

SUSPENDED MATTER AND TRACE METAL DETERMINATIONS

P. R. Betzer, USF

INTRODUCTION

Suspended particle mass and trace metal determinations were made on 42 samples of suspended matter which were gathered from 14 stations located in the MAFLA area. Each sample was weighed to determine its total mass of suspended matter and then dissolved and analyzed for iron, chromium, lead, nickel, copper, cadmium and vanadium. Sample collection, particle mass determinations, and chemical analyses were carried out as specified in the original BLM contract.

RESULTS AND DISCUSSION

The suspended matter in shelf waters of the MAFLA area averaged **184 $\mu\text{g/l}$** -- about six times the levels normally found in shallow, open, Gulf waters (Betzer, unpublished data). Depth distributions of suspended matter showed no near-bottom increases at any stations in Areas I, 111 and IV and at only 1 each in Areas II and V. Thus, at the time we sampled, there was little evidence that substantial amounts of suspended material were being moved on the shelf in near-bottom nepheloid layers. Surprisingly, there were no marked differences in the average amount of suspended matter found among the five lease areas. From Table I it would seem that Area V is significantly higher than the rest, but if the near-bottom sample from station 13 is excluded, the average suspended load drops to **190 $\mu\text{g/l}$** . It is not clear then from the distribution of suspended particle masses in all the lease areas what the most important particle sources are for the MAFLA waters. For

example, if the Mississippi River were adding substantial amounts of **terrigenous** material to Lease Area V, we would expect large **increases** in particle masses there relative to the other Lease Areas. The Mississippi River may, in fact, be the dominant source of materials for Area V, but we will, have to rely on chemical analyses of suspended matter to decide.

COMPOSITION OF SUSPENDED MATTER IN MAFLA AREA

It is **clear** from a comparison of the chemical data for the suspended matter (Table 1) with that for surface sediments (Table 2" of B. Presley) that the suspended material in the MAFLA areas (with the exception of the 26 meter sample from Station 13) is not resuspended bottom sediment. This is evident from the very high elemental enrichments and elevated element/iron ratios one finds for cadmium, **lead** and copper in suspended matter compared **to** sediments **in** all Lease Areas (**Table 1**). The ratio of lead, copper, and cadmium concentrations in suspended matter to those in sediment from the MAFLA area averages, respectively, 26, 40, and 400. Since the suspended matter in all Lease Areas was dominated by organic matter (see Section of G. Knauer on Water Column), it is likely that the concentrations of these elements in organic matter is quite high. If this is true, a sample dominated by clays or carbonates should **have** " **low** concentrations of lead, cadmium, and copper. An example is the near-bottom sample from Station 13 in Lease Area V, which is **likely** dominated by clay material -- here we found the " largest concentration of both suspended matter (1788 ug/l) and iron (4.8%) of any sample. By way of contrast with **all other MAFLA samples**, the concentrations of lead, copper, and cadmium as **well** as chromium and nickel **in** this sample

were the lowest of **all the** samples of suspended **matter** which we analyzed. Not surprisingly, the concentrations of lead, copper, cadmium, chromium, and nickel **fell** within the range of **values** presented for bottom sediments from Lease Area V.

SUMMARY

1) No significant differences in the distribution and concentration of suspended particles were found **in the MAFLA** Area. Of 14 stations, **only** two had near-bottom **nepheloid** layers; 2) the chemical composition of suspended matter from all Lease Areas was markedly enriched in several elements compared to bottom sediments. This sharp compositional difference can be used to locate areas where significant bottom **water-sediment** interaction has occurred and trace the material as it moves over **and/or off** the shelf. Such a technique might also **work with materials released from drilling practices**; 3) a majority **of** the cadmium, lead, and copper found in the suspended materials throughout the **MAFLA** area is probably associated with organic materials and not suspended clays or carbonates; 4) it is possible that the enrichment of **MAFLA** zooplankton (relative to Pacific **zooplankton**) in lead, cadmium, and copper is related to the substantial amounts of these elements in the organic-rich suspended matter in the **MAFLA** Area.

TABLE I

SUSPENDED MATTER TRACE METAL SUMMARY +

AREA	NO. OF SAMPLE		S.P.M.* ($\mu\text{g}/\text{l}$)	Fe	Pb	Cd	Cu	Cr	Ni	V
I	9	Average	129	.57	200	59	199	160	486	N.D
		Range	81-266	24-.98	76-322	8-243	51-684	-		
II	6	Average	217	.22	145	15	103	N.D.	1609	N.D
		Range	74-200	11-.47	44-316	3-25	31-187	-		
II	9	Average	91	1.26	273	29	481	N.D.	N.D.	N.D
		Range	49-161	28-4.3	19-975	8-73	133-898	-		
Iv	9	Average	125	1.09	189	55	328	144	174	N.D
		Range	50-334	10-4.2	1107-364	14-100	162-563	14-276		
v	9 "	Average	368	1.19	109	45	254	120	52	57
		Range	61-1788	25-4.8	14-209	2-226	17-715	15-191	-	

+ Values for all elements are in $\mu\text{g}/\text{g}$ dry weight except iron which is in percent

* Suspended Particulate Matter in micrograms per Liter of water filtered.