Appendix A

MAXIMUM CONCENTRATIONS OF CONTAMINANTS, TCLP AND DERM SOIL DISPOSAL CRITERIA

MAXIMUM CONCENTRATION OF CONTAMINANTS FOR TOXICITY CHARACTERISTIC AS DETERMINED USING TCLP

Contaminant	Level (mg/l)	Contaminant	Level (mg/l)
Arsenic	5.0	Hexachlorobenzene	0.13
Barium	100.0	Hexachlorobutadiene	0.5
Bensene	0.5	Lead	3.0
Cadmium	1.0	Lindane	5.0
Carbon tetrachloride	0.5	Mercury	0.4
Chlordane	0.03	Methoxychlor	0.2
Chlorobenzene	100.0	Methyl ethyldetone	10.0
Chloroform	6.0	Nitrobenzene	200.0
Chromiun	5.0	Pentachlorophenol	2.0
o-Cresol	200.0	Pyridine	100.0
m-Cresol	200.0	Selenium	5.0
p-Cresol	200.0	Silver	1.0
Cresol	200.0	Tetrachloroethylene	5.0
2,4-D	10.0	Toxaphene	0.7
1,4-Dichlorobenzene	7.5	Trichloroethylene	0.5
1,2-Dichloroethane	0.5	2,4,5-Trichlorophenol	0.5
1,1-Dichloroethylene	0.7	2,4,6-Trichlorophenol	400.0
2,4-Dinitrotoluene	0.13	2,4,5-TP (Silvex)	2.0
Endrin	0.02	Vinyl chloride	1.0
Heptachlor (and its hydroxide)	0.008		0.2

Ref: Toxicity Characteristic Rule, Subtitle C, RCRA

SOIL DISPOSAL CRITERIA

INDUSTRIAL INCINERATION

8010's	<1,000 ppm	8020's	<1,000 ppm		
FLASHPOINT	>140 F (optional)				
As	<55 ppm	Ba	<2,750 ppm	Cd	<55 ppm
Cr	<275 ppm	Pb	<77 ppm	Hg	<17 ppm
Se	<165 ppm	Ag	<165 ppm		

LANDFILL

Gasoline Spill		Diesel Spill		Waste Oil Spill	
8020's	<100 ppm	8100's	<100 ppm	8010's	<100 ppm
O/G	<50,000 ppm			8020's	<100 ppm
				O/G	<50,000 ppm
				TCLP Pb	<5 ppm
FLASHPOINT	>140 F			TCLP Cr	<5 ppm

PCB 25 ppm max.

CLEAN SOIL CRITERIA / CLEAN BACKFILL CRITERIA

Gasoline Spill		Diesel Spill		Waste Oil Spill	
8010's	<50 ppb	8010's	<50 ppb	8010's	<50 ppb
8020's	<100 ppb	8020's	<100 ppb	8020's	<100 ppb
PAH's	<6 ppm	PAH's	<6 ppm	PAH's	<6 ppm
O/G*	<250 ppm	8100's	<6 ppm	O/G*	<250 ppm
TCLP Pb**	<0.05 ppm	O/G*	<250 ppm	TCLP Pb**	<0.05 ppm
TCLP Cr**	<0.5 ppm	TCLP Pb**	<0.05 ppm	TCLP Cr**	<0.5 ppm
TRPH***	<10 ppm	TCLP Cr**	<0.5 ppm	TCLP Cd**	<0.01 ppm
		TRPH***	<10 ppm		

1. PARAMETERS MAY BE EXPANDED FOR SPECIFIC SITUATIONS.
2. THE QUANTITIES OF SOIL TO BE DISPOSED OF MAY ALSO AFFECT THE POSSIBLE DISPOSAL ALTERNATIVES.
3. ALL SOILS MUST NOT BE A HAZARDOUS WASTE AS DEFINED BY 40 CFR 261.
4. ALL HAZARDOUS WASTES MUST BE DISPOSED OF AT AN EPA APPROVED FACILITY. ALL OTHER CONTAMINATED SOILS WILL BE EVALUATED BY DERM FOR DISPOSAL AT ALTERNATE FACILITIES.

* Oil and grease (O/G) may increase to 500 ppm outside of Wellfield Protection Areas.

** TCLP (Toxicity Characteristic Leaching Procedure) Clean Soil Criteria as compared to Dade County Chapter 24 Effluent Standards (or applicable groundwater criteria).

*** TRPH (Total Recoverable Petroleum Hydrocarbons) EPA Draft Method 9073.

Water and Soil Analytical Test Equivalents: 601/8010, 602/8020, 610/8100

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Appendix B

MIAMI RIVER WATER QUALITY PLAN Draft Excerpts Provided March 1993 METRO-DADE, Department of Environmental Resources Management

Sediment Quality and Related Monitoring

Sediment Chemistry

The sediments of the Miami River and its tributaries have been extensively sampled for trace metals, synthetic organic chemicals, petroleum hydrocarbons, and coprostanol (a chemical indicator of sewage pollution) by numerous federal, state and local agencies. Although the magnitude contamination is highly

variable, most investigators report that the concentration of these pollutants is high compared to other sediments in Biscayne Bay and the state of Florida.

In a study for the Florida Department of Natural Resources, Corcoran et al. (1983) found higher levels of hydrocarbons in the Miami River sediments than other locations in Biscayne Bay. The concentrations detected were an order of magnitude higher than at other locations in Florida, and were as high as concentrations for the New York Biqht, Chesapeake Bay and the Providence River area. Analyses indicated that the hydrocarbons in River were primarily of petrogenic origin. Further work by Corcoran et al (1984) showed that Miami River sediments also contained elevated concentrations of several pesticides, herbicides, trace metals, and polychlorinated biphenyls. In some cases, concentrations of these contaminants was as great or greater than those reported for other urban U.S. ports.

As part of its comprehensive study of Florida deepwater ports, the Florida Department of Environmental Regulation conducted extensive sediment sampling in the Miami River, its tributaries and adjacent portions of Biscayne Bay. This work also showed that the Miami River sediments were contaminated with a variety of trace metals and synthetic organic chemicals. Ryan et al. (1984) reported that sediment concentrations of cadmium, lead, silver, copper, and mercury are considerably higher for the Miami River and adjoining portions c)f Biscayne Bay than for any other Florida ports studied. Using the aluminum-to-metal ratio technique to normalize among samples, virtually all. samples exceeded criteria for anthropogenic enrichment. Likewise, concentration and number of different synthetic organic chemicals was greater in the Miami River and harbor than in other Florida ports. Chlorinated hydrocarbons polynuclear aromatic hydrocarbons, and polychlorinated biphenyls were detected at a number of stations. This study also showed that the concentrations of contaminants were relatively higher in the Miami River than in the Port of Miami area and generally decreased with distance away from the mouth of the River, suggesting that the Miami River is a source of contamination of Biscayne Bay. Results of further sampling transacts conducted in later years are consistent with this conclusion (Ryan, unpublished data). Figures 14, 15, and 16 depict selected trace metals concentrations from sediment samples collected by FDER and Dade County DERM from 1983 to 1989.

The U.S. Army Corps of Engineers conducted three series of sampling episodes in the Miami River in connection with its feasibility assessment of dredging of the River. The Corps concluded (1990) that although most of the same contaminants were detected, the sediment concentration of trace metals in 1987 and 1988 sampling episodes were lower than those previously reported. No PCB's were detected in 1988 samples. The Corps report suggested that the Miami River sediment quality may be improving. Sediment samples collected and analyzed by DERM in 1989, however, showed concentrations of copper, cadmium, lead and zinc to be variable but as great or greater than previous studies. Further inspection of Corps of Engineers and FDER grain-size analysis data shows that

some of the sediment samples analyzed in the Corps of Engineers study have a relatively lower or no silt-clay fraction (see Figures 17, 18, and 19). Since trace metals and organics tend to be associated with finer-grained fractions, this may account for the lower contaminant concentrations obtained in the 1988 Corps study.

Sediment data from various agency studies are tabulated in spread sheets in Appendix G.

Elutriate Tests

Elutriate tests are used to evaluate the potential for release of sediment-bound contaminants into the water column if sediments are disturbed or resuspended, such as may occur during dredging or spoil disposal. This procedures involves the agitation or suspension of sediments in water from the site under specified condition, followed by separation of the water from the sediment by centrifugation and filtration, and analysis of the water (elutriate) for parameters of interest.

The Florida Department of Environmental Regulation performed elutriate tests at selected sites in the Miami River during the Florida Deepwater Ports study. Ryan et al (1984) reported that mercury and/or silver concentrations in elutriate water from Miami River sediments tested may exceed state water quality standards, and that lead, nickel, zinc, arsenic, cadmium, and copper concentrations are considerably higher in elutriate water than background site water for one or more locations sampled. The Corps of Engineers (1990) obtained similar elutriate test results at five stations in the lower Miami River, where mercury concentration of elutriate water equaled or exceeded State water quality standards at all stations, and silver concentration exceeded state water quality standards at four out of five sampling sites. The Corps concluded that future dredging in the Miami River and Wagner Creek may require a temporary variance from some water quality standards.

Bioassays

The Corps of Engineers has undertaken bioassay evaluations in accordance with 40 CFR 227.6 on sediments from the Miami River system in order to assess the suitability of the sediments for ocean disposal (COE, 1990). In 1985, the Corps tested sediments from sites located between the salinity control structure and Tamiami Canal. No mortality was reported in any of the test animals, and limited bioaccumulation was not considered by the Corps to be environmentally significant.

Additional bioassays were conducted in 1988 using sediments from six sites in the lower river and Wagner Creek (Vittor, 1988). In 96-hour exposures to 100% suspended particulate phase, statistically significant mortality (up to 37%) was reported for mysids (Mysidopsis bahia) from five out of six sample sites. No statistically insignificant mortality 'occurred in mysids in more dilute exposures, or in grass shrimp (Palaemonetes pugio) or silversides (Menidia menidia) at any exposure. This level of mortality was not considered to exceed limiting permissible concentrations for disposal operations.

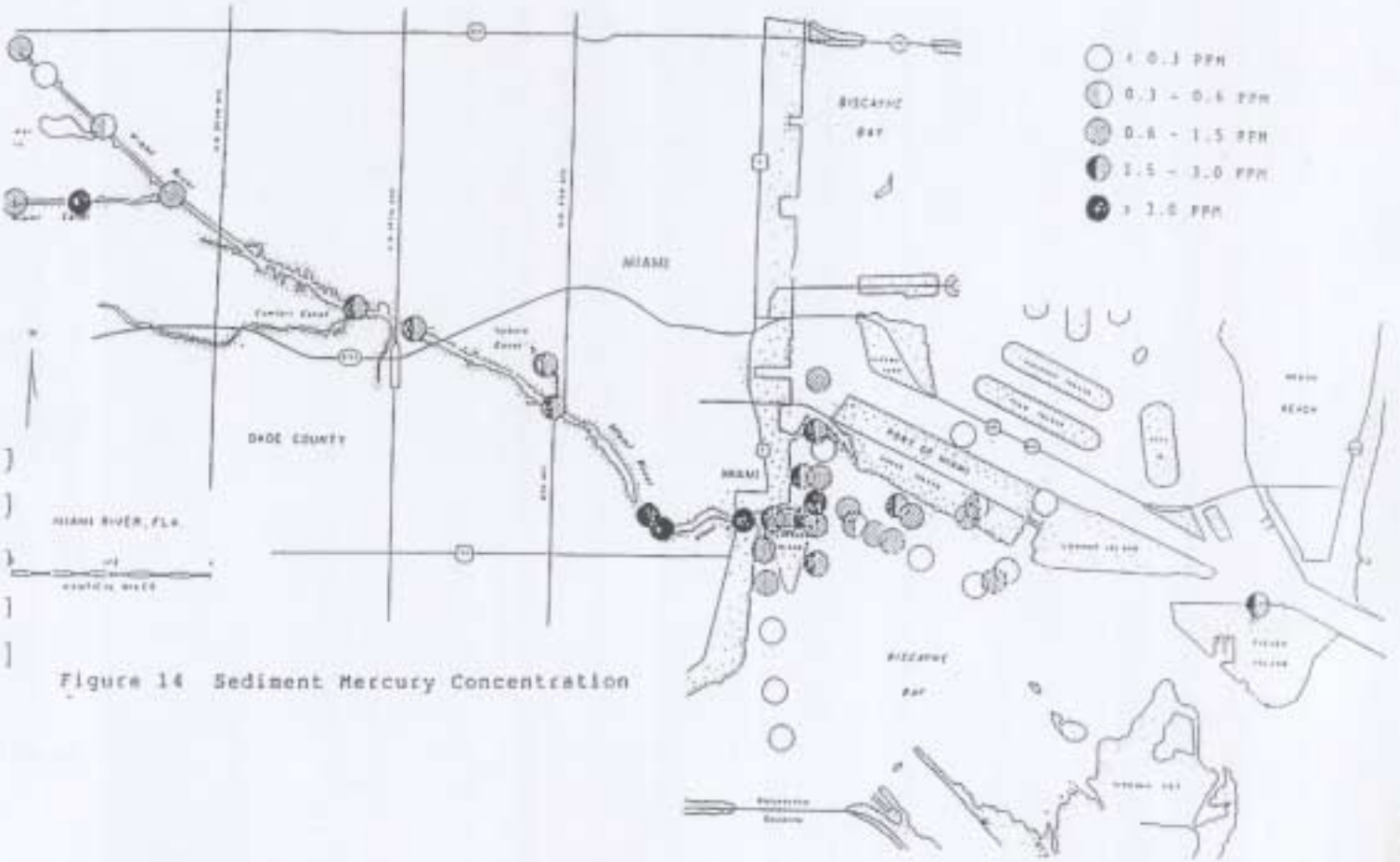


Figure 14 Sediment Mercury Concentration

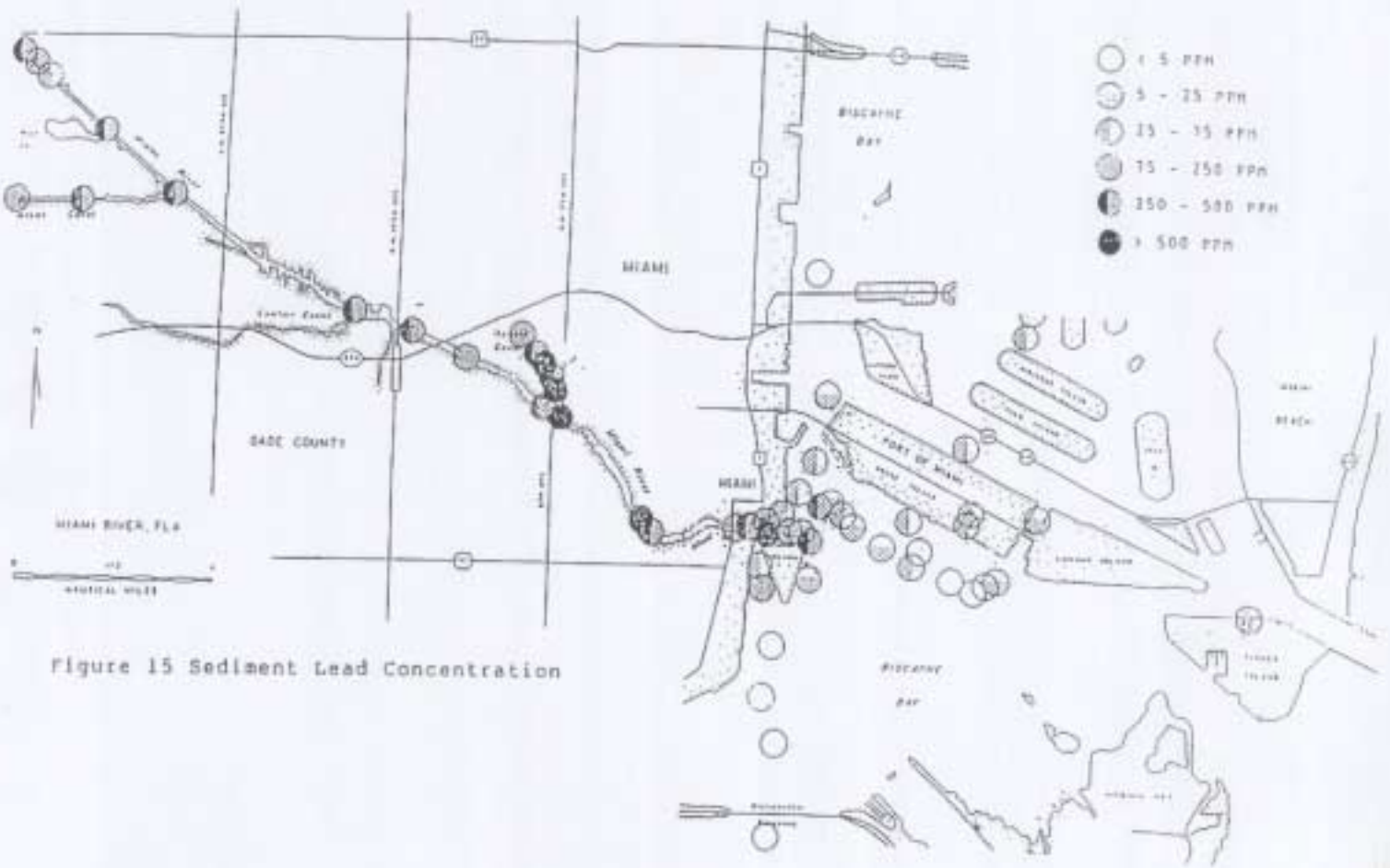


Figure 15 Sediment Lead Concentration

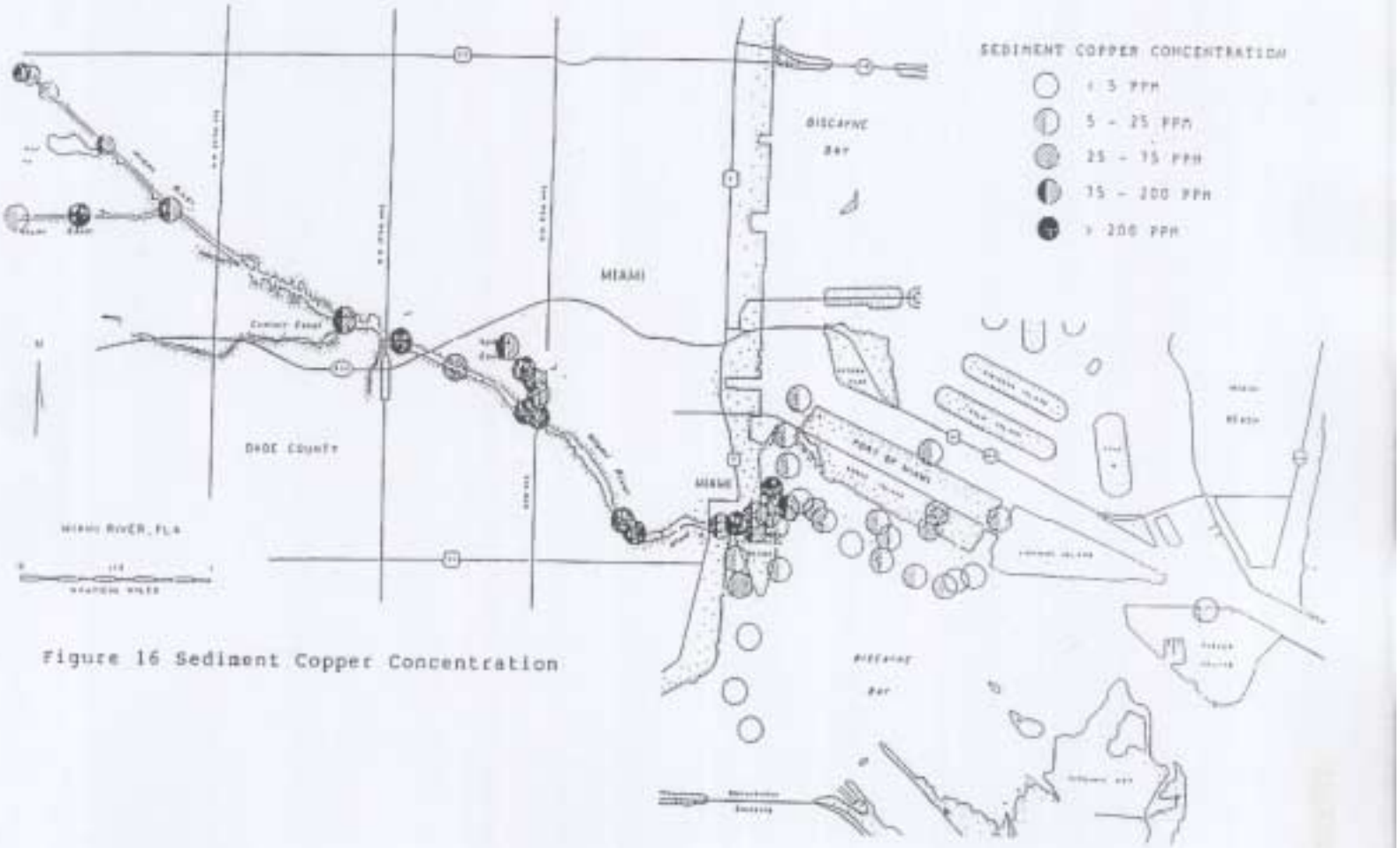


Figure 16 Sediment Copper Concentration

Figure 17

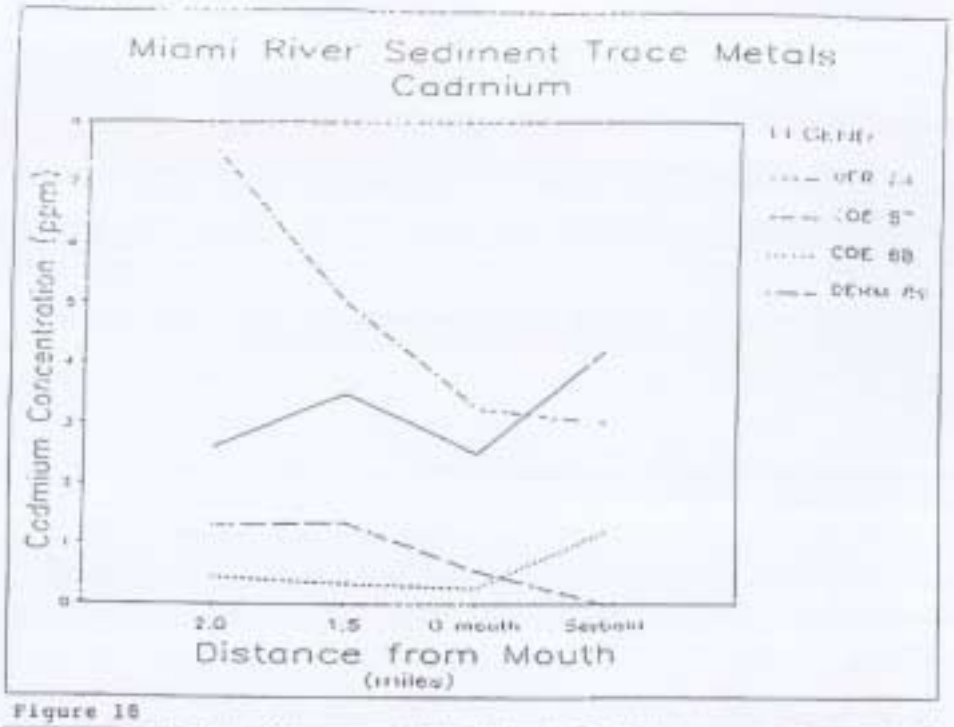
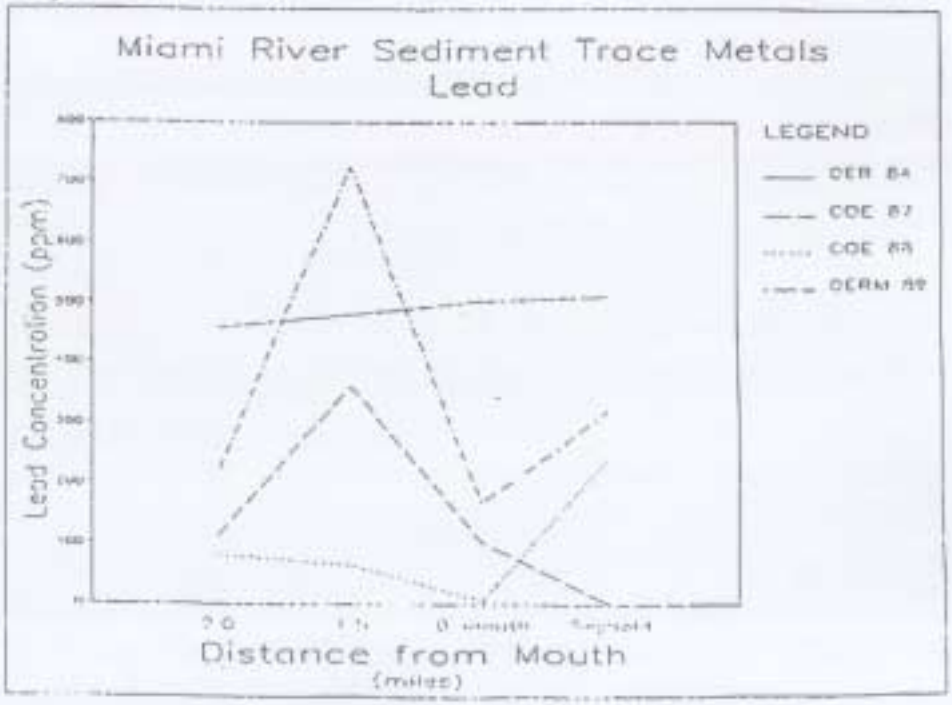


Figure 18



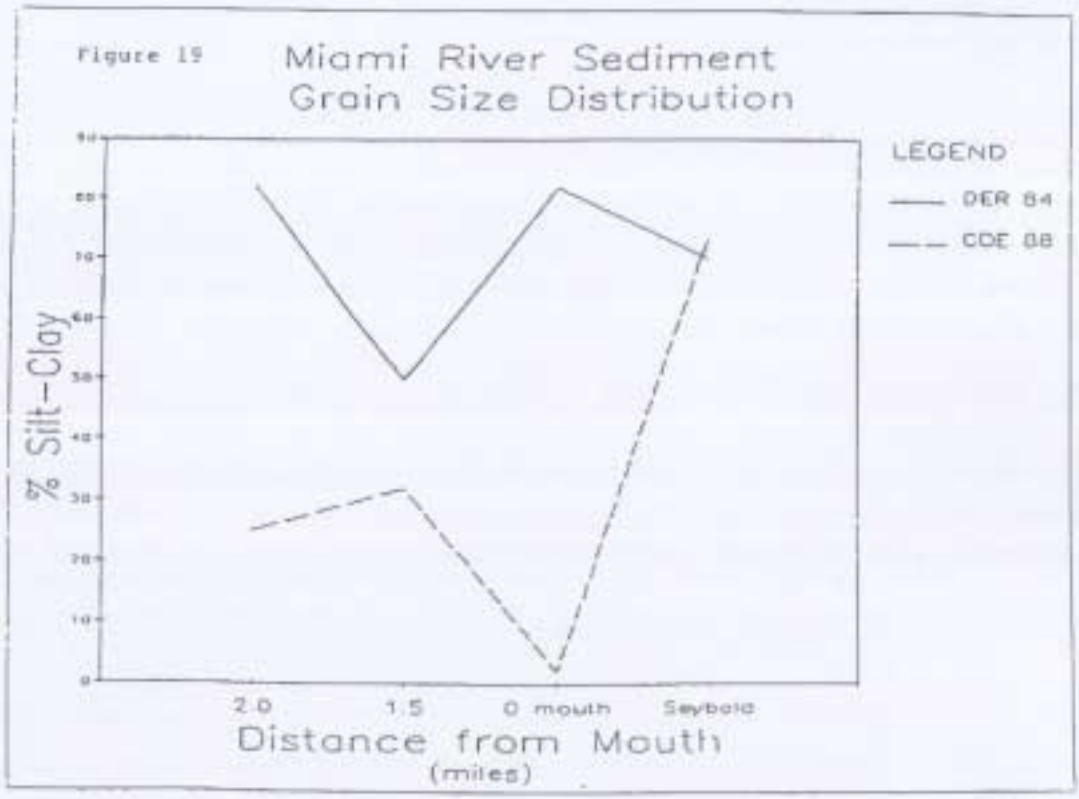


Figure 19
Miami River Sediment
Grain Size Distribution
% Silt-Clay
LEGEND
DER 84
CDE 88
2.0
1.5
0 mouth
Seybold
Distance from Mouth
(miles)

DRAFT

Ten-day solid phase bioassay tests were also conducted on the same sediment sample sites. Forty-two percent mortality occurred in the brown shrimp (Penaeus aztecus) exposed to sediment from the mouth of Wagner Creek. According to Vittor & Associates (1988), this was the only statistically significant mortality observed in the solid phase bioassay tests, which also included polychaetes (Nereis virens) and quahogs (Mercenaria mercenaria).

Tissue analysis was performed on test organisms before and following the ten-day solid phase incubation bioassay. According to Vittor and Associates (1988), pre-bioassay tissue analyses indicated contaminant levels below detection limits for all parameters and test species, other than mercury and cadmium in quahogs. At the conclusion of the 10-day exposure, however, cadmium, mercury, saturated petroleum hydrocarbons, and aromatic petroleum hydrocarbons were detected among all three species of test organisms. There was some indication that mercury concentrations were elevated in quahogs exposed to sediments from Wagner Creek and the Miami River near SW 2nd Avenue, and saturated hydrocarbon levels were relatively high in polychaetes or shrimp incubated with sediments from the same stations. Due to variability and the occurrence of contaminants in some organisms incubated with reference control sediments, Vittor and Associates (1988) concluded that significant bioaccumulation could not be demonstrated.

1991 Sediment Analysis

To further explore the suitability of Miami River sediments for ocean disposal, 7 additional core samples were collected in July 1991 for a variety of analyses by the Corps of Engineers in cooperation with several state and local agencies. Station locations are shown in Figure 20. The cares were homogenized and split for a variety of chemical, elutriate, and bioassay analyses. Results of chemical analyses are summarized in Table 4. Triplicate analvsis for a variety of chlorinated hydrocarbon pesticides failed to detect any target compounds, with the exception of one station in Wagner Creek where aldrin was detected at 7 ppm in only one of three triplicate samples. PCBS, mercury and silver were not detected in any of the 1991 sediment samples. These results are similar to those obtained by the Corps in 1988. Lead, copper, chromium, zinc, cadmium, and aluminum concentrations, however, were elevated and were most consistent with earlier results obtained by FDER and DERM. Using the FDER metal:aluminum ratio (see discussion in following section on Standards), these samples indicate a high degree of anthropogenic enrichment for the trace metals listed above. As concluded in past sampling events, the greatest degree of contamination generally occurs in the vicinity of Wagner Creek to 2nd Avenue.

Elutriate tests and analysis of reference water showed that lead, zinc, copper and chromium were released into the water column in low amounts from some, but not all sediments tested. These results are generally similar to those reported by FDER (1986) in its study of the Miami River and Port of Miami. In contrast to the results of the 1988 Corps study, mercury and silver were not detected in these elutriate tests. Synthetic organic chemicals were generally not detected.

Bioassay test results conducted on these same 1991 are not yet available from the Corps of Engineers- Corps staff has reported that sediments showed high levels of mortality in the amphipod Ampelisca sp. exposed to solid-phase sediments from all

stations tested. Significant mortality also occurred in other test organisms exposed to solid-phase sediments from some, but not all, stations. Mortality among test organisms in suspended particulate bioassays was not considered to exceed criteria, considering dilution in the mixing zone. Results of these bioassays, however, generally indicate that Miami River sediments are not suitable for ocean disposal (Pennington, verbal communication).