

THE DISPERSION OF NA, K, Ca AND Mg ALONG THE FOOTWALL OF A Pb-Zn ORE BODY, HOPE MINE, JAMAICA

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ABSTRACT

Carby, B. E. (1978). The dispersion of Na, K, Ca and Mg along the footwall of a Pb-Zn ore body, Hope Mine, Jamaica. *In*: H. J. Mac Gillavry & D. J. Beets (eds.): The 8th Caribbean Geological Conference (Willemstad, 1977). *Geol. Mijnbouw*, 57, p. 135-138.

The Hope Mine lead-zinc deposit is located near the western margin of the Wagwater Belt, Jamaica. The galena-sphalerite mineralisation is associated with an andesite body of (?) Eocene age and was deposited from hydrothermal emanations.

The dispersion patterns of Na, K, Ca and Mg in two adits of the mine are briefly described and the results are presented. The ratios MgO/CaO and K₂O/Na₂O are calculated. It is found that this ratio might be useful in locating ore bodies of this type.

INTRODUCTION

The Hope Mine is located just east of the village of Papine, St. Andrew. It was worked for lead and zinc during the 18th and 19th centuries and since then various exploration companies have investigated the deposit. The ore minerals present are galena and sphalerite. Mineralisation averages approximately 6.3% zinc, 2.6% lead (RAND, 1965) and 0.02-0.08% oz/ton gold (SIDDELEY, 1972). The ore shoot is lensoid in shape, strikes at 003° and its long axis plunges 333° at 45°.

GEOLOGICAL SETTING

The ore body is located near the western margin of the Wagwater Belt, a structural unit bounded on the west by the Wagwater Fault and on the east by the Yallahs-Plantain Gardens Fault system. Contained within the belt are approximately 3,700 m. of (?) Palaeocene to Lower Eocene volcanic and sedimentary rocks (GREEN, 1972).

Mineralisation is associated with an andesite lava flow and the ore body occurs at the faulted contact of the lava flow and Eocene conglomerates.

SAMPLING AND ANALYTICAL METHODS

Samples were collected at 6 m. intervals along the fourth and fifth adits of the mine (Fig. 1). They were washed, air-dried, crushed and ground to -170 mesh.

Dissolution was carried out with hydrofluoric and perchloric acids, after a method described by TOMBLIN (1967).

Na and K were determined by flame photometry, and Mg and Ca by titration against EDTA. All values obtained were calculated to weight percent oxide. The results are presented in Figs. 2-7 which show weight percent oxide plotted against distance from the ore body.

DISCUSSION

Na, K, Ca and Mg are some of the primary elements involved in reactions between percolating hydrothermal fluids and wall rocks. The concentration of these elements will be enriched or

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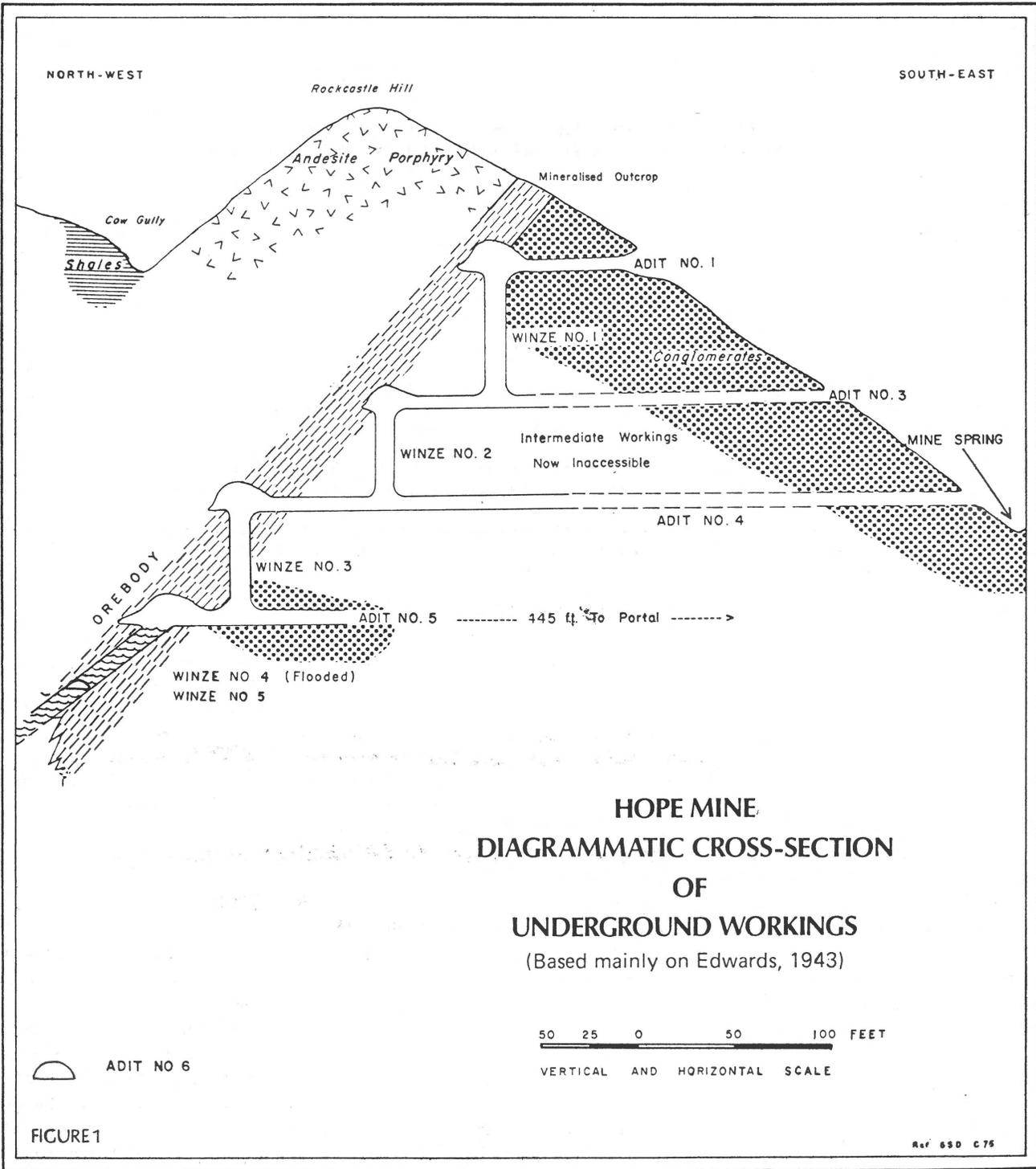
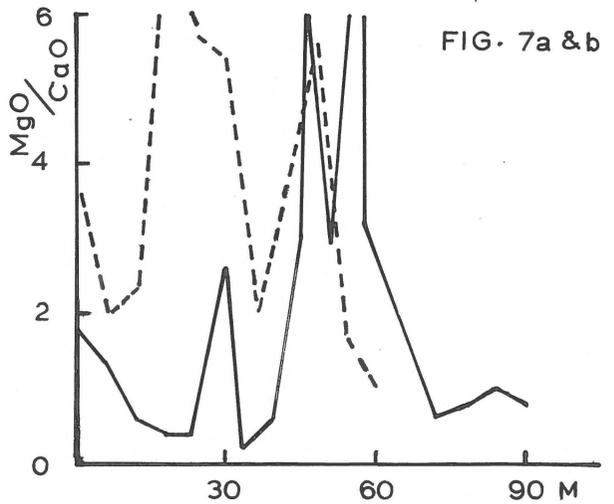
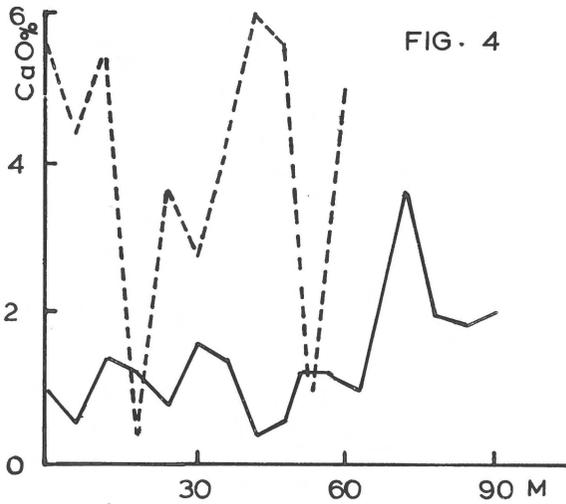
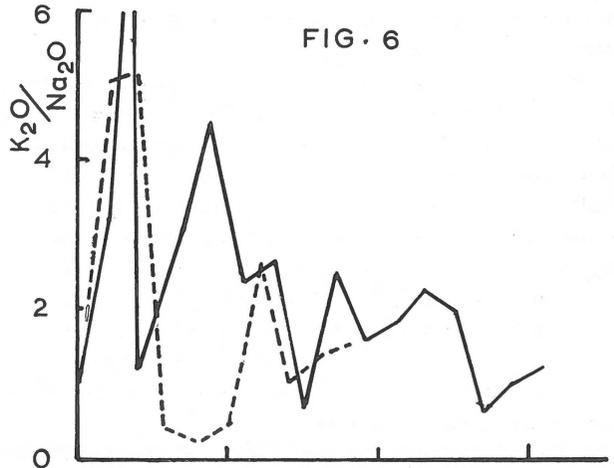
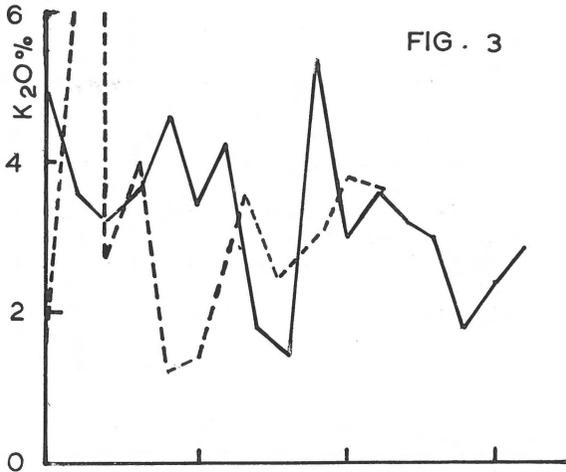
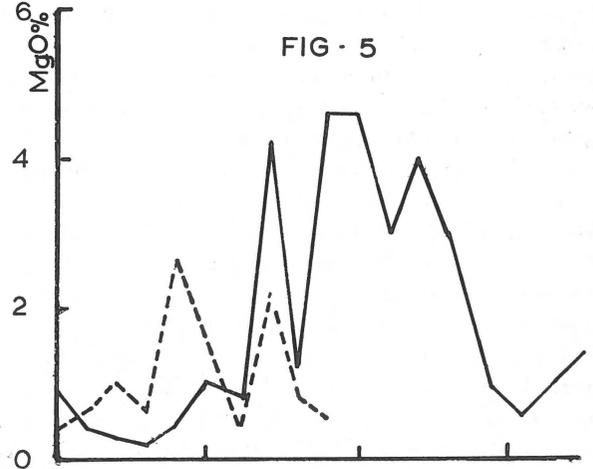
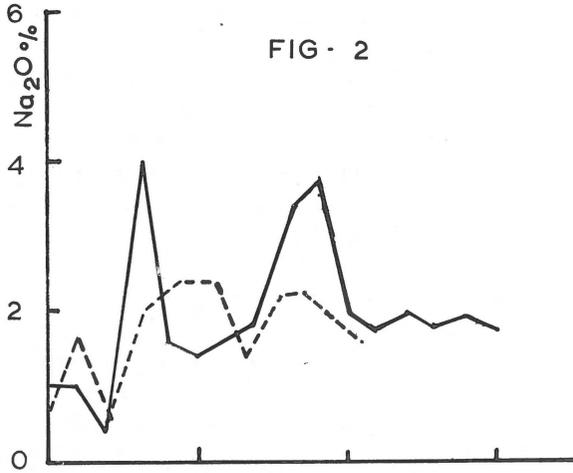


Fig. 1
Diagrammatic cross-section of the underground workings in the Hope Mine (after Edwards, 1943).



Figs. 2-7
Weight percentages of various oxides, plotted against the distance from the ore body (Hope Mine, Jamaica).

depleted depending on the specific reaction taking place. Distribution of these elements will also be affected by structural features such as fractures and veining. The extreme fluctuation of CaO in Adit 4 (Fig. 4) is thought to be due to pervasive gypsum veining which occurs throughout the mine.

The high potash values in both adits, and the increase in K_2O and decrease in Na_2O as the ore body is approached in Adit 4, (Fig. 2 and 3) is suggestive of potash metasomatism. BOYLE (1974) states that potash metasomatism is "especially common in the vicinity of many types of epigenetic mineral deposits". Meyer and Hemley state (in BARNES, 1967, p. 172) that spatially sericitization may be the alteration type most associated with sulphide ore, and Sales and Meyer (in PARK & MCDIARMID, 1970, p. 155) found that at Butte, Montana, wherever sericitic and argillic alteration took place, sericitic alteration always occupied the space closest to the ore body. The higher K_2O values between 0 and 60 m. in both adits (Figs. 2 and 3) may therefore indicate a sericite alteration zone adjacent to the ore body.

The ratio K_2O/Na_2O increases with decreasing distance to the ore body in both adits (Fig. 6). This is a result of ionic substitution of K for Na. BOYLE (1974) reports similar findings from massive sulphide bodies in New Brunswick, and concludes that the K_2O/Na_2O ratio is useful for estimating proximity to ore in epigenetic deposits. The results of this study suggest that this ratio could be used as a tool for locating mineralisation in the Hope Mine area.

The decrease in CaO in Adit 5 might reflect breakdown of plagioclase and removal of Ca. The relatively low Mg values (< 2%) as the ore body is approached suggest leaching of Mg from ferromagnesian minerals.

The high MgO values (Fig. 5) midway along both adits are undoubtedly due to chlorite. Meyer and Hemley (in BARNES,

1967, p. 176) state that addition of large amounts of Mg and/or Fe are common where chlorite is the dominant phase of alteration. These high MgO values might therefore represent a chlorite zone adjacent to the sericite zone.

The ratio MgO/CaO (Fig. 7) increases towards the ore body in Adit 4, but fluctuates in Adit 5. Further work needs to be carried out before it is suggested that MgO/CaO can indicate the presence of mineralisation in this area.

CONCLUSION

Although this study has so far been only preliminary, the results suggest that K_2O/Na_2O , and possibly MgO/CaO are good indicators of proximity to Pb-Zn mineralisation in this area.

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