



# REFERENCE SHEET

## REFERENCE MATERIAL

### IAEA-SL-1

#### TRACE AND MINOR ELEMENTS IN LAKE SEDIMENT

Date of issue: September 1999<sup>⊕</sup>

**Recommended Values**  
*(Based on dry weight)*

Element	Recommended Value mg/kg	95% Confidence Interval mg/kg	N*
As	27.6	24.7 – 30.5	24
Ba	639	586 – 692	15
Ce	117	100 – 134	8
Co	19.8	18.3 – 21.3	35
Fe	67400	65700 – 69100	35
La	52.6	49.5 – 55.7	26
Mn	3460	3300 – 3620	34
Rb	113	102 – 124	12
Th	14	13 – 15	18
Ti	5170	4740 – 5600	15
V	170	155 – 185	20
Zn	223	213 – 233	26

\* Number of accepted laboratory means which were used to calculate the recommended values and confidence intervals.

⊕ Revision of the original reference sheet dated December 1979

**Information Values**  
(Based on dry weight)

Element	Information Value mg/kg	95% Confidence Interval mg/kg	N*
Cd	0.26	0.21 – 0.31	7
Cr	104	95 – 113	34
Cs	7.0	6.1 – 7.9	20
Cu	30	24 – 36	31
Dy	7.5	5.3 – 9.7	5
Eu	1.6	1.1 – 2.1	10
Ga	23.7	18.6 – 28.8	11
Hf	4.2	3.6 – 4.8	7
Hg	0.13	0.08 – 0.18	5
K	14500	12400 – 16600	7
Lu	0.54	0.41 – 0.67	10
Na	1700	1600 – 1800	5
Ni	44.9	36.9 – 53.9	11
Pb	37.7	30.3 – 45.1	20
Sb	1.31	1.19 – 1.43	15
Sc	17.3	16.2 – 18.4	16
Se	2.85	1.31 – 4.37	7
Sm	9.25	8.74 – 9.76	8
Sr	80	37 – 123	7
Ta	1.58	1.00 – 2.16	6
Tb	1.40	0.94 – 1.86	7
U	4.02	3.69 – 4.35	15
Yb	3.42	2.77 – 4.07	5

\* Number of accepted laboratory means which were used to calculate the information values and confidence intervals.

The values listed above were established on the basis of statistically valid results submitted by laboratories which had participated in an international intercomparison exercise organized during 1977-1978. The details concerning the criteria for qualification as a recommended or an information value can be found in the report (IAEA/RL/64) "Intercomparison Run SL-1: Determination of Trace and Minor Elements in Lake Sediment IAEA-SL-1" [1]. This report is available free of charge upon request.

### **Intended Use**

This sample is intended to be used as a reference material for the measurement of trace and minor elements in lake sediment samples. It can also be used as a quality control material for the assessment of a laboratory's analytical work, for the validation of analytical methods and for quality assurance within a laboratory.

## **Origin and preparation of the material**

The lake sediment material was collected and prepared by Drs. J.C. Ritchie and C. Cooper (US Department of Agriculture, Agricultural Research Service, USDA Sedimentation Laboratory, Oxford, Mississippi, USA) and donated to the Agency by Dr. J.C. Ritchie. The sediment was collected at the Sardis Reservoir; Panola County, Mississippi, USA (water depth: 15 m).

The material was dried in an oven at 50 °C over a seven day period then ground and sieved. The fraction of the material which passed through a 0.1mm sieve (ca. 60 Kg) was collected and sent to the Agency for further processing. The material was thoroughly mixed at the Agency's Laboratory by rotating it in a plastic drum for 60 hours before it was dispensed into plastic bottles. Each bottle contained approximately 25 g of the material.

## **Homogeneity**

The within and between bottle homogeneity was evaluated by determining the content of three marker elements (As, Cs and Sc) by instrumental neutron activation analysis. A number of sub-samples (100 mg) was taken from a single bottle and an equal number of single samples were taken from individual bottles selected at random. A statistical analysis of the results using F and t-tests indicated that the within and between bottle results did not differ significantly and the material can therefore be considered homogeneous (at a sample intake mass at, or above, 100 mg).

## **Dry weight determination**

All recommended and information values are expressed on a dry weight basis. Therefore the dry weight must be determined at the time of analysis, using separate sub-samples of 500 mg dried to constant weight in a drying oven set to 105 °C. Subsequent weighings should differ by less than 5 mg.

The moisture content of the material was assessed at the time of bottling and after a one year period of storage, by drying the material in an oven at 105 °C to constant weight. The results indicated that the moisture content had increased slightly from 2.7 % to 3.4% over this period.

## **Instructions for use**

The recommended minimum sample size for analysis is 100 mg. Analysts are reminded to take appropriate precautions in order to avoid contaminating the remaining material in the bottle. No special precautions are required for the storage of this material.

## **Legal disclaimer**

The IAEA makes no warranties, expressed or implied, with respect to the data contained in this reference sheet and shall not be liable for any damage that may result from the use of such data.

## **References**

- [1] Dybczynski R. and Suschny O., Final report on the intercomparison run SL-1 for the determination of trace elements in a Lake Sediment sample. IAEA/RL/64, IAEA, Vienna, Austria 1979.

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