International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
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DISCUSSION ON MINE ENVIRONMENTAL MANAGEMENT PRACTICES AND KIOSK MEASURES

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ABSTRACT

The rapid development of economic is inseparable from the support of resources, while the huge consumption quantities of resources will inevitably lead the negative impact to the environment of mine, such as the poor environment for production of the mine , discharging the "three kinds of wastes" , geological disasters, and the destruction of environmental resources, etc. How minimize the extent of environment pollution and damage, and how protect and manage the environment of mine, which have become a focus of the whole society. In modern mining, non-waste mining is an important issue, because it can solve these mentioned environmental problems of mine, and changing the traditional downward-type mining technology to upward-type exploitation, will leave the waste rock in the tunnel of mine and reduce the collapse area, at the same time, which will be very effective on discharging wastewater. So it is very promising way to reduce the environmental problems of mine

INTRODUCTION

The environmental problems caused by mineral resources utilization means those problems that affect ecological balance and environment when mineral resources are used (including mining, transporting, processing and consuming), which are actual problems in the rapid development of the Chinese economic construction. After discussing the environmental effect in every aspect, the author analyses some charactristics of the Chinese mineral resources environment and puts forward some countermeasures and proposals.

"Mining" probably conjures several images. One familiar scene is of the old West, where prospectors blast the sides of mountains, tunnel through the earth, or pan at a river's edge for gold. Another is of environmental impacts of acid mine drainage from older mines that did not benefit from modern technology and management practices. The common view of mining is of environmental degradation. Few individuals outside the industry are aware of modern mining practices and associated

business, environmental, and public policy issues or of how mining companies are responding to today's environmental challenges.

The extraction of ore from underground or surface mines is but one stage in a complicated and time-consuming process of producing minerals. A mine is born through exploration and mine development. This is followed by mining and beneficiation, and ends with mine closure and rehabilitation. A mining company must undertake all mining activities to be viable and competitive. It must adhere to a comprehensive set of rules of regulations.

In general, the company's environmental policy dictates that its operations go beyond simply meeting current regulatory standards.

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The operations must exemplify best contemporary practice for the minimization and, where feasible, elimination of adverse environmental effects. The company does so by

- incorporating environmental matters as a basic part of short- and long-range planning for all projects and operations;
- complying with all applicable environmental laws, regulations, and prescribed standards and criteria, and ensuring that its contractors do likewise;
- participating in the development of environmental legislation;
- promoting and, where feasible, implementing new or more effective practices for environmental protection, compliance, and emergency response;
- taking reasonable measures to ensure that Kennecott operations are responsive to the environmental needs of the communities in which they operate; and
- regularly reporting Kennecott's performance on environmental matters through the Board of Directors to RTZ, PLC, Kennecott's parent corporation based in London.

Environmental monitoring programmes at mining companies

Today mining companies are required to carry out environmental monitoring programmes where discharges and emissions are quantified in terms of chemical composition and discharge rates. The Metals Mining Sector of the Acid Drainage Technology Initiative (ADTI–MMS) is developing a handbook describing the best scientific and engineering practices for the design of such programmes (McLemore et al., 2009). An important aspect of such a programme is that sample and data quality should be acceptable for modelling and prediction studies. During the last two to three decades, Swedish mining companies have systematically collected and analysed samples of water, biota and airborne particulate matter close to mine sites. In general, both the quantity and the quality of the data have improved over time. These long-term datasets provide important information on historical variations of emissions, and should be used in future studies of mining-related environmental effects and sustainability. In contrast to Swedish authorities, Environment Canada has developed guidelines for monitoring environmental effects of metal mining (Environment Canada, 2012).

Measures taken in underground mining

Of underground excavation in rock roadway and generated a lot of waste, not to the ground directly in the underground processing, can reduce the ground gangue heap, the elimination of pollution, can save the gangue underground, well on transportation costs. Gangue well technology is through a variety of technical means, gangue rock roadway excavated, transported to underground waste disposal field broken, through a pipe and the wind transport to the work surface backfill mined out area, do gangue underground. The gangue filling to fill both to eliminate the pollution of coal gangue surface emission, but also to reduce the surface and strata movement and subsidence area is reduced.

Perfect the management system of mine environment monitoring. Help and guidance in the local environmental monitoring station, routine of mine groundwater standard higher data monitoring, the establishment of groundwater environment database, provide detailed and reliable basic data for the development of enterprises and scientific research. Environment related

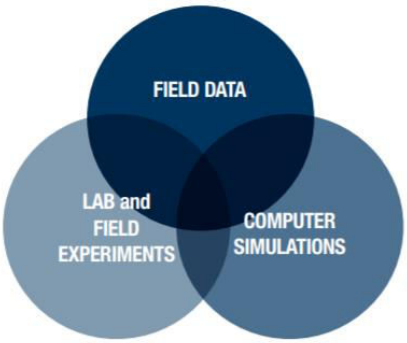
departments establish regional groundwater monitoring network and compensation mechanism, the mainland area water environment real-time monitoring, in accordance with the "who develops protection, who destroyed who is restored, who pollution who governance "principle, urge the Mining Corporation to fulfill the groundwater environmental protection and restoration of the obligation, funds through multiple channels to raise, gradually complete the pit was closed after the groundwater environmental restoration, the simultaneous development of the mining area of economic development and environmental protection.

Biogeochemical and ecological modelling

A large number of biogeochemical and ecological numerical models are now available. Although these models in most cases were not specifically developed for studies of mining-related environmental issues, many of these models can be applied to study various biogeochemical and ecological aspects related to the dispersion of chemical compounds in waters receiving mine effluents. Fundamentals of ecological modelling are described in Jørgensen and Bendoricchio (2001), and a large number of studies have been published (e.g. Asaeda et al., 2001). Five different computer softwares/models are briefly described below.

HYPE simulates water flow and substances on their way from precipitation through soil, river and lakes to a river outlet. The model also simulates concentrations and river transport of the nutrients nitrogen and phosphorus (Lindström et al., 2010).

PHREEQC is a computer programme designed to perform a variety of aqueous geochemical calculations (PHREEQC, 2014). The programme has capabilities for speciation and saturation-index calculations, one-dimensional transport calculations etc., and has been used extensively to model mine water compositions.



Three principally different approaches to be used in a study of the biogeochemical and ecological footprint of mining

The damage to land resources

The destructional forms of mine exploiting directly to land resources are excavating land (Figure 3), subsiding land, misappropriating land and defiling land of mining “three wastes”. In addition, the change of tiny landform, geology and hydrology caused by mine excavating and collapse resulted in damage to drainage system and water supply system of land also add to the destructions. Thereby, the soil fertility factors have been exacerbating. Hydrocele of surface, soil stalinization, desertification, water and soil erosion are becoming more and mom grievous.

Ground fissures in Shijiaying mining area.

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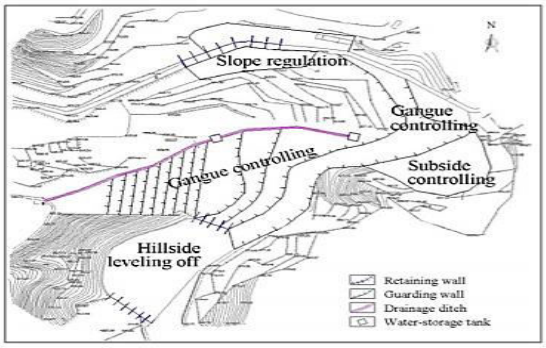
Land excavating in Shijiaying mining area

Controlling Scheme of Geological Environment

After the effects of ecological environment in Shijiaying mining area are assessed, the general controlling scheme can be organized with anticipated target and control measures. Based on the study area landform, present characteristics and problems of mine geological environment. The study area is divided into 3 sections: gangue controlling area, slope repairing area and subside controlling area. Each area will take the comprehensive controlling scheme of the combination of engineering measures and biological measures



Layout chart of engineering measures of the geological environment

The impact on the human living environment

1. Water Resource: The waste-water pollution generated by open-pit water is very obvious. Large amounts, of acid, heavy metal ions, various kinds of mineral processing reagents, suspended solids washing waste-water and domestic sewage are produced in the mining process. Features of waste water emission are large quantity, complex composition, long duration and wide range. Secondly, toxic and harmful substances of solid waste through the long term of oxidation, erosion and leaching flows into underground. These waste-water through the way of runoff or infiltration to pollution the environment of mining and the surrounding area. Opencast mining also pumping and drain of groundwater, lower the groundwater level, less the amount of water, aquifer of Quaternary will be drained in the open-pit mining process, seriously influence the use of water resources.

2. Air Pollution: The main air pollution generated by open-pit mining include: gas generated by large open-pit mining operation of machine equipment, power equipment, transportation equipment. Float coal mining steps, coal under side slopes, waste dump and miscellaneous coal scattered on the ground during transportation of miscellaneous coal, after prolonged exposure to air, the phenomenon of spontaneous combustion will produce large amounts of harmful gases, and there is a lot of smoke associated. Motor transport in large opencast coal mine is very common, especially more than 100 tons of large vehicles are favored by the mine.it generates a large amount of exhaust. The harmful gases like CH4 and CO, CO2, NOx, H2S etc. And other substances can lead to the destruction of the ozone layer, cause the greenhouse effect, but also the formation of acid rain, causing secondary pollution, seriously affecting the production of human living environment.

3. Noise pollution: The sound generated by transport vehicles and large machinery are the main source of noise mine open-pit mining. The noise level can reach 90 dB (A) above,

sometimes as high as 120 dB(A) This level often extends far beyond national standards. The noise environment not only can make listening mechanism of damaged, causing insomnia, fatigue, dizziness, memory loss and other symptoms and affect sleep and rest, but also harm people's physical and mental health.

4. The burning loss of coal resources and the destruction of the environment

CONCLUSION

To solve the environmental problems of mine, except to make laws and rules sound, as well as to enhance supervision and management, the technological improvements also are very important, changing the traditional mining methods to the upward-type exploitation, which can be more effective to solve the problems such as occupied and damaged the land, geological environmental pollution, reducing the subsidence area and the destruction of the landscape, and so on, although at present the actual applications and researches of the upwardtype exploitation are not very much, the upward-type exploitation is still a very promising way to solve the environmental issue of mines.

FUTURE WORK

Future research should focus on research gaps judged as critical for an environmental impact assessment (EIA, 2014). The Kiruna mine site and its surroundings is an example of an appropriate study site to assess the biogeochemical and ecological footprint and environmental sustainability of mining. State-ofthe Art analytical techniques and modelling software should be used to study emissions, transport distances, attenuation mechanisms, and ecological effects in the receiving waters and their riparian zones downstream of the mine.

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