



# United States Geological Survey

## Certificate of Analysis

### Marine Sediment, MAG-1

MAG-1 is a fine grained gray-brown clayey mud with low carbonate content, from the Wilkinson Basin of the Gulf of Maine. The collection site was approximately 125 km east of Boston, Massachusetts. The age of the sediment is Holocene, but probably includes reworked Pleistocene sediment from surrounding areas.

Element concentrations were determined by cooperating laboratories using a variety of analytical methods. Certificate values are based primarily on international data compilations (Abbey, 1983, Gladney and Roelandts, 1988, Govindaraju, 1994). USGS reports (Flanagan, 1967, 1976) provide background information on this material.

#### Recommended values

Oxide	Wt %	±	Oxide	Wt %	±
Al <sub>2</sub> O <sub>3</sub>	16.4	0.30	MnO	0.098	0.009
CaO	1.37	0.10	Na <sub>2</sub> O	3.83	0.11
Fe <sub>2</sub> O <sub>3</sub> T	6.80	0.60	P <sub>2</sub> O <sub>5</sub>	0.16	0.021
K <sub>2</sub> O	3.55	0.17	SiO <sub>2</sub>	50.4	0.96
MgO	3.00	0.10	TiO <sub>2</sub>	0.75	0.07

Element	µg/g	±	Element	µg/g	±	Element	µg/g	±
B	140	6	F	770	80	Sb	0.96	0.1
Ba	480	41	Ga	20	1.5	Sc	17	1
Be	3.2	0.4	Gd	5.8	0.7	Sm	7.5	0.6
Cd	0.20	0.03	Hf	3.7	0.5	Sr	150	15
Ce	88	9	Ho	1.0	0.1	Tb	0.96	0.09
Cl	31000	600	La	43	4	Th	12	1
Co	20	1.6	Li	79	4	U	2.7	0.3
Cr	97	8	Lu	0.4	0.04	V	140	6
Cs	8.6	0.7	Nd	38	5	Y	28	3
Cu	30	3	Ni	53	8	Yb	2.6	0.3
Dy	5.2	0.3	Pb	24	3	Zn	130	6
Eu	1.6	0.14	Rb	150	6	Zr	130	13

Oxide	Wt %	Other	Wt %
Fe <sub>2</sub> O <sub>3</sub>	3.49	H <sub>2</sub> O+	5.6
FeO	3.06	H <sub>2</sub> O-	2.39
		S <sub>tot</sub>	0.39
		C <sub>tot</sub>	2.15

Element	µg/g	Element	µg/g	Element	µg/g
Ag	0.08	Er	3	Sn	3.6
As	9.2	Hg	0.02	Ta	1.1
Au	0.0024	I	380	Tm	0.43
Bi	0.34	Mo	1.6	W	1.4
Br	250	Nb	12		

## Bibliography

Abbey, S., 1983, Studies in "Standard Samples" of Silicate Rocks and Minerals 1969-1982, Canadian Geological Survey paper 83-15, p-114.

Flanagan, F.J., 1967, U.S. Geological Survey silicate rock standards, *Geochimica et Cosmochimica Acta*, 31: 289-308

Flanagan, F.J., 1976, Descriptions and Analyses of Eight New USGS Rock Standards, U.S. Geological Survey Professional Paper 840, p 192

Gladney, E.S. and Roelandts, I., 1987 Compilation of Elemental Concentration Data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1, and STM-1, *Geostandards Newsletter*, 12:253-362

Govindaraju, K., 1994, 1994 Compilation of Working Values and Descriptions for 383 Geostandards, *Geostandards Newsletter*, 18:1-158

## Glossary

Fe <sub>2</sub> O <sub>3</sub> T	Total iron expressed as Fe <sub>2</sub> O <sub>3</sub>
C <sub>tot</sub>	Total concentration of carbon
S <sub>tot</sub>	Total concentration of sulfur
Wt %	Percent of total element concentration
µg/g	Total element concentration expressed as micrograms of element per gram of solid sample
±	One standard deviation

## Notes

Unless otherwise indicated total element concentrations are reported for material on an as-received basis, i.e., no drying.

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USGS reference materials (RMs) may be obtained directly from Dr. Stephen A. Wilson at the address or numbers listed below. The price for each bottle of RM is \$65.00 (U.S.) **except** DGPM-1 which is \$150.00 (U.S.). This cost includes all shipping and handling charges using normal mail delivery. Urgent requests for RMs should be initiated by FAX or e-mail. If required, overnight delivery is available with these charges added to the final bill.

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