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Influence of Construction Materials on Cut-Off Grade and Ore Reserve Determination: Case Study of Itakpe Deposit, Central Nigeria

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Abstract
The presence of construction materials in an ore deposit can add value to the deposit and affect cut-off grade. In this paper, the influence of the presence of granite and aplites on the cut-off grade and ore reserve of Itakpe Iron ore deposit has been studied. This study was carried out by converting the values and production costs of the construction stones to their main ore equivalent using some mathematical models. The study shows that by adding the value of the construction materials to the value of the iron ore, cut-off grade of Itakpe iron ore decreases from 30%Fe to 28.16%Fe. This corresponds to an increase of mineable ore reserve from 137.25mt to 152.34mt given the operating economic parameters.

Key words: Ore Reserve, Cut ±Off Grade, Construction Materials, Itakpe Ore Deposit, Nigeria.

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The cut-off grade of an ore is the grade at which the recoverable value from a given tonnage of the ore will balance all expenditures on mining, waste removal, mineral processing and smelting, and leave the corporate outfit with at least, a minimum acceptable profit margin (Alwyu, 1991). Cut-off grade and ore reserve of a deposit are closely interrelated. When cut-off grade is raised, then ore reserve will decrease. If cut off grade is lowered, then ore reserve increases.

Michelson and Buckley (1973) and Halodnikov (1988) have shown that the presence of secondary ores and minor metals in a deposit significantly affect the cut-off grade and reserve of the main ore. Thus the exploitation of construction materials in Itakpe deposit will affect the cut-off grade and reserve of the iron ore.

Itakpe deposit contains 10 million tones of granite and 7 million tones of aplite (NIOMCO Project Report, 1980) which the organization is currently quarrying. The essence of this paper is to show how this quarrying operation affects the cut-off grade and reserve of Itakpe iron ore.

Geology of the Itakpe Area