

Mineralurgical Beneficiation of Heavy Mineral Sands Collected in The South Continental Platform of Sardinia.

Alfano G., Del Fà C., Ghiani M., Peretti R., Zucca A.

Centro Studi Geominerari e Mineralurgici del C.N.R.-Cagliari

ABSTRACT : The paper deals with results of a survey carried out on the continental platform of Sardinia. The survey allowed to single out some zones characterized by the presence of heavy minerals at interesting concentrations. In particular, the paper described the sampling campaign carried out over an area located in the South of Sardinia. Finally, the results of a series of beneficiation tests are presented and discussed.

RESUME : L'interprétation et l'évaluation des résultats des diverses campagnes d'échantillonnage du fond marin, effectuées pendant la période 1977-1980 dans la plateforme continentale de la Sardaigne, on permis de mettre en évidence, dans quelques zones, des accumulations de minéraux lourds. En particulier, ce mémoire se réfère aux résultats de la campagne d'échantillonnage dans la plateforme continentale de la Sardaigne du Sud et de la valorisation minéralurgique des sédiments.

The paper, also through the introduction of sampling maps, deals with the results of a survey carried out on the continental platform of Sardinia with the aim of discovering economic exploitable mineral deposits. Both oceanographic ships of C.N.R. and smaller boats were used for the sampling campaigns. The survey, extended over 5 years, allowed to single out some zones of the platform characterized by the presence of interesting indications :

- continental shelf comprised between Torre di Cala d'Ostia and Capo Sperone, for the presence of Cassiterite, Ilmenite, Magnetite, Hematite, Titano-magnetite, Zircon, Rutile, Monazite, Rare Earths, as well as traces of Ni, Co, V;

- continental shelf between Capo San Lorenzo and Capo Carbonara for the presence of Tin (recognized in the form of Cassiterite in the zone north of Capo Ferrato), Ilmenite, Rutile, Anatase, Leucoxene, Magnetite, Hematite, Titano-magnetite, Zircon, Monazite;

continental shelf comprising the archipelago composed of the

island of La Maddalena, Santo Stefano, Caprera with the extensions to the north and to the south of the archipelago, for the presence of Co and of indications of Monazite;

- continental shelf comprised between Capo Testa and Castelsardo, for the presence of Magnetite, Ilmenite, Leucoxene, Anatase, Rutile, Titano-magnetite, Zircon, Monazite, Cassiterite;

continental shelf comprised between Isola della Tonnara and Torre Argentina, for the presence of Titano-magnetite, Magnetite, Hematite, Ilmenite, Zircon, Monazite, Quartz.

In particular, one of these zones, comprised between Torre di Chia and Capo Spartivento in the South of the Island, has been explored by taking about 30 samples of sediment, 400 kg each on the average, from C.N.R. Oceanographic ship, over a total of 1,8 sq.km, between the bathymetric levels 10 and 40 m. In addition, also the zone from the shore line and the 10 m bathymetric level was tested, bringing thus the whole area explored up to about 6 sq.km. The samples were picked up using a compressed air device, able to penetrate into the sediments across a thickness of about 1 m. The apparatus, built at the C.N.R. laboratories of the Cagliari Centre, basically consists of two pipes, the first for compressed air injection and the second for the suction of the pulp. It is based on the fact that a decrease of density is produced in the interior of a partially submerged pipe when air is insuffled at the lower end. The air-water mixture, flows upwards under the pressure of the hydrostatic load which produces a considerable draft force. Air was supplied by a rotative engine-compressor capable of producing 7,200 litres per minute at a pressure of 7 A.T.A. Average pulp rate was about 70 litres per minute with a proportion of solids of 25% by weight. This system was used in order to prevent the loss of material in the finest size range and it allowed to collect big

samples with satisfactory results. The paper described the sampling programme and the procedures followed. The samples, collected at the crossing of 500 m spaced network lines, were subjected to laboratory tests such a size analysis and chemical assay. The mineral anomalies, already pointed out in previous papers, have been confirmed and the presence of Cassiterite, Titano-magnetite, Hematite, Rutile, Zircon and minerals containing REO+ Th at interesting concentrations ascertained/1,2/. Afterwards, the results of beneficiation tests carried out on single samples and on a sample representative of the whole area are presented, and the possibilities of obtaining commercial concentration of the various minerals given and discussed. The separation methods employed were gravimetric, magnetic, electric processes; for each, the most suitable flowsheet is given and the overall results summarized. The treatment of a sampling weighing 1.8 Tonnes and assaying 0.20% ZrO₂, 53 ppm Sn, 1.01% TiO₂, 3.06% Total Fe and 117 ppm REO + Th, allowed to obtain : a concentrate containing 35.16% TiO₂ and 48.25% Total Fe (16.8% Fe (II)) with a recovering of 62.77% TiO₂; a ZrO₂ concentrate containing 76.0% ZrO₂ and 3.7% REO + Th with a recovery of 31.36% ZrO₂ and 25.28% REO + Th; a preconcentrate containing 3.5% REO + Th with a recovery of 74.72%; a Cassiterite concentrate containing 25.23% Sn with a recovery of about 70.0%.

REFERENCES

- /1/ - U.O.Carta : La campionatura della piattaforma continentale della Sardegna. Rapporto del lavoro svolto e valutazioni preliminari. Centro Studi Geominerari e Mineralurgici del C.N.R. presso l'Università di Cagliari. Maggio 1980.
- /2/ - U.O.Carta : Risultati delle campionature della piattaforma continentale della Sardegna. Prime indicazioni sulle ricerche svolte. Convegno del C.N.R. sui Placers. Trieste 27-29 Giugno 1980.

