	30.5	3.7 J	55.8	27.1
RCM 6-1	0-1	Bank	7.82	14.5	14.8	10.5	3.8 J	<3.0	74.5	61.2
RCM 6-2	1-2	Bank	8.15	25.2	25.5	8.9	36.5	<3.0	120	77.3
RCM 7-1	0-1	Bank	7.45	14.7	14.9	10.8	11.2	<3.0	180	148
RCM 7-2	1-2	Bank	7.98	54.3	51.8	8.3	33.7	6.1	301	268
RCM-9	0-1	Bottom	7.35	94.2	84.0	6.6	867	221	681	301
RCM-10	0-1	Bottom	7.56	129	108	6.9	1080	274	588	241

J - estimated value
 UJ - estimated non-detect

Table 3.6-7: Summary of Qualified Data

Sample ID	Analyte	Result	Units	Qualification	Comment
RCM-1-1	Copper, in sediment	865	mg/kg	J	1
RCM-1-2		4,010	mg/kg	J	
RCM-2-1		7,350	mg/kg	J	
RCM-2-2		220	mg/kg	J	
RCM-3-1		153	mg/kg	J	
RCM-3-2		32.5	mg/kg	J	
RCM-4-1		80.1	mg/kg	J	
RCM-4-2		61.3	mg/kg	J	
RCM-5-1		9,680	mg/kg	J	
RCM-5-2		5,150	mg/kg	J	
RCM-6-1		138	mg/kg	J	
RCM-6-2		209	mg/kg	J	
RCM-7-1		389	mg/kg	J	
RCM-7-2		2,520	mg/kg	J	
RCM-9	Sulfide, Acid Volatile	<0.4	mg/kg	R	2
RCM-10		<0.4	mg/kg	R	
SPCM-1		<0.5	mg/kg	R	

Notes:

J – estimated concentration

R – rejected

1) High lab duplicate RPD – qualified as estimated to indicate imprecise results.

2) Very low MS/MSD recoveries – rejected to indicate uncertainty associated with these data.

Table 3.6-8: Physical and Compressibility Properties of Soft Sediment Cap Materials

Source of Material	USCS Classification	Specific Gravity G_s	Estimated Placement Density and Moisture			Porosity n (%)	Void Ratio e	Estimated Compression Index C_c	Liquid Limit LL (%)	Estimated Coefficient for Consolidation C_v (ft ² /day)
			Total Density (pcf)	Dry Density (pcf)	Moisture Content (%)					
New Alignment NSCM-1	CH	2.74	90.0	47.4	90	72	2.61	1	80	0.015
New Alignment NSCM-2	MH	2.33	70.0	20.0	250	86	6.14	4	157	0.007
Import Borrow (off-site) Source	CH	2.70 (estimated)	105.0	75.0	40	55	1.22	0.4	60 (estimated)	0.03

Table 3.6-8: Physical and Compressibility Properties of Soft Sediment Cap Materials

Source of Material	USCS Classification	Specific Gravity G_s	Estimated Placement Density and Moisture			Porosity n (%)	Void Ratio e	Estimated Compression Index C_c	Liquid Limit LL (%)	Estimated Coefficient for Consolidation C_v (ft ² /day)
			Total Density (pcf)	Dry Density (pcf)	Moisture Content (%)					
New Alignment NSCM-1	CH	2.74	90.0	47.4	90	72	2.61	1	80	0.015
New Alignment NSCM-2	MH	2.33	70.0	20.0	250	86	6.14	4	157	0.007
Import Borrow (off-site) Source	CH	2.70 (estimated)	105.0	75.0	40	55	1.22	0.4	60 (estimated)	0.03

Table 3.6-9: Prediction of Soft Sediment Cap Self Consolidation

Soft Sediment Cap Thickness	Total Density of Cap Material	Predicted Self-Consolidation	Estimated Time for 95% Consolidation Single Drainage	Estimated Degree of Consolidation After 30 Days
(feet)	(pcf)	(inches)	(days)	(%)
3	70	9 to 10	1,543	<5
3	90	4 to 5	720	10
3	105	3	360	20
4	70	12 to 16	2,743	<2.5
4	90	6 to 8	1,280	5
4	105	4 to 5	640	10
6	70	26 to 30	6,171	<1
6	90	12 to 14	2,880	<2.5
6	105	9 to 10	1,440	<5

Table 3.6-10: Estimated Long Term Subsoil Settlements - Cap Design

Fill Conditions			Settlement		
Thickness (feet)	Width (feet)	Unit Weight (pcf)	West Edge (inches)	Centerline (inches)	East Edge (inches)
Segment 1 - STATION 1+00 TO 15+00 (BORING URS-1)					
3.9	50	90	1	8.5	1
3.9	50	105	1.5	13.2	1.5
Segment 2A - STATION 15+00 TO 20+00 (BORING URS-1)					
4.6	66	90	1.3	10.4	0.9
4.6	66	105	1.9	16.4	1.3
Segment 2B - STATION 20+00 TO 24+00 (BORING URS-2)					
4.3	64	90	1.2	11.4	0.9
4.3	64	105	1.8	20.1	1.3
Segment 3A - STATION 24+00 TO 26+00 (BORING URS-2)					
5.5	84	90	1.1	16.9	1.1
5.5	84	105	1.7	29.3	1.6
Segment 3B - STATION 26+00 TO 30+00 (BORING URS-2, SAMPLE RCM1) (1)					
6.0	71	90	1.9	32.1	1.4
6.0	71	105	2.8	47.9	2.1
Segment 3B - STATION 26+00 TO 30+00 (BORING URS-2, SAMPLE RCM1) (2)					
6.0	71	90	3.1	53.7	2.4
6.0	71	105	3.9	67.6	3.0
Tide Gate Area - STATION 31+00 TO SOUTH SIDE (BORING URS-2) (1)					
4'cap + 2.5'LWA	52.5	90	1.5	24.2	1.4
4'cap + 2.5'LWA	52.5	105	2.1	34.0	2.0
Tide Gate Area - STATION 31+00 TO SOUTH SIDE (BORING URS-2) (2)					
4'cap + 2.5'LWA	52.5	90	2.7	43.8	2.6
4'cap + 2.5'LWA	52.5	105	3.3	52.2	3.1
Tide Gate Area - STATION 31+00 TO NORTH SIDE (BORING URS-2) (1)					
4'cap + 5'LWA	53.5	90	1.8	28.7	1.7
4'cap + 5'LWA	53.5	105	2.4	38.2	2.2
Tide Gate Area - STATION 31+00 TO NORTH SIDE (BORING URS-2) (2)					
4'cap + 5'LWA	53.5	90	2.4	38.6	2.3
4'cap + 5'LWA	53.5	105	2.9	47.4	2.8
Segment 4 - STATION 32+00 TO 35+00 (BORING URS-4) (1)					
6.3	70	90	0.5	8.4	0.5
6.3	70	105	0.7	14.1	0.7
Segment 4 - STATION 32+00 TO 35+00 (BORING URS-4) (3)					
6.3	70	90	0.6	12.1	0.6
6.3	70	105	0.9	18.0	0.9
Segment 5A - STATION 35+00 TO 37+00 (BORING URS-4)					
5.3	56	90	0.4	6.7	0.5
5.3	56	105	0.7	11.1	0.7
Segment 5B - STATION 37+00 TO 47+00 (BORING URS-4)					
6	52	90	0.6	7.6	0.5
6	52	105	0.8	12.6	0.8
Segment 6 - STATION 47+00 TO 53+00 (BORING URS-3)					
6.3	66	90	0.3	7.4	0.3
6.3	66	105	0.5	10.7	0.4

Note 1 - Groundwater at ground surface

Note 2 - Groundwater at 2 feet below ground surface (bgs)

Note 3 - Groundwater at 1 foot bgs

Table 3.6-11: Estimated Total Settlement and Time Rates (Cap and Subsoil)

Fill Conditions			Settlement at One Year			Time and Settlement for 95% Consolidation			
Thickness (feet)	Width (feet)	Unit Weight (pcf)	West Edge (inches)	Centerline (inches)	East Edge (inches)	Time (years)	West Edge (inches)	Centerline (inches)	East Edge (inches)
Segment 1 - STATION 1+00 TO 15+00 (BORING URS-1)									
3.9	50	90	3.4	4.8	3.4	43-50	4.5	11.4	4.5
3.9	50	105	2.6	4.9	2.6	43-53	3.7	13.6	3.7
Segment 2A - STATION 15+00 TO 20+00 (BORING URS-1)									
4.6	66	90	4.6	6.1	4.5	45-54	7.4	15.4	7.1
4.6	66	105	4.0	6.2	3.9	45-59	5.8	18.0	5.3
Segment 2B - STATION 20+00 TO 24+00 (BORING URS-2)									
4.3	64	90	4.6	6.3	4.5	23-42	7.1	15.2	6.8
4.3	64	105	4.1	7.0	3.9	23-50	5.5	20.3	5.0
Segment 3A - STATION 24+00 TO 26+00 (BORING URS-2)									
5.5	84	90	4.7	8.0	4.7	25-53	7.5	26.4	7.4
5.5	84	105	4.1	9.2	4.1	25-63	5.8	34.5	5.7
Segment 3B - STATION 26+00 TO 30+00 (BORING URS-2, SAMPLE RCM1) (1)									
6.0	71	90	4.9	11.0	4.8	24-56	8.2	43.2	7.7
6.0	71	105	4.4	12.5	4.2	24-73	6.8	53.8	6.2
Segment 3B - STATION 26+00 TO 30+00 (BORING URS-2, SAMPLE RCM1) (2)									
6.0	71	90	5.9	13.0	5.8	24-66	11.9	68.0	11.2
6.0	71	105	5.4	14.5	5.2	24-73	9.1	74.5	8.3
Tide Gate Area - STATION 31+00 TO SOUTH SIDE (BORING URS-2) (1)									
4'cap + 2.5'LWA	52.5	90	4.8	8.7	4.8	24-56	7.9	30.5	7.8
4'cap + 2.5'LWA	52.5	105	4.3	9.6	4.3	24-73	6.3	38.1	6.2
Tide Gate Area - STATION 31+00 TO SOUTH SIDE (BORING URS-2) (2)									
4'cap + 2.5'LWA	52.5	90	6.9	13.5	6.9	24-66	11.7	52.7	11.5
4'cap + 2.5'LWA	52.5	105	5.8	13.1	5.7	24-73	8.7	57.6	8.5
Tide Gate Area - STATION 31+00 TO NORTH SIDE (BORING URS-2) (1)									
4'cap + 5'LWA	53.5	90	4.9	9.5	4.8	24-56	8.2	35.1	8.1
4'cap + 5'LWA	53.5	105	4.4	10.2	4.3	24-73	6.5	42.4	6.4
Tide Gate Area - STATION 31+00 TO NORTH SIDE (BORING URS-2) (2)									
4'cap + 5'LWA	53.5	90	7.0	12.8	6.9	24-66	11.6	47.8	11.5
4'cap + 5'LWA	53.5	105	5.7	12.8	5.7	24-73	8.4	58.9	8.3
Segment 4 - STATION 32+00 TO 35+00 (BORING URS-4) (1)									
6.3	70	90	4.5	7.3	4.5	43-49	6.8	21.3	6.8
6.3	70	105	3.8	7.7	3.8	43-57	4.8	22.1	4.8
Segment 4 - STATION 32+00 TO 35+00 (BORING URS-4) (3)									
6.3	70	90	5.0	8.3	5.0	43-56	9.8	28.7	9.8
6.3	70	105	4.2	8.7	4.2	43-59	6.3	27.5	6.3
Segment 5A - STATION 35+00 TO 37+00 (BORING URS-4)									
5.3	56	90	4.5	6.4	4.5	40-42	6.8	16.4	6.8
5.3	56	105	3.8	6.6	3.8	40-51	4.8	17.0	4.8
Segment 5B - STATION 37+00 TO 47+00 (BORING URS-4)									
6	52	90	4.5	7.3	4.5	40-44	6.9	19.9	6.9
6	52	105	3.9	7.4	3.8	40-51	4.9	20.2	4.9
Segment 6 - STATION 47+00 TO 53+00 (BORING URS-3)									
6.3	66	90	4.5	7.1	4.5	39-46	6.7	20.4	6.6
6.3	66	105	3.8	7.2	3.8	39-50	4.6	18.8	4.5
Note 1 - Groundwater at ground surface									
Note 2 - Groundwater at 2 feet below ground surface (bgs)									
Note 3 - Groundwater at 1 foot bgs									

Table 3.6-12: Key Model Input Parameters

Station			1+00 - 15+00	15+00 - 24+00	24+00 - 35+00	35+00 - 47+00	47+00 - mouth
Ground Water Well			MW8A MW25	MW3A	MW19/MW4A	MW18	MW62
Wetland/ Upland			Wetland	Wetland	Upland	Wetland	Wetland
Cap Section							
Initial Cap Thickness (feet)			3	3	4	3	3
Consolidation (inches)			9.5	12	35	8.4	8
Bioturbation Layer (inches)			18	18	18	18	18
Porosity (%)			86 ⁽¹⁾	86	73	78	80 ⁽²⁾
Concentration (Sampling Location) ⁽³⁾	Sediment (mg/kg)	Cu	7350 (RCM2-1)	220 (RCM2-2)	93,200 (RCM10)	9680 (RCM5-1)	2520 (RCM7-2)
		Zn	6120 (RCM2-1)	347 (RCM2-2)	10,000 (RCM1-2)	4710 (RCM5-1)	3780 (RCM7-2)
	Porewater (mg/L)	Cu	11.9 ⁽⁴⁾ (RCM2-1)	35.9 (RCM2-2)	1080 (RCM10)	1450 (RCM5-1)	33.7 ⁽⁴⁾ (RCM7-2)
		Zn	28.5 ⁽⁴⁾ (RCM2-1)	433 (RCM2-2)	166,000 (RCM1-2)	1150 (RCM5-1)	301 ⁽⁴⁾ (RCM7-2)
Horizontal Seepage (ft/yr)			0.7	0.7	0.7	0.7 - 1.4	0.068
Groundwater Concentration	Cu (mg/L)		12	770	13	13	12
	Zn (mg/L)		19	2410	70000	437000	5
	Cu Flux (mg/yr/ft ²)		0.0031	0.2	0.0034	0.0035	0.023
	Zn Flux (mg/yr/ft ²)		0.005	0.63	18	114	0.0096
Wet Density of the Cap (pcf)			90				
TOC(%)			1.57				
Self Consolidation (inches)			5	6.5	8	6.5	6.5
Total Porosity (%)			72				
Cu (mg/kg)			59				
Zn (mg/kg)			206				

(1) No historical porosity data exists at this site, and this porosity data is from the nearest sampling locations, RCM 2-1 and 2-2.

(2) No historical porosity data exists at this site, and this porosity data is from the nearest sampling locations, RCM 5-1 and 5-2.

(3) Highest metal concentration in bottom sediment porewater in each section are selected.

(4) The porewater concentrations selected for stations 0+00 - 15+00 and 47+00 - mouth are RCM 2-1 and RCM 7-2, respectively, which are based on the closeness of location and sediment concentrations. Historical Cu and Zn concentrations in the sediment for these stations are:

Concentration (mg/kg)	0+00 - 15+00	47+00 - mouth
Cu	3200	1610
Zn	3810	2120

**Table 3.6-13: Summary of Flux Model Results
(No Vertical Seepage)**

Station		1+00 - 15+00	15+00 - 24+00	24+00 - 35+00	35+00 - 47+00	47+00 - mouth
Cap Thickness		3	3	4	3	3
Leff (ft)	Cu	1.08	0.96	1.83	0.96	0.96
	Zn	1.08	0.96	1.82	0.96	0.96
tb (yr)	Cu	337,500	109,200	26,240	5,664	114,900
	Zn	17,970	2,748	279	1,530	3,419
Cb (mg/L)	Cu	0.03	0.09	2.7	3.6	0.08
	Zn	0.07	1.08	415	2.9	0.75
Wb (mg/kg)	Cu	23	28	56	59	28
	Zn	2.9	9	93	13	7.4
tss (yr)	Cu	2,306,000	746,100	179,300	38,710	784,900
	Zn	122,800	18,780	1,909	10,450	23,360
Css (mg/L)	Cu	2.9	8.9	267	359	8.3
	Zn	7.1	107	41,090	285	74
Wss (mg/kg)	Cu	2,244	2,799	5,530	5,865	2,764
	Zn	286	850	9,180	1,256	735
Coc (mg/L)	Cu			3.1		
	Zn			81		
Woc (mg/kg)	Cu			270		
	Zn			410		

Notes:

Leff = Effective cap thickness after consolidation of cap and underlying sediments minus bioturbation layer

tb = Time until 5% of steady state flux at the bottom of bioturbation layer

Cb = Porewater concentration at tb

Wb = Sediment concentration at tb

tss = Time until 95% of steady state flux at the bottom of bioturbation layer

Css = Steady state porewater concentration at bottom of bioturbation layer at time equals tss

Wss = Steady state sediment concentration at bottom of bioturbation layer at time equals tss

Coc = San Francisco Bay chronic water quality criteria

Woc = Sediment criteria (ERM)

BOLD = Concentration exceeded criteria

**Table 3.6-14: Summary of Flux Model Results
(0.1 cm/yr Vertical Seepage)**

Station		1+00 - 15+00	15+00 - 24+00	24+00 - 35+00	35+00 - 47+00	47+00 - mouth
Cap Thickness		3	3	4	3	3
Leff (ft)	Cu	1.08	0.96	1.83	0.96	0.96
	Zn	1.08	0.96	1.82	0.96	0.96
tb (yr)	Cu	337,500	109,200	26,240	5,664	114,900
	Zn	17,970	2,748	279	1,530	3,419
Cb (mg/L)	Cu	0.05	0.14	4.7	5.6	0.13
	Zn	0.11	1.66	728	4.4	1.2
Wb (mg/kg)	Cu	35	43	98	91	43
	Zn	4.4	13	163	19	11
tss (yr)	Cu	2,306,000	746,100	179,300	38,710	784,900
	Zn	122,800	18,780	1,909	10,450	23,360
Css (mg/L)	Cu	3.2	9.7	304	394	9.2
	Zn	7.8	118	46,670	312	82
Wss (mg/kg)	Cu	2,466	3,071	6,283	6,434	3,032
	Zn	315	932	10,430	1378	806
Coc (mg/L)	Cu			3.1		
	Zn			81		
Woc (mg/kg)	Cu			270		
	Zn			410		

Notes:

Leff = Effective cap thickness after consolidation of cap and underlying sediments minus bioturbation layer

tb = Time until 5% of steady state flux at the bottom of bioturbation layer

Cb = Porewater concentration at tb

Wb = Sediment concentration at tb

tss = Time until 95% of steady state flux at the bottom of bioturbation layer

Css = Steady state porewater concentration at bottom of bioturbation layer at time equals tss

Wss = Steady state sediment concentration at bottom of bioturbation layer at time equals tss

Coc = Water criteria

Woc = Sediment criteria (ERM)

BOLD = Concentration exceeded criteria

**Table 3.6-15: West to East Groundwater Flow Impact on Cap
(Predicted concentrations at horizontal distances into west side of the Cap)**

Station	1+00 - 15+00	15+00 - 24+00	24+00 - 35+00	24+00 - 35+00	35+00 - 47+00	47+00 - mouth		
Horizontal Seepage (ft/yr)	0.7	0.7	0.7	1.4	0.068	0.068		
Impact Horizontal Distance (ft)	0.2	0.6	4.5	6.5	0.06	0.02		
30 Years After Capping	Porewater (µg/L)	0.0	0.0	0.0	0.0	0.7	0.4	
	Zn	0.1	0.002	0.0	0.0	1.7	1.3	
50 Years After Capping	Sediment (mg/kg)	0.0	0.0	0.0	0.0	12	5.7	
	Zn	2.8	0.0	0.0	0.0	7.4	31	
100 Years After Capping	Porewater (µg/L)	0.0	0.0	0.0	0.0	1.8	1.1	
	Zn	2.9	1.3	0.09	0.04	2.3	1.9	
Chronic Water Quality Criteria (µg/L)	Cu	0.0	0.0	0.0	0.0	29	18	
	Zn	119	11	0.02	0.01	10	8.5	
Sediment Criteria (ERM) (mg/kg)	Cu	0.0	0.0	0.0	0.0	3.7	2.8	
	Zn	55	1.5	191	172	3.0	2.7	
Sediment (mg/kg)	Cu	0.0	0.0	0.0	0.0	60	46	
	Zn	2,226	60	43	38	13	39	
Chronic Water Quality Criteria (µg/L)	Cu						3.1	
	Zn						81	
Sediment Criteria (ERM) (mg/kg)	Cu						270	
	Zn						410	

Note: Bold indicates concentration exceeds criterion