PRJ, Vol. 7 (January 1995); P. 111–113, 1 FIG, 3 TABLES.

Short Note

LEAD LEVELS IN SURFACE LAYERS OF NEARSHORE SEDIMENTS OF THE WESTERN COAST OF LIBYA

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مستويات تركيز الرصاص في تراكمات الطبقات العليا من الساحل الغربي للجماهيرية

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تم قياس تركيز نسبة الرصاص في التراكمات الرملية القريبة من السواحل الغربية للجماهيرية في المنطقة بين الزاوية وتاجوراء وذلك باستعمال طريقة طيف الإمتصاص الذري. تراوح التركيز بين 0.2 إلى 57.0 مايكروجرام/جرام على أساس الوزن الجاف وتراوح المعدل بين 2.0 إلى 24.2 مايكروجرام/جرام على نفس الأساس.

كما أجريت معاملة إحصائية للنتائج وتم مقارنتها مع نتائج منشورة لأماكن أخرى على سواحل البحر الأبيض المتوسط.

INTRODUCTION

Lead levels in nearshore sediments of the western coast of Libya (i.e. Az-Zawiya to Tajoura) have been determined by atomic absorption spectrophotometry. The observed values range from 0.2 to 57.0 μg^{-1} dry weight. The mean values at different locations were found to range from 2.0 to 24.2 μg^{-1} dry weight. The frequency distribution has been determined. The data were also compared with those reported in the literature for other places in the Mediterranean coast. This work presents the analysis of lead in sediments of the coastal area of the western part of Libya i.e. from Az-Zawiya to Tajoura including the capital city, Tripoli. A number of industrial plants discharge their effluents after some degree of treatment. The coastal area also receives waste-water from domestic sewage and agricultural runoff. There is a main road parallel to the sea coast on which a large number of vehicles use for transportation. These vehicles use leaded gasoline. During the raining season the runoff water of this road also goes to the sea. Such discharges usually contain potentially harmful substances including lead which can be sorbed by particulate matter and assimilated by organisms, eventually reaching the sediments.

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EXPERIMENTAL

Sediment samples were collected from sixteen locations. Sampling sites are given in Table 1. The collected samples were airdried for 24 hours, grounded and passed through 80 mesh sieve. Standard procedure, described in ASTM D4698 was followed for the total digestion of sediment samples for chemical analysis of various metals.

A 0.5 g of finely grounded sample of sediments was taken into a 100 mL TFE-fluorocarbon beaker, 6 mL HNO_3 (sp. gr. 1.41) was added and placed on a hot plate for approximately 30 min. The hot plate was previously adjusted to produce a surface temperature of 200°C. The beaker was removed from the hot plate and waited for 5 min. A portion of 6 mL of HF (sp. gr. 1.19) and 2 mL of $HClO_4$ (sp. gr. 1.67) were added to the beaker and returned to the hot plate. The

Table 1. Locations of Sediment Sampling

Site No.	*Location*	*No. of Samples*
1	Janzour area, near Pipe Factory	10
2	Janzour area, near Textile and Soap Factory	10
3	Janzour area, near Fish Canning	10
4	Girgarish area, Beach no. 1	10
5	Girgarish area, near Muntada ElAkhdar	10
6	Tripoli City, before harbour, near Datul Imad building	10
7	Tripoli City, after harbour, near hotel Shatul Naqil	10
8	Tajoura area, near Marine Research Centre	10
9	Tajoura area, after Tourist City	10
10	3 km from refinery towards West (Sabrata)	8
11	5 km from refinery towards West (Sabrata)	
12	Az-Zawiya Refinery, near harbour	9
13	Az-Zawiya Refinery	9
14	2 km from Az-Zawiya Refinery towards east (Tripoli)	9
15	Jodayem (Scout Hall)	9
16	Almaya	9

beaker was heated until the evolution of white perchloric fumes and the solution had reached incipient dryness. The beaker was then removed from the hot plate and waited for 5 min. 2 mL of $HClO_4$ (sp. gr. 1.67) was added and the beaker was returned again to the hot plate. Heating was continued until the solution had reached incipient dryness. The beaker was removed from the hot plate, and temperature was lowered to 100°C. 2 mL of HCl (50 vol.%) was added, followed by 10 mL water. The solution was put on the hot plate and the residue was dissolved completely. The solution was, then, transferred to a 50 mL volumetric flask and filled by adding distilled water. This solution represents concentration of 10 g of sample per litre of solution.

The above solution was analysed for lead content by using flame ionisation atomic absorption spectrophotometer (AAS). Atomic Absorption Spectrophotometer (Varian AA 1475) was used throughout this study. Varian high intensity hollow cathode lamp was used for lead. The operating conditions used were as recommended by the manual of the instrument.

RESULTS AND DISCUSSION

Sixteen sites were selected for the determination of lead content in surface sediments of the western Libyan coast. For each location ten samples were collected unless otherwise reported in Table 1. Each sample was prepared for analysis according to the procedure described in ASTM D4698. The range of lead contents of ten replicates from each of the sixteen locations are given in Table 2. The minimum and maximum observed lead content in sediments were found to be 0.2 and 57.0 μg^{-1} dry weight, respectively. The mean concentration of lead of ten replicates from each location is given as a range ($X \pm S.D.$) in Table 2. The highest mean concentration of lead (24.2 μg^{-1} dry weight) is found at location 6 which is near Datul-imad building in Tripoli city. This is the location where domestic sewage is discharged to sea after treatment. The location is also near the coastal road of the city. Other higher concentration of lead (15.3 μg^{-1} dry weight) was observed at location 7 which is near the city harbour. This location is also close to the coastal road of Tripoli city. These observations indicate that the major source of lead may be attributed to combustion of leaded gasoline. It should be noticed, however, that the mean value of lead content found in the western Libyan coastal sediments is below the reported values (Table 3) of

Table 2. Concentration (µg/g dry weight) of Lead in Sediments of Western Coast of Libya

Site No.	*Concentration (µg g^{-1} dry weight) (Min. – Max.)*	*Average concentration ($\bar{X} \pm S.D.$)*
1	0.8–5.1	2.0±1.3
2	0.4–5.0	2.6±1.3
3	2.6–20.4	8.1±5.8
4	2.0–7.6	4.3±2.4
5	2.4–21.1	10.3±4.8
6	17.2–57.0	24.2±12.3
7	0.8–42.8	15.3±12.3
8	1.5–4.0	2.6±0.8
9	1.3–3.2	2.5±0.6
10	1.9–7.4	3.8±1.7
11	1.8–4.3	3.2±0.8
12	2.6–8.2	5.0±1.9
13	1.6–4.4	3.0±0.9
14	2.5–20.3	7.5±5.2
15	1.3–2.9	2.0±0.7
16	0.2–3.3	2.0±1.0

Table 3. Concentrations (µg/g dry wet) of Lead in Surface Layers of Nearshore Sediments in Different Locations of the Mediterranean Sea

Location	*Value*	*Reference*
Mediterranean	4.5–280	UNEP, 1986
Adriatic	5.3–96	Donazzdo et al., 1984
Ligurian Sea	36–180	Cosma et al., 1982
Sicily	4.5–17	Castagna et al., 1982
	7.5–20	Castagna et al., 1987
Spain	4.8–550	Modamio, 1986
Thermaicos, Greece	18–246	Voutsinou-Taliadouri & Satsmadjis, 1983

nearshore sediment of different locations in the Mediterranean sea. The frequency distribution of lead content in nearshore sediments is given in Fig. 1.

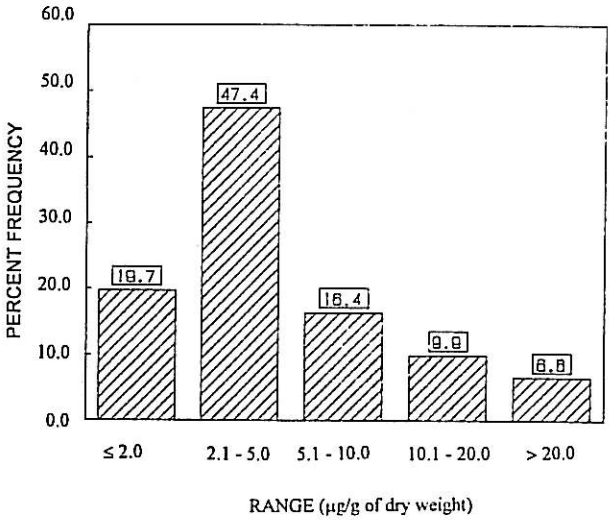

FIG. 1. Frequency distribution of lead in coastal sediments of the western coast of Libya.

CONCLUSIONS

Lead levels in nearshore sediments of the western coast of Libya (i.e. Az-Zawiya to Tajoura) have been determined by using atomic absorption spectrophotometric technique. The observed values range from 0.2 to 57.0 μg^{-1} dry weight.

The sediment samples were collected from sixteen locations and analysed for lead content. The mean values at different locations were found to range from 2.0 to 24.2 μg^{-1} dry weight. These values are below the reported values of nearshore sediments of different locations in the Mediterranean sea.

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