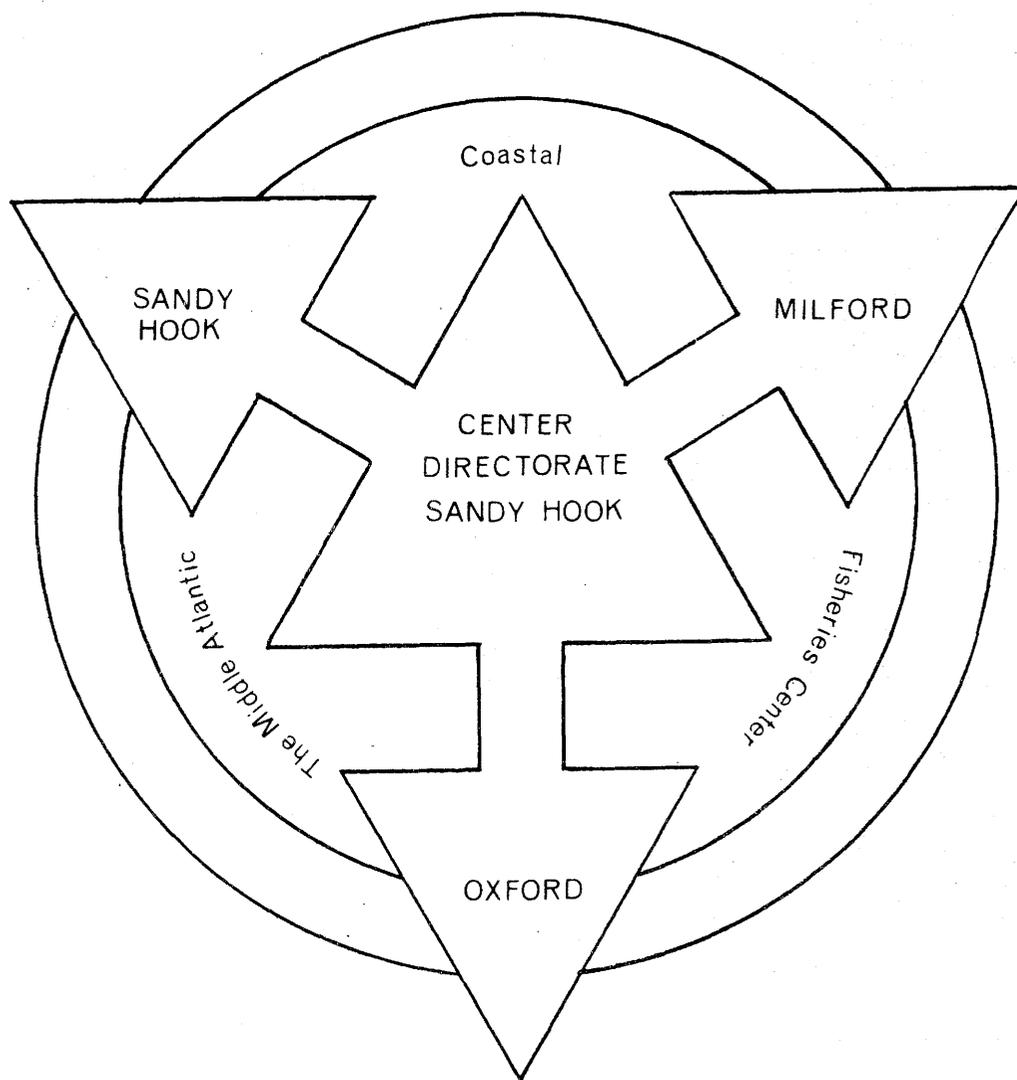


Further Analyses of Heavy Metals in Sediments  
Collected from the Outer New York Bight



U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
Northeast Region

MIDDLE ATLANTIC COASTAL FISHERIES CENTER



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Ecosystems Investigations

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ABSTRACT

Sediment samples from 82 stations located between 20-35 fathoms in the New York Bight were analyzed for the metals Cd, Cr, Cu, Ni, Pb and Zn. The samples were collected in June 1974 and February 1975. In most instances Cd, Cr and Cu were below the detection limits of the methodology used. All metals were present in far smaller amounts than in the New York Bight Apex where extensive ocean disposal of dredging spoils, industrial wastes and sewage sludge has occurred. The data are useful as a baseline against which environmental change can be compared.

INTRODUCTION

Recent reports from the Middle Atlantic Coastal Fisheries Center (MACFC) have provided data on the abundance and distribution of heavy metals in sediments collected from stations located in the New York Bight Apex (Greig et al., 1974) and beyond the continental shelf-slope break (Graikoski et al., 1974). Because of the possibility of eventual ocean disposal of solid wastes in shelf waters seaward of the Bight Apex and the probability of petroleum exploration and drilling on the outer continental shelf, personnel of Ecosystems Investigations have recently collected sediment samples at stations

located between 20-35 fathoms within two proposed alternate ocean disposal sites and a potential oil development site located within the boundaries of the Baltimore Canyon Trough (Fig. 1). The samples were analyzed using the techniques given in Greig et al. (1974).

Since the subject offshore sites have not been directly impacted upon by ocean disposal, as have the Apex stations and the offshore deep water disposal stations reported upon by Graikoski et al. (1974), the heavy metals values reported herein may be regarded as background or baseline. It must be recognized, however, that crustal erosion and subsequent terrigenous export has added to the heavy metal burdens of shelf sediments and some limited amounts of entrained materials, having their origins in ocean dumping and ocean outfalls, may have been deposited on the outer shelf sediments.

## RESULTS

The results of analyses conducted on sediment samples collected at stations within the two alternate disposal sites are given in Tables 1-5. The data resulting from the analysis of samples collected at stations located within the Baltimore Canyon Trough are presented in Table 6. The values obtained were generally one to two orders of magnitude less than those previously reported for sediments collected from the New York

Bight Apex (Carmody et al., 1973; and Greig et al., 1974). The amounts of metals present were also somewhat less than those reported for deep water stations located at the mouth of the Hudson Canyon (Graikoski et al., 1974). This general area has been designated the deep water site (station 106) for ocean disposal of certain toxic industrial wastes.

Cadmium, chromium and copper were rarely detectable in sediments; nickel and zinc were usually measurable but were present in very small amounts relative to their abundance in Bight Apex sediments. Lead varied somewhat but was often not detectable.

Since heavy metal additions to sediments are known to be associated with ocean disposal practices and certain offshore petroleum development procedures, the data reported herein should form an excellent baseline useful in describing the impact and extent of ocean disposal and oil exploration and drilling practices.

#### ACKNOWLEDGMENTS

Samples were collected at the alternate dump site stations during a June 1974 R/V Venture cruise and a February 1975 R/V Delaware cruise. Ms. Leslie Rogers was responsible for sample collection and processing during the Venture cruise and Dr. James Thomas was Chief Scientist during the Delaware cruise.

Samples were collected from the Baltimore Canyon Trough area during a joint USGS-NOAA R/V Mt. Mitchell cruise held in May 1974. Mr. David Radosh was responsible for the collection and handling of the sediment samples during this cruise.

#### LITERATURE CITED

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Figure 1. Location of benthic sampling areas in New York Bight. Alternate dump sites (ADS) #1 (north) and #2 (south) indicated by 1. Baltimore Canyon Trough (BCT) sites indicated by 2; BCT activities reported upon in this paper were conducted in area 2 north.

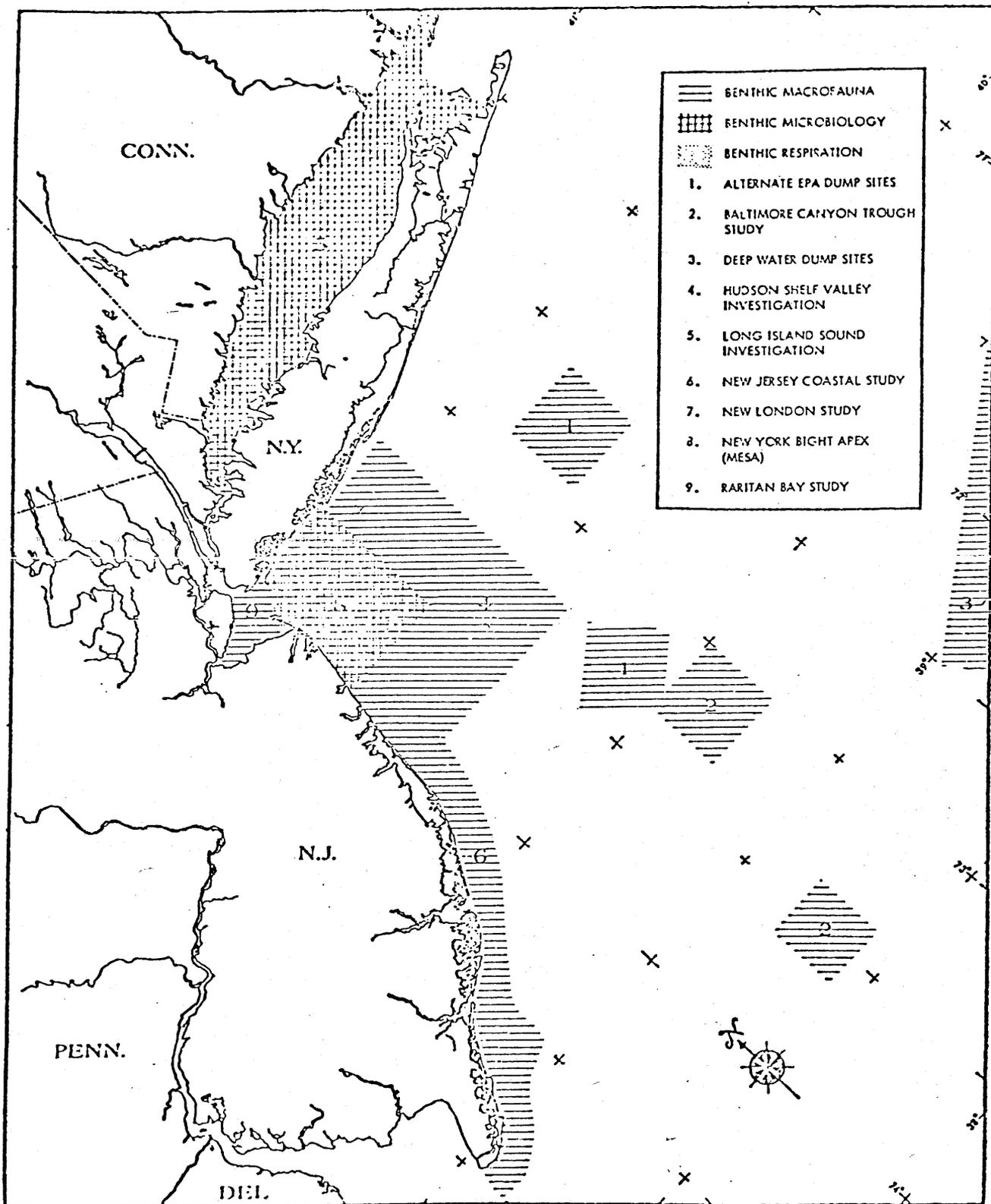


Table 1. Metal Concentrations in the top 1½ inches of sediment collected from alternate dump sites in the New York Bight. Stations 1-29.

Lab Code	Field Code		Metal Concentrations (ppm, dry weight) <sup>a</sup>					
			Cd	Cr	Cu	Ni	Pb	Zn
14905	D-75-2	DUPI -1 G1	ND <sup>b</sup>	ND	ND	4.8	ND	7.2
14906	"	" G2	ND	ND	ND	7.2	ND	6.5
14907	"	" G3	ND	ND	ND	ND	ND	4.5
14908	"	" G4	ND	ND	ND	5.7	ND	6.8
14909	"	" G5	ND	ND	ND	6.2	ND	---
14910		DUPI Sta. 1	ND	ND	ND	7.4	ND	7.1
14911		" Sta. 2	ND	ND	ND	5.5	ND	7.9
14912		" Sta. 3	ND	ND	ND	7.0	ND	7.6
14913		" Sta. 4	ND	ND	ND	6.0	ND	9.1
14914		" Sta. 5	ND	ND	ND	8.9	ND	9.5
14915		" Sta. 6	ND	ND	ND	7.2	ND	8.4
14916		" Sta. 7	ND	ND	ND	8.5	ND	9.4
14917		" Sta. 9	ND	ND	ND	6.9	ND	10.2
14918		" Sta. 10	ND	ND	ND	8.2	ND	9.4
14919	D-75-2	DUPI 11 G1	ND	ND	ND	8.4	ND	8.0
14920	"	" G2	ND	ND	ND	6.0	ND	9.7
14921	"	" G3	ND	ND	ND	4.5	ND	9.2
14922	"	" G4	ND	ND	ND	8.6	ND	8.1
14923	"	" G5	ND	ND	ND	9.6	ND	8.9
15052		DUPI Sta. 11	ND	ND	ND	ND	ND	9.7
14924		" Sta. 12	ND	ND	ND	11.2	ND	8.9
14925		" Sta. 13	ND	ND	ND	9.3	ND	9.8
14926		" Sta. 21	ND	ND	ND	9.7	ND	10.1
14927		" Sta. 29	ND	ND	ND	8.6	ND	10.2
14928	D-75-2	DUPI 29 G1	ND	ND	ND	7.7	ND	9.9
14929	"	" G2	ND	ND	ND	11.6	4.0	9.8
14930	"	" G3	ND	ND	ND	9.3	ND	9.9
14931	"	" G4	ND	ND	ND	6.2	ND	9.6

Values are the mean of duplicate measurements.

ND= Not Detectable - Detection limits= Cd-1.0, Cu-4.0, Pb-4.0, Cr-4.0 to 4.4  
Ni-4.0, Zn-3.0.

Table 2. Metal concentrations in the top 1½ inches of sediment collected from alternate dump sites in the New York Bight, Stations 37-64.

Lab Code	Field Code	Metal Concentrations (ppm, dry weight) <sup>a</sup>					
		Cd	Cr	Cu	Ni	Pb	Zn
14932	DUPI Sta. 37	ND <sup>b</sup>	ND	ND	9.8	4.0	10.6
14933	" Sta. 45	ND	ND	ND	9.5	ND	9.7
14934	" Sta. 53	ND	ND	ND	8.1	ND	9.8
14935	" Sta. 54	ND	ND	ND	8.1	ND	11.4
14936	" Sta. 55	ND	ND	ND	9.5	ND	10.2
14937	D-75-2 DUPI 56 G1	ND	ND	ND	8.3	ND	13.4
14938	" " G2	ND	ND	ND	8.2	ND	11.6
14939	" " G3	ND	ND	ND	ND	4.0	11.3
14940	" " G4	ND	ND	ND	7.5	4.0	11.1
14941	" " G5	ND	ND	ND	9.6	ND	12.3
14942	DUPI Sta. 56	ND	ND	ND	8.1	ND	13.5
14943	" Sta. 57	ND	ND	ND	7.1	ND	10.4
14944	" Sta. 58	ND	ND	ND	10.2	ND	11.8
14945	" Sta. 59	ND	ND	ND	8.1	ND	10.8
14946	" Sta. 60	ND	ND	ND	4.9	4.0	9.8
14947	" Sta. 61	ND	ND	ND	5.9	ND	12.3
14948	" Sta. 62	ND	ND	ND	7.5	ND	11.5
14949	" Sta. 63	ND	ND	ND	5.6	ND	12.9
14950	" Sta. 64	ND	ND	ND	ND	ND	13.7
14951	D-75-2 DUPI 64 G1	ND	ND	ND	8.9	ND	11.4
14952	" " G2	ND	ND	ND	ND	ND	11.5
14953	" " G3	ND	ND	ND	10.4	ND	12.5
14954	" " G4	ND	ND	ND	9.2	ND	13.2
14955	" " G5	ND	ND	ND	8.5	ND	12.5
14956	DUPI Sta. 65	ND	ND	ND	12.4	ND	12.3

a. Values are the mean of duplicate measurements.

b. ND= Not Detectable (See Table 1 for detection limits).

ble 3. Metal concentrations in the top 1½ inches of sediment collected from alternate dump sites in the New York Bight, Stations 66-88.

Lab Code	Field Code		Metal Concentrations (ppm, dry weight) <sup>a</sup>					
			Cd	Cr	Cu	Ni	Pb	Zn
14957	D-75-2	DUPI 66 G1	ND <sup>b</sup>	ND	ND	8.5	4.0	13.0
14958	"	" G2	ND	ND	ND	9.6	ND	12.1
14959	"	" G3	ND	ND	ND	8.0	4.0	12.6
14960	"	" G4	ND	ND	ND	6.8	ND	12.1
14961	"	" G5	ND	ND	ND	---	5.0	11.8
14962		DUPI Sta. 66	ND	ND	ND	7.9	4.0	12.8
14963		" Sta. 67	ND	ND	ND	11.0	5.0	12.3
14964		" Sta. 68	ND	ND	ND	6.3	6.0	13.0
14965		" Sta. 69	ND	ND	ND	11.3	6.0	11.8
14966		" Sta. 70	ND	ND	ND	17.2	5.0	29.2
14967		" Sta. 71	ND	ND	ND	---	5.0	10.9
14968		" Sta. 72	ND	ND	ND	6.5	4.0	ND
14969	D-75-2	DUPI 72 G1	ND	ND	ND	5.8	ND	7.3
14870	"	" G2	ND	ND	ND	ND	ND	3.6
14971	"	" G3	ND	ND	ND	6.8	ND	7.1
14972	"	" G4	ND	ND	ND	4.7	ND	5.8
14943	"	" G5	ND	ND	ND	6.9	ND	4.1
14974		DUPI Sta. 73	ND	ND	ND	ND	ND	4.2
14975		" Sta. 74	ND	ND	ND	6.3	ND	4.8
14976		" Sta. 75	ND	ND	ND	ND	4.0	6.6
14977		" Sta. 76	ND	ND	ND	ND	ND	4.0
14978		" Sta. 77	ND	3.9	ND	--	ND	4.8
14979		" Sta. 78	ND	ND	ND	6.1	ND	6.2
14980		" Sta. 79	ND	5.1	ND	6.2	4.0	9.9
14981		" Sta. 80	ND	ND	ND	6.1	ND	4.0
14982		" Sta. 81	ND	ND	ND	ND	ND	6.6

Values are the mean of duplicate measurements.

ND= Not Detectable (See Table 1 for detection limits).

Table 4. Metal concentrations in the top 1½ inches of sediment collected from alternate dump sites in the New York Bight.

Lab Code	Field Code	Metal Concentrations (ppm, dry weight) <sup>a</sup>						
		Cd	Cr	Cu	Ni	Pb	Zn	
14983	D-75-2	DUPI 82 G1	ND <sup>b</sup>	ND	ND	ND	ND	5.6
14984	"	" G2	ND	ND	ND	ND	ND	5.7
14985	"	" G3	ND	ND	ND	ND	ND	5.5
14986	"	" G4	ND	ND	ND	5.1	ND	4.6
14987	"	" G5	ND	ND	ND	5.8	ND	6.4
14988		DUPI Sta. 82	ND	ND	ND	ND	ND	6.6
14989		" Sta. 83	ND	ND	ND	4.6	ND	6.1
14990		" Sta. 84	ND	ND	ND	ND	ND	6.8
14991		" Sta. 85	ND	ND	ND	4.7	ND	5.3
14992	D-75-2	DUPI 86 G1	ND	ND	ND	6.3	ND	5.5
14993	"	" G2	ND	ND	ND	6.1	5.0	8.3
14994	"	" G3	ND	ND	ND	5.6	4.0	7.1
14996	"	DUPI Sta.86 G4	ND	ND	ND	6.4	4.0	5.0
14997	"	DUPI 86 G4	ND	ND	ND	5.9	4.0	4.7
14998	"	" G5	ND	ND	ND	ND	4.0	6.7
14999		DUPI Sta. 86	ND	ND	ND	ND	5.0	8.8
15000		" Sta. 87	ND	ND	ND	ND	6.0	11.3
14995		" Sta. 88	ND	ND	ND	6.1	4.0	9.0
15001		" Sta. 89	ND	ND	ND	ND	ND	6.1
15002		" Sta. 90	ND	ND	ND	ND	ND	8.4
15003		" Sta. 91	ND	ND	ND	5.0	7.0	12.1
15004	D-75-2	DUPI 92 G1	ND	ND	ND	ND	ND	12.4
15005	"	" G2	ND	ND	ND	6.2	ND	11.0
15006	"	" G3	ND	ND	ND	ND	ND	11.7
15007	"	" G4	ND	ND	ND	6.0	ND	11.1
15008	"	" G5	ND	ND	ND	ND	ND	10.1
15009		DUPI Sta. 92	ND	ND	ND	5.1	ND	12.0
15010		" Sta. 93	ND	ND	ND	10.3	5.0	12.9
15011		Sta. 94	ND	ND	ND	ND	ND	5.4

Values are the mean of duplicate measurements.

ND= Not Detectable (See Table 1 for detection limits).

Table 5. Metal concentrations in the top 1½ inches of sediment collected from alternate dump sites in the New York Bight.

Lab Code	Field Code	Metal Concentrations (ppm, dry weight) <sup>a</sup>					
		Cd	Cr	Cu	Ni	Pb	Zn
15012	DUPI Sta. 95	ND <sup>b</sup>	ND	ND	ND	ND	6.6
15013	" Sta. 96	ND	4.6	ND	7.8	8.0	14.7
15014	" Sta. 97	ND	ND	ND	ND	4.0	7.8
15015	" Sta. 98	ND	ND	ND	ND	7.0	12.0
15016	" Sta. 99	ND	ND	ND	5.2	7.0	8.8
15017	D-75-2 DUPI 100 G1	ND	ND	ND	ND	ND	7.7
15018	" " G2	ND	ND	ND	ND	6.0	9.2
15019	" " G3	ND	ND	ND	5.8	ND	7.4
15020	" " G4	ND	ND	ND	7.6	ND	7.1
15021	" " G5	ND	ND	ND	ND	ND	7.8
15022	DUPI Sta. 100	ND	6.1	ND	9.4	6.0	12.5
15023	" Sta. 101	ND	4.5	ND	6.1	ND	8.0
15024	D-75-2 DUPI 102 G1	ND	ND	ND	4.5	5.0	9.4
15025	" " G2	ND	ND	ND	ND	ND	8.3
15026	" " G3	ND	ND	ND	5.2	6.0	9.3
15027	" " G4	ND	ND	ND	ND	4.0	8.5
15028	" " G5	ND	ND	ND	ND	ND	7.0
15029	DUPI Sta. 102	ND	ND	ND	7.9	6.0	7.4
15030	" Sta. 103	ND	ND	ND	5.5	4.0	6.9
15031	" Sta. 104	ND	ND	ND	5.0	4.0	8.2

a. Values are the mean of duplicate measurements.

b. ND= Not Detectable (See Table 1 for detection limits).

Table 6. Metal concentrations in the top 1½ inches of sediment collected from the Baltimore Canyon.

Lab Code	Field Code				Metal Concentrations (ppm, dry weight) <sup>a</sup>					
					Cd	Cr	Cu	Ni	Pb	Zn
15038	BCI -	001 -	GR001	MM-01	ND <sup>b</sup>	ND	ND	11.8	<12.5	16.5
15039	"	004	"	"	ND	ND	ND	<13.7	<12.5	13.5
15040	"	007	"	"	ND	ND	ND	7.7	ND	6.9
15041	"	010	"	"	ND	ND	ND	7.7	ND	9.5
15042	"	025	"	"	ND	ND	ND	ND	ND	6.3
15043	"	028	"	"	ND	ND	ND	5.8	ND	9.3
15044	"	031	"	"	ND	ND	ND	7.0	ND	10.3
15045	"	037	"	"	ND	ND	ND	ND	ND	10.1
15046	"	048	"	"	ND	ND	ND	<12.0	<17.5	11.5
15047	"	051	"	"	ND	ND	ND	<15.5	<12.5	12.3
15048	"	054	"	"	ND	ND	ND	9.6	ND	11.4
15049	"	063	"	"	ND	ND	ND	5.2	ND	9.8
15050	"	083	"	"	ND	ND	ND	11.5	ND	12.2
15051	"	086	"	"	ND	ND	ND	8.3	ND	9.9

Values are the mean of duplicate measurements.

ND = Not Detectable (See Table 6 for detection limits).