

Geo-environmental modeling of a Birimian gold deposit (West African Paleoproterozoic Belt): Case study of Sissingué gold project Perseus Mining in Ivory Coast

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Since the advent of new mining codes and the general awareness on social responsibility, the players in the mineral extractive industry are seeking new prediction tools, identification and assessment of associated impacts to their activities. The rulers, financial and NGOs are becoming more serious with governance and environmental and social responsibility. Thus, this research project aims to contribute to the prediction, prevention, and mastery of the environmental risks of waste rock piles during exploitation of metalliferous deposits in general, and in particular those related to the Sissingué gold project in the West African Paleoproterozoic belt called locally the Birimian. Specifically, it will develop a reliable tool for predicting the Acid Mine Drainage (AMD) and its environmental consequences from the knowledge of the geological parameters.

In fact, the Sissingué deposit is located in the north of Côte d'Ivoire in the Paleoproterozoic (Birimian) Syama-Boundialy Belt where several gold deposits are known and the most important is that of Syama, Mali. The primary gold mineralization known in this geological context in West Africa is very often associated with sulphides whose exposure to free air in the presence of water and oxygen can generate AMD and releasing fairly toxic heavy metals into the receiving environment.

Through our research work we propose to build a geological model of the deposit from which we can deduce an environmental model reflecting the ability of geological materials to generate the AMD or not.

The result work will allow to understand the geological and mineralogical control of the deposit, and then the geological model and environmental mode built will allow better prediction and management of major environmental problems related to geological mineralized material exposed to air, and adopt appropriate corrective and preventive measures. This tool can be used for environmental studies for new mines and the rehabilitation of old abandoned mines on one hand, and on other hand for various applications including geochemistry, environmental regulation and others. This research project will also be a practical example of how scientific research beyond the academic promotion can lead to technological innovation and contribute to the sustainable development of our nations.

Keywords: Gold mine, geo-environmental model, Birimian, Sissingué, Ivory Coast, West Africa