MISE-A-LA-MASSE — A COST EFFECTIVE METHOD IN MINERAL EXPLORATION*

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Extended Abstract

Exploration cost has increased manifold in recent times. Diamond drilling is the major contributor in this exploration cost. If drilling operations could be optimized by any reliable scientific method, it can help significantly in reducing the cost of exploration.

Mise-a-la-masse is one of the geophysical exploration methods, which can optimize the costly drilling operations. It is a French word meaning 'excitation of mass' and is a post-discovery method, since the prior knowledge of existence of a mineralised zone is necessary.

The principle (Gupta et al. 1999) of this method of mineral exploration is to plant one current electrode in a borehole passing through a sulphide deposit. The other current electrode is kept at infinity and the resulting potential distribution is measured for constant or normalized current by keeping one of the potential electrodes also at infinity. The equipotential maps in such cases are good indicators of the strike length, dip and pitch of the ore body affording a tool for defining the shape of the ore body in three dimension.

Mise-a-la-masse method was first used by Schlumberger in 1920 (Parasnis, 1966). Very limited information was available in literature on this method (McMurray and Hoagland, 1956; Gamer, 1963; Parasnis, 1967; Ketola, 1972; Pelton and Hallof, 1972; Crown et al. 1975; Mansinha and Mwenifumbo, 1983; Elloranta, 1985).

In Geological Survey of India, this method is being extensively applied in mineral exploration of base metals and sulphide hosted gold mineralisation in Rajasthan. Lode geometry of the mineralised lenses is delineated by energizing the intersected mineralized zone in one borehole and its prognosticated extension has been proved by subsequent drilling operations.

METHODOLOGY

Mise-a-la-masse surveys are carried out by IP (Time Domain), Scintrex unit TSQ-3 (3KW). One of the current electrodes say C1 (the positive electrode) is planted in the mineralised part of a borehole. The other current electrode C2 (negative electrode) is located more than 1 km away from the borehole in the up dip side (Fig.1).

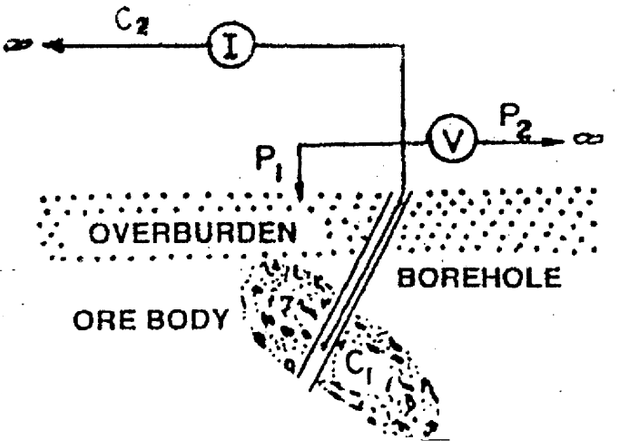

Fig.1. Electrode configuration used in *Mise-a-la-masse* method.

One of the potential electrodes P2 should also be kept at a great distance from the chosen borehole on the opposite side of C2, Surface potentials are measured with respect to the infinity electrode preferably over a grid around the borehole, The current electrode in the borehole consists of a metal rod (lead is preferred) attached to an insulated flexible copper wire. The observed potentials on the ground are normalized for 1A current and equipotential maps then prepared.

EXPLORATION BY *MISE-A-LA-MASSE*

Mise-a-la-masse surveys have been successfully employed in exploration for base metal and sulphide-hosted gold in Rajasthan. Extensions, dip, pitch and shape of the ore bodies have been deciphered. The results presented are of *mise-a-la-masse* surveys carried out in Timaranmata

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sulphide hosted gold (Bhukia gold extension), Kayar Lead-Zinc (Ajmer district, Rajasthan), Sawar Lead-Zinc (Ajmer district, Rajasthan) and Bhukia gold, Banswara district, Rajasthan) prospects.

In Timaranmata (E) block the total strike length of ore body delineated is more then 550m. In this case, 100 m grid of drilling could have been increased up to 200 or 250 m interval and as a result the saving of at least 3 additional boreholes, which is a significant saving and contribution.

In Kayar area, the results clearly indicate that both boreholes KYR 19 and KYR 20 (intermediate zone) intersected one and the same lode. Proper planning of the boreholes in light of these *mise-a-la-masse* results could have saved the cost of intervening boreholes.

In Bhukia area, seven boreholes were drilled to ascertain the total strike length of the sulphide body. If only two boreholes BHU 1 and BHU 10 were drilled and *mise-a-la-masse* surveys carried out, total strike length of the ore body could have been delineated and thus saving the cost of five boreholes. *Mise-a-la-masse* surveys in two boreholes have saved the cost of five boreholes, which itself is the cost effectiveness of the method.

In Sawar area, a new blind zone was delineated based on the results of *mise-a-la-masse* survey results and a borehole SWK-5 drilled exclusively on these recommendations intersected a 20 m thick sulphide zone with >5% TMC.

Mise-a-la-masse surveys in some of the boreholes of a prospect may thus help in optimizing the costly diamond drilling operations and thus resulting in saving the cost of many boreholes without in any way affecting the quality of exploration.

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We regret very much to record the demise of Dr. S.G. Vasudeva, formerly of Atomic Mineral Division (AMD), on 25 November, 2006 at Bangalore.