

Table B, Suisun Bay Channel and New York Slough FY 1994 Cost Comparison

DESCRIPTION	QUANTITY	AMOUNT	UNIT PRICE
MOB/DEMOB	1 JOB	\$173,000.00	LUMPSUM
SUISUN/JERSEY	40,000 CYS	\$680,000.00	\$17 PER CY
NY/JERSEY	25,000 CYS	\$300,000.00	\$12 PER CY
SUISUN/IN-BAY	16,331 CYS	\$57,158.50	\$3.50 PER CY
NY/JERSEY OVERRUN	7,519 CYS	\$86,618.88	\$11.52 PER CY
OVERRUN MOB/DEMOB	1 JOB	\$20,000.00	LUMPSUM
TOTAL *	72,719 CYS	\$1,259,618.80	

* This denotes the amount of dredged material placed only at Jersey Island and the cost.

4.0 THE REGULATORY PROCESS

One of the lessons learned is the complexity of Federal-State-Local inter-agency coordination. Coordination with multiple agencies can be complex and is often enough to discourage private interests who might otherwise consider participating in such projects.

Planning complexities were compounded since dredging and disposal of the material occurred in two separate jurisdictions of the COE and RWQCB. Both Suisun Bay Channel and New York Slough dredging is the responsibility of the San Francisco District COE while the disposal of the dredged material at Jersey Island is within the Sacramento District COE's jurisdiction. The same is true for the SFBRWQCB and the Central Valley RWQCB, respectively.

The BCDC's jurisdictional boundary lies within the dredging and aquatic disposal areas pursuant to the Coastal Zone Management Act. The Consistency Determination (CD) concurrence between the SFCOE and the BCDC stipulated upland disposal for the New York Slough material, and strongly recommended the same for the Suisun Bay Channel material, supporting the requirements of the two year Waste Discharge Order between the SFCOE and the SFBRWQCB. However, as agreed upon within the CD and Waste Discharge Order, if no such upland site existed by the time dredging took place then disposal would need to continue at the historically used Suisun Bay Disposal Site. Thus, the BCDC had the incentive to locate an upland site, becoming a major force in identifying a local interest for both channel's dredged material, in this case a State water development agency, the Department of Water Resources.

The 1986 Water Resources Development Act requires the local sponsor to provide all necessary lands, easements, right of ways, and disposal sites. The Port of Stockton is technically the responsible local sponsor, however at the time of the Jersey Island Demonstration Project negotiations were underway to transfer this responsibility to Contra Costa County. Although the Suisun Bay Channel is bisected lengthwise and part lies within Solono County, the primary industrial benefactors of this ship channel are located within Contra Costa County, making it the logical county to accept local sponsorship. Currently, COE headquarters in Washington D.C. is working on a new Project Cooperative Agreement which will transfer local sponsorship from the Port of Stockton to Contra Costa County. This will eliminate the COE Sacramento District's jurisdiction for this federal navigation channel which lies within the San Francisco District boundaries. However, should Contra Costa County chose an upland site in adjacent counties to the east, then the COE Sacramento District would need to be consulted.

Since transfer of local sponsorship is not yet completed, the DWR accepted full liability in order to proceed with the project. The DWR then cost shared its financial responsibility (75%) with the Reclamation District 830 (25%), who had to receive permission from the local land owners, who own approximately 20 % of the Island, and the Iron House Sanitation District, who owns and manages the remaining 80%, to go ahead with the project.

Perhaps the most difficult obstacle confronting planners is the "race against the clock". The Federal government operates on a Fiscal Year which extends from October 1st to September 30th. This time constraint has ramifications for both establishing the dredged material quantities to be delivered and the negotiations for construction financing.

The first survey, the pre-condition survey, which reveals the initial quantity estimate, took place in December 1993. At that time there was approximately 40,000 CYS at Suisun Bay Channel and 25,000 CYS at New York Slough. These were the quantities used for planning the design and cost estimates to finance the project. The first meeting of the various agencies to discuss project implementation occurred in March 1994, at which time the COE offered to conduct the sediment testing. Testing is necessary in order to screen the sediment as to its suitability for upland disposal. This was done by a contractor in April 1994. However, the sediment test results were not known until June 1994. The material proved to be acceptable. At that time the DWR/RD 830 prepared a project description and applied for a Waste Discharge Order from the CVRWQCB. The CVRWQCB worked closely with the applicants to expedite the project and were able to place the permit request on their August 1994 agenda. Formal approval was received by mid-September 1994. The environmental assessment was completed by the end of funding, September 1994; the DWR/RD 830 provided their portion of the funding and the COE advertised and let the bid by September 30th 1994.

Planning for the Jersey Island Demonstration Project was under an extremely tight time frame, approximately six months. However, since there was a great desire and willingness for the project to succeed, there was a concerted effort by the involved agencies to expedite the planning process.

Prior to the onset of dredging, the COE performs a condition hydrosurvey to establish any changes in quantity and shoal locations. This was done in December 1994, one year after the pre-condition, and the quantities were determined to have increased in both channels due to shoaling: Suisun Bay Channel had an estimated 56,331 cubic yards, for an additional 16,331 cubic yards, and New York Slough Channel, 32,519 cubic yards, representing an additional 7,519 cubic yards.

A Request for Proposal (RFP) was sent to the Contractor on December 8, 1994. The RFP asked the Contractor to provide price proposals to dredge the additional yardage and to place the additional New York Slough material on Jersey Island and the additional Suisun Bay material in-bay and, alternatively, on Jersey Island. This would have required an additional \$216,000 of funding from the State if the Suisun material were to be placed onto Jersey Island. This amount was based on the bid amount of \$17 per CYS for Jersey Island placement and \$3.50 CYS for open water disposal at Suisun Bay. The difference of \$13.50 per CYS applied to the 16,000 additional CYS of material then became the responsibility of the State.

The State declined to pay for the extra yardage and so the COE disposed of the material aquatically at the Suisun Bay Disposal Site. The COE is required by law to conduct its operations in the most cost effective manner. In addition, the COE budgets two years in advance of the current fiscal year. Therefore, additional funding is not appropriated and available for projects that cost more than originally budgeted.

Lastly, due to the additional time required for planning and developing the project, and because project implementation occurred at a later date than usual, the COE was contacted twice by the San Francisco Bar Pilots Association regarding the formation of dangerous shoals within the Suisun Bay Channel (both in May and August 1994). Normally, this channel is dredged annually by June of the FY. For each emergency dredging event equipment had to be mobilized and the dredged material disposed of aquatically. This resulted in a greater inefficiency and additional cost to the public and the local sponsor who depends on a safe, navigable waterway to conduct commerce.

5.0 ENVIRONMENTAL ISSUES

Conspicuously excluded from the Regulatory Process Section is a discussion on environmental regulations. Compliance with environmental statutes protecting endangered/threatened species and water quality is mandatory and the explanation of each warrants a separate section in this report.

The primary reason for implementing the demonstration project is to maintain the levees at full function. If any of the levees on these eight islands fail, the brackish tidal prism would expand and return to its former extension further east, endangering both State and local water supplies given the intake location to the State Water Project.

A secondary reason for the pilot project is to investigate whether water quality impacts would result from the placement of saline dredged material onto Island levees. The concern with placement of these sediments at a location such as Jersey Island is the introduction of salts into the freshwater portions of the Delta. This residual salinity could have the potential for causing or contributing to an exceedance of State water quality objectives at the compliance point and in the receiving waters, thereby degrading fresh water quality. The Jersey Island Demonstration Project is a part of the continuing DWR effort to demonstrate the feasibility of using material dredged from the Bay-Delta Estuary for levee improvement and maintenance. Also, there was a joint interest as the COE was investigating beneficial reuse of dredged material.

Another component of the regulatory process was the need to interact with the United States Fish and Wildlife Service, National Marine Fisheries Service and the California Department of Fish and Game pursuant to Federal and State laws.

In order for the project to qualify for State SB 34 subvention and Federal O & M program funds, the above agencies needed to determine that the proposed action would not "result in a net long-term loss of riparian, fisheries, or wildlife habitat." There could also be no adverse impact to any listed or proposed listed endangered and threatened species.

For these reasons, the northern portion of Jersey Island, an approximate 300 foot-wide swath, adjacent to the San Joaquin and False Rivers, was surveyed on June 24 and 28, 1994 by the COE's staff ecologist, botanist and biologist. The purpose of these site visits was to map the existing emergent wetland vegetative communities and to verify the existence of any protected species. In order for the CDFG to find that there would be "no net loss" to these resources, the COE prepared two reports entitled Jersey Island Dredge Material Reuse Project, Project Impacts on Wetlands: Endangered and Rare Plant Species; and Riparian Habitats and Jersey Island Beneficial Reuse Demonstration Project, General Habitat Assessment. These reports were submitted to the CDFG in August 1994 and approved, with conditions (i.e., requirement to "flag" dredged material placement sites prior to construction), by September 1994.

Wetland habitat is recognized as having intrinsic value to wildlife and its identification is important in order to protect this resource from filling with dredged material. Once identified, the dredged

material was placed in those areas that were completely devoid of emergent wetland vegetation. In order to ensure that sensitive areas were completely and adequately avoided, staff from both the COE and the CDFG "flagged" the areas for dredged material placement prior to construction. In addition, construction personnel were instructed as to where the dredged material could be placed.

As it turned out, the regions that were "flagged" for dredged material placement and devoid of wetland vegetation were areas that had been recently, probably within the last five years, reinforced with sandy material. If a wetland were found it would have been under the jurisdiction of the Sacramento District COE and a wetland determination inspection and permit would have been necessary pursuant to the Clean Water Act. This permit process would take, at a minimum, four months and mitigation measures (i.e., replacement in kind) would have been required. Since the "tight" project schedule was unable to accommodate this process, a unilateral decision to avoid any wetlands was made by the San Francisco COE. This is the reason for the project's segmented configuration.

Endangered/Threatened Species

The United States Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) are Federal agencies (part of the Departments of the Interior and Commerce, respectively) that have the responsibility for implementing the provisions of the Endangered Species Act; influencing decisions on proposals which have the potential to impact fish and wildlife habitat.

Coordination with the FWS and the NMFS was necessary in order to research the possible existence of endangered, threatened, candidate species that are protected under both the Endangered Species and Marine Mammal Protection Acts and which may have been impacted by the project.

Consultation with the FWS, the NMFS and the California Department of Fish and Game (CDFG) was conducted either in writing and/or via telephone regarding the presence of endangered, threatened, or candidate species.

The FWS and NMFS indicated the possible existence of the following species in the project area: the endangered winter-run chinook salmon (*Oncorhynchus tshawytscha*), the threatened delta smelt (*Hypomesus transpacificus*), the proposed for listing Sacramento splittail (*Pogonichthys macrolepidotus*); and the threatened giant garter snake (*Thamnophis gigas*).

The California Natural Diversity Data Base (CNDDB) provides listings of observed sightings of special status species (i.e., endangered or threatened plants and animals) by location. A CNDDB search was conducted by the California Department of Fish and Game with the result that no special status species (i.e., the giant garter snake and rare plants) were reported on the project site.

The FWS indicated that the threatened Delta smelt and the proposed listed Sacramento splittail existed within the proposed project dredge area. These species generally spawn from mid-December to July for the smelt and March to July for the splittail. The NMFS indicated that the endangered winter-run chinook salmon were also present. Both agencies agreed with the COE's determination that these species would not be adversely affected. In fact, these three species would be exposed to less impacts since dredged material disposal would be upland rather than in an aquatic environment.

Water Quality

The surface water from the project area flows to the island's lateral drains and then to the main drain (See Figure 3, Jersey Island Demonstration Project Site Plan). This water is then pumped into the San Joaquin River. The sections for dredged material placement are served by separate field drains. This permitted independent monitoring of the rate of salt loss from each different source of dredged material, and the rate of movement through the drain system as a function of the concentration of salinity in those dredged materials.

The dredge material criteria and receiving water criteria were developed to protect the domestic water supply and to prevent violations of water quality objectives. The criteria was developed based on testing done by the COE which indicated the sediment's quality. The DWR estimated and calculated saline discharge concentrations and analyzed the receiving water's ability for diluting these concentrations to acceptable drinking water standards.

The COE contracted with ToxScan Incorporated to conduct the necessary field studies of the material to be dredged. The sediment chemistry results are published within the final report entitled, Chemical Analysis of Sediments at Suisun Bay Channel and New York Slough for 1994 Maintenance Dredging, June 1994.

The grain size analysis classified the material as moderate to fine sand. The sediment chemistry indicated that the salinity of dredged material is 10,000 to 17,000 milligrams per liter (mg/l) from Suisun Bay and 3,000 to 4,000 mg/l from New York Slough. In addition, the sediment testing included extensive chemical analyses, gas chromatography studies, and waste extraction tests (WET) using both deionized water (modified or DI) and a weak acid (non-modified or citrate).

The results from the modified WET were used for the comparison since water would be the dissolvent affecting the placed dredged material.

The Monitoring and Reporting Program (MRP) required post project compliance monitoring until constituent concentrations returned to background levels (See Appendix for the Waste Discharge Requirements and complete monitoring results). Past short term monitoring efforts at other demonstration sites did not specifically analyze the impact of saline dredged material on receiving waters.

The MRP addressed the monitoring of constituents from island drainage water; receiving water at the San Joaquin River; Island soils; and the dredged material at the project site. A monitoring program was implemented to ensure compliance with the appropriate water and soil quality criteria. The DWR Water Quality Assessment staff conducted the ongoing sampling and monitoring of the soil and water at the site.

The predredge assessment results from the three sediment sample composites collected from the Suisun Bay Channel were: the total metals were less than the Waste Discharge Requirement (WDR) limits; the soluble metals (citrate WET test) were greater than WDR limits, however the soluble metals from the DI WET test were below WDR limits; pesticides, PCBs, TPHs, and TBTs were below detection limits; oil and grease were 20 mg/kg; total phthalates were between 70-92 mg/kg; 3 PAHs were greater than the LEL but were below SEL (Canada); the grain size analysis showed 98-98.2% sand; and this material had 10-17 parts per thousand interstitial salinity.

The predredge assessment results from the two sediment sample composites taken from New York Slough were: the total metals were less than the WDR limits; the soluble metals (citrate WET test) were greater than WDR limits, however the soluble metals from the DI water WET test were below WDR limits; pesticides, PCBs, PAHs, TPHs, and TBTs were below detection limits; oil and grease were also below detection limits; total phthalates were between 150-270 mg/kg; the grain size analysis indicated 92.8-97.5% sand; and this material had 3-4 parts per thousand interstitial salinity.

Figure 3, illustrates the dredged material placement locations; the monitoring well locations (used for both background field monitoring and project performance monitoring); the main drain performance monitoring locations; and the receiving water sample locations.

For the receiving water monitoring locations, Site R-1 was placed 200 feet upstream of the discharge site and Site R-2 was placed 250 feet downstream. Background monitoring levels indicated that dissolved metals were below detection levels except for arsenic which was 0.002 mg/l at both monitoring sites.

As for the monitoring of the Island's main drain, CP-1 indicates the compliance point at the pump station and MP-1 was placed 100 feet upstream from the lateral drains intersection with the main drain. Background results showed that dissolved metals were less than detection limits except for arsenic and zinc. CP-1's arsenic level was measured at 0.002 mg/l and MP-1's was 0.005 mg/l (the same for zinc). Total dissolved solids (TDS) exceeded WDRs at both locations. Electroconductivity (EC) at CP-1 ranged from 1,400-2,600 between April through August 1994. The DWR installed four shallow wells ranging from 1/2 foot to 2 feet deep: MW-A for the Suisun material, MW-B and MW-D for the New York Slough material, and MW-C was a control where no dredged material was placed. The pre-project soil assessments at these areas indicated that total metals were below WDR limits and that soluble metals (DI WET) were below detection limits.

9. The higher cost of dredging for this project is mainly attributed to: a) the decision to use a clamshell dredge versus a hopper dredge due to the undesirability of brackish water being introduced onto the Island. The clamshell method is less efficient than the hopper. Since the shoals were both scattered over long distances and thinly deposited, the clamshell had to move and set up more often than a hopper would have, thus slowing the dredging process and increasing the cost b) only one contractor (Manson) submitted a bid. According to the other probable contractor (Dutra), a bid package was never received. Having only one bid may have resulted in a higher cost, and c) the transportation distance of the material from the Suisun Bay Channel to the Island is much further than the historically used aquatic disposal site. The COE believes that the costs could have been significantly reduced, if there was more and continuous (rather than intermittent) shoaling and if there had been competitive bidding.

The Regulatory Process

10. There is a desire among certain agencies to implement a larger pilot project and to ultimately dispose of this O & M dredged material upland on a regular basis. However this may be difficult to achieve since the quantities (See Table A) are variable and available funding is uncertain.

11. Jersey Island required nine months to plan and coordinate, from December 1993-September 1994. A minimum of one full year would be necessary for a similar project. A more ambitious project should have a two year planning period.

12. It has become increasingly difficult to provide upland dredged material disposal sites due to the lack of local funding.

13. The COE is constrained in how it does its contractual business. Federal law states that dredging and disposal of the material must be performed in the most cost effective manner. As long as aquatic disposal is permitted it will remain the most cost effective disposal method.

14. The Sacramento District COE conducted a General Investigation reconnaissance study entitled The Sacramento-San Joaquin Delta, Western Delta Islands, California, May 1995 which focused on Section 1135 environmental restoration at Webb Tract, Jersey, and Twitchell Islands. Webb Tract was infeasible due to the owner's desire to impound fresh water for later resale. Jersey Island was also infeasible since its landowners have plans to expand its sewage treatment facilities at this location. However, they still are interested in future levee rehabilitation. Twitchell Island, which is owned by the DWR (80%) and Chevron (20%) did pass the reconnaissance level study phase and has entered into the feasibility level study phase. This feasibility report is expected to be completed in 1998.

Environmental Issues

15. At Jersey Island, dredged material was placed on areas that had been recently improved and thus were devoid of any wetland vegetation. This is the reason for the segmented configuration.

Endangered/Threatened Species

16. Consultation with both the FWS and NMFS must be started as early in the process as possible since it is becoming increasingly difficult to arrive at project consensus regarding impacts and mitigation plans.

17. Any type of dredging and disposal plan will necessitate informal/formal consultation with the FWS regarding the Delta Smelt since the whole of Suisun Bay is designated critical habitat pursuant to the Draft Delta Native Fishes Recovery Plan. The final report is due by end of 1995. Since real time monitoring (the species actual location within the Delta at a given time of year) indicates this species current distribution, sampling would be necessary (Bob Pine, FWS). Use of "windows" to avoid impacts no longer apply. Distribution for real time monitoring can be found by calling the Fish and Game Delta Office at (209) 948-7800.

Water Quality

18. Dissolved arsenic was found in all monitoring wells at low levels except for MW-B which had 0.010 mg/l. MW-B zinc level was also above the WDR limit at 0.018 mg/l.

19. MW-A and MW-B were in mineral type soils. MW-C and MW-D were placed in organic type soils. No material was placed in MW-C. MW-A and MW-B had higher EC, TDS, chlorine and bromide. MW-B had the highest EC, TDS, and bromine. The chlorine was highest in MW-A. Dissolved arsenic exceeded the drinking water standard or Maximum Contaminant Level (MCL) at MW-B.

20. The groundwater was at its highest in January-February 1995 and declined steadily over time. There was no apparent direct relationship between groundwater and the river's flow and/or tidal surge. However, the direction of groundwater flow remains unknown.

21. Post project receiving water results indicated: pH, dissolved oxygen (DO), and temperatures were all within WDR limits; very little change in EC, TDS, chloride and bromide between R-1 and R-2, however they were greatly affected by flow and tidal changes; dissolved metals remained below detection limits except for arsenic and zinc; and EC/TDS correlations equaled 1.0.

22. Post project well monitoring indicated that the pH was within WDR limits; the salt loading from the main drain into the river did not appear to be significant; dissolved metals were below detection limits except for arsenic, copper, nickel, and zinc; the EC/TDS correlations were .70 at MP-1 and .94 at CP-1. The TDS at CP-1 exceeded WDR limits seven times and MP-1 exceeded CP-1 seven times; average TDS increased 3.8% from MP-1 to CP-1; and there were no past or present main drain pumping records.
23. Receiving water salt loading at R-1 and R-2 did not appear to be significant.
24. The DWR estimated the salt load from the Suisun Bay Channel material to Area A on Figure 3 at 137,065 pounds or 68.5 metric tons. The salt load to Areas B & D from the New York Slough was calculated to be 43,904 pounds or 22 metric tons (however this used the 25,000 CY estimate, not the 32,719 actually placed). Therefore, the total salt introduction is estimated to be _____ pounds (DWR will determine this amount during review of this Draft report).
25. Due to an extremely wet rainy season and because of the low porosity and high permeability of sandy material, the salt impacts were relatively short term (only about one month, refer to Appendix A for detailed results).
26. As of the date of this report the DWR has concluded the water quality is at background levels, however, they are continuing long-term monitoring.
27. There are issues regarding the placement of the receiving water detection locations (upstream versus downstream). Since tidal flow influences the direction of the San Joaquin River in both directions, background levels differ depending on a flood or ebb cycle.
28. Additional EC monitoring is needed at several lateral drains and upstream of MP-1.
29. The DWR, BCDC, COE, RWQCB, DFG, NMFS, and FWS believe the small sized demonstration project is a success.

7.0 RECOMMENDATIONS

The San Francisco District COE recommends the following:

- * In March 1988, the California Legislature passed the Delta Flood Protection Act (Senate Bill 34) which recognized the importance of the Sacramento-San Joaquin Delta Region. The bill legislated the intent to appropriate \$12 million annually for Delta flood protection for ten years, ending in 1998. SB 34 directs the California Department of Water Resources (DWR) to develop and implement flood protection projects on the eight western Delta islands. This funding source should be used before it expires and planning for the next project should start immediately.
- * There should be an attempt to locate dredged material upland disposal sites closer to the Suisun Bay Channel and within the same Federal and State jurisdictions, if possible. Contra Costa County should share this leadership with the DWR.
- * Federal General Investigation studies could be performed for the Islands closest to the dredged material locations per request of the local sponsor. Congressional authority for future study could also come from Section 1135 Environmental Restoration and/or Section 204 Beneficial Use of Dredge Material. Islands to be considered for projects could include Sherman (DWR soon to own 90%), Seal, Roe, Ryer, Chipps, Browns, Van Sickle, Winter, Kimball and West. These are all located near the dredge sites and dredged material stockpiling facilities, levee rehabilitation, and wetland recreation could be the focus for future studies.
- * Additional pilot projects could be performed for the Islands closest to the dredged material locations.
- * The DWR recommends better communication between the agencies involved; a longer lead time and more thorough pre-project monitoring to develop better background monitoring programs for salt loading; refining the contract specifications to meet WDR or background monitoring plans; and developing more small, medium, and large demonstration projects.
- * Complete the unreinforced segments on Jersey Island's northern perimeter.
- * Ground water standards and the RWQCB's application of those requirements need to be revisited for areas that do not draw groundwater for drinking. Also, direction of groundwater flows should be studied.
- * Prepare an environmental master plan on islands needing levee repair, wetland restoration and mitigation banking sites for future long-term projects. This master plan would identify environmentally sensitive areas and potential mitigation sites. A programmatic EIS/EIR for such projects might be the most efficient approach.

* Contra Costa County could investigate the possibility of establishing an assessment district to raise funds from the users of the navigation channels. A separate account could be set aside to provide upland disposal sites and to promote other beneficial uses within the County.

* In order to create a "turn key" operation for the Corps' yearly O & M activities, prepare an interagency Memorandum of Understanding.

Appendix A to LTMS EIS/EIR Appendix K

**Waste Discharge Requirements
and
Monitoring Results from
the Department of Water Resources**

WASTE DISCHARGE REQUIREMENTS

RECEIVING WATER

- * Turbidity not to increase more than 10 percent over background levels.
- * Dissolved oxygen concentrations not to fall below 7.0 mg/L (October 1 - June 30) and 5.0 mg/L (July 1 - September 30).
- * Temperature not to increase above 56 degrees Fahrenheit (13.3 degrees Celcius) or river background temperatures (October 1 - June 30), whichever is greater; and not to increase more than 5 degrees Fahrenheit (2.8 degrees Celcius) over river background temperatures (July 1 - September 30).
- * pH not to fall below 6.5 or exceed 8.5.

AGRICULTURAL DRAIN

- * pH not to fall below 6.5 or exceed 8.5.
- * Total Dissolved Solids concentrations at the main drain not to exceed 10 percent or a maximum of 150 mg/L, whichever is less, over the TDS concentrations 100 feet upgradient of the point where dredged sediment drainage enters the main drain.

GROUND WATER

- * Electrical conductivity not to exceed an annual average incremental increase of 400 umhos/cm, or a maximum of 2,600 umhos/cm, whichever is less.
- * Not to contain chemicals, heavy metals, or trace elements in concentrations that adversely affect beneficial uses or exceed drinking water maximum contaminant levels (MCLs).

DREDGED SEDIMENT

- * Not to exceed specified concentrations for the following constituents: arsenic, cadmium, chromium, copper, lead, mercury, nickel, thallium, and zinc.
- * Not to contain waste classified as "hazardous" or "designated".

RECEIVING WATER (R-1 and R-2)
 Background Data (in mg/L except as noted)
 Sampling Date: 11/3/94

Constituent	R-1	R-2
Turbidity (NTUs)	-	-
Dissolved Oxygen	-	-
Temperature (degrees Celcius)	-	-
pH (pH units)	7.8	7.8
Electrical Conductivity (umhos/cm)	1890	2200
Total Dissolved Solids	968	1140
Suspended Solids	14	12
Hardness (as CaCO3)	237	253
Total Organic Carbon	2.3	2.2
Total Alkalinity	65	66
Chlorides	499	591
Bromides	1.85	2.21
Total Sulfides	-	-
Dissolved Sulfides	<0.5	<0.5
Sulfate	76	86
Fluoride	0.1	0.1
Sodium	270	336
Magnesium	43	48
Potassium	-	-
Calcium	24	22
Boron	0.2	0.2

Dissolved Metals: All concentrations below detection limits except for arsenic, which was 0.002 mg/L at R-1 and R-2.

RECEIVING WATER (R-1 and R-2)
Monitoring (in mg/L except as noted)
Minerals and General Water Parameters

Constituent	Monitoring Period	R-1	R-2
Turbidity (NTUs)	12/1/94 - 9/20/95	6.4 - 90	5.0 - 90
Dissolved Oxygen	12/1/94 - 9/20/95	7.2 - 13.1	7.5 - 13.0
Temperature (degrees Celcius)	12/1/94 - 9/20/95	9.1 - 24.5	9.2 - 23.7
pH (pH units)	12/1/94 - 9/20/95	6.3 - 8.0	6.9 - 8.2
Electrical Conductivity (umhos/cm)	12/1/94 - 9/20/95	121 - 2,910	77 - 2,950
Total Dissolved Solids	12/1/94 - 7/26/95	82 - 1,550	78 - 1,540
Suspended Solids	12/1/94 - 8/23/95	2 - 50	3 - 54
Hardness (as CaCO3)	12/1/94 - 7/26/95	36 - 368	36 - 377
Total Organic Carbon	12/1/94 - 8/23/95	2.0 - 7.6	1.8 - 8.0
Total Alkalinity	12/1/94 - 7/26/95	34 - 76	32 - 78
Color	3/16/95 - 8/23/95	7 - 150	25 - 200
Chlorides	12/1/94 - 7/26/95	8 - 790	8 - 797
Bromides	12/1/94 - 8/23/95	0.03 - 2.68	0.02 - 2.65
Total Sulfides	12/1/94 - 8/23/95	<1 - 7.2	<1 - 7.7
Dissolved Sulfides	12/1/94 - 8/23/95	<0.5 - 7.0	<0.5 - 9.0
Sulfate	12/1/94 - 7/26/95	9 - 112	9 - 116
Fluoride	12/1/94 - 7/26/95	<0.1 - 0.1	<0.1 - 0.1
Sodium	12/1/94 - 7/26/95	8 - 455	9 - 447
Magnesium	12/1/94 - 7/26/95	4 - 68	4 - 69
Potassium	12/1/94 - 7/26/95	1.0 - 4.4	1.0 - 4.0
Calcium	12/1/94 - 7/26/95	8 - 35	8 - 37
Boron	12/1/94 - 7/26/95	<0.1 - 0.3	<0.1 - 0.3