



**International Atomic Energy Agency**  
**Analytical Quality Control Services**  
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# REFERENCE SHEET

## REFERENCE MATERIAL

### IAEA-SL-3

#### 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	3.2	3.0 – 3.4	17
Ce	45.5	43.8 – 47.2	14
Eu	0.66	0.64 – 0.68	14
Hf	9.1	8.5 – 9.7	18
K	8740	7910 – 9570	9
La	22.5	21.5 – 23.5	18
Nd	21.5	20.0 – 23.0	13
Rb	38.8	36.9 – 40.7	20
Sm	3.83	3.53 – 4.13	16
Sr	4700	4500 – 4900	14
Th	7.0	6.5 – 7.5	21

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

⊕ Revision of the original reference sheet dated July 1987

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

Element	Information Value mg/kg	95% Confidence Interval mg/kg	N*
Al	24500	23300 – 25700	5
Br	5.6	4.8 – 6.4	16
Ca	111100	107200 – 115000	9
Cs	1.38	1.24 – 1.52	16
Dy	2.22	1.65 – 2.79	6
Lu	0.30	0.27 – 0.33	12
Mg	27000	24600 – 29400	5
Na	6690	6360 – 7020	13
Sb	0.56	0.46 – 0.66	15
Sc	3.91	3.64 – 4.18	18
Ta	0.70	0.65 – 0.75	8
Tb	0.49	0.44 – 0.54	9
Ti	2610	2300 – 2920	5
U	2.30	2.08 – 2.52	13
Yb	1.89	1.77 – 2.01	14

\* 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 1986-1987. The details concerning the criteria for qualification as a recommended or an information value can be found in the report (IAEA/RL/143) "Report on the Intercomparison Run IAEA-SL-3: Trace Elements in Lake Sediment" [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 was collected from the Neusiedlersee, located some 80 km south-east of Vienna, Austria. The material was collected directly from the top layer of the sediment using a mud pump and then coarse particle were removed in the field by passing the sediment through a 1 cm sieve.

After removal of the superficial water, the sediment material still retained approximately 46% water by weight. The material was allowed to air dry for one month before being dried in an oven at 400 °C for 24 hours. After drying, the material was milled to pass a 500 µm sieve. This fraction was then passed through a 71 µm sieve and the collected material was designated SL-3 and was used for this intercomparison study. The material was thoroughly mixed in a rotating plastic drum for 48 hours and then bottled into plastic containers each containing approximately 25 g. Finally, the samples were irradiated to a dose of  $2.5 \times 10^4$  Gy using a  $^{60}\text{Co}$  source to ensure long-term stability of the material by inhibiting microbial action.

### **Homogeneity**

The homogeneity of the material was assessed by determining the concentration of a number of elements (Ce, Th, Hf, Ba, Sc, Rb, Fe, Co) by instrumental neutron activation analysis in ten sub-samples taken from the bulk sample at random. It was found that the results did not differ significantly and therefore this material could be considered homogeneous (at a sample intake mass at, or above, 150 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.

### **Instructions for use**

The recommended minimum sample size for analysis is 150 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] LaBrecque J. J., Hanna A. N., Rassoul A. and Schelenz R., Report on the Intercomparison run IAEA-SL-3: Trace Elements in Lake Sediment. IAEA/RL/143, IAEA, Vienna, Austria 1987.

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