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Impact of Open Cast Coal Mining on Air and Water Environment and its Management

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ABSTRACT

Major environmental impacts result from both underground and opencast mining. Some of the issues are common for both types of mining such as lowering population change in land use pattern, habitat disturbance and Socioeconomic stresses. Some impacts are more pronounced for underground mining as mine fire, problems of subsidence etc. While issues related with land degradation, waste dumps, air pollution, noise and vibration problems are more prominent in case of open cast mining.

Air pollution in coal mines is mainly due to the fugitive emission of particulate matter and gases including methane, sulphur dioxide and oxide of nitrogen. The mining operations like drilling, blasting, movement of the heavy earth moving machinery on haul roads, collection and transportation and handling of coal, screening, sizing and segregation units are the major sources of such emissions. Underground mine fire is also a major source of air pollution in some of the coal fields.

The major sources of water pollution due to mining are mine drainage, water seepage through waste dumps, surface run off and ground water interception with excavation. Operating and disused mines may be a source of acidic water containing iron and other salts depending on the composition of the coal bearing strata. The mine effluent affects the water quality of surrounding Nala/reservoir/river.

Keywords : Opencast Mining, Habitat Disturbance, Drilling, Blasting

INTRODUCTION

Mining is one of the oldest industries of the world. It is as old as civilization and has always been known as a hazardous occupation. Open cast mining in one of the methods of mining, in which the rocks and alluvium, below which the ore and mineral deposit lies, are removed and dumped in the initial stage in a place which is not required in future for quarrying, residential or other purposes. The mineral exposed is completely extracted in this method of mining. The rejects are often dumped indiscriminately, and since the mineral areas are usually abandoned without any reclamation practices, the entire area becomes barren and unsightly. Also other activities of mining, which includes drilling, blasting, loading & transportation, generate dust & noise pollution. The open cast mining affects the environment in many diverse ways depending on the terrain feature, type & extent of mining activities, nature of mineral, etc (Srivastava & Singh, 1990).

Coal is one of the major minerals in India, which is mined by open cast mining as well as underground mining. In India Coal production raised from about 78 million tones in 1973, When the Coal industry was nationalised to 254 million tones in 1995. The strategy for the Coal industry has been to accelerate Coal production in order to meet the growing demand of power and other sectors by expanding open cast coal mining, which helped the industry to meet the increasing demand at comparatively lower

additional cost. Since nationalisation, almost all the increase in coal production has come from open cast coal mines. Presently about 70% production comes from open pit mines and 30% come from underground mines. This trend in likely to continue in future also (Sachdev, 1995).

The consumption of coal during 1994-95 was about 261 million tones. The electricity generation sector is the largest consumer of coal in India. It accounts for 67% of total coal consumption and generating over 70% of the electricity in the country. There has been phenomenal growth of the coal based electricity generation capacity, which rose from 8,000MW in 1973 to about 51,000MW at present. The coal based thermal capacity is projected to exceed 81,000MW by 2002. The electricity sector will therefore, continue to remain the largest coal consumer for some decades (Sachdev, 1995).

Air Pollution

Mining activities create variety of pollution viz air, water & noise pollution etc. Air pollution problem is more relevant in case of open cast mines and is caused by blasting operations, movement of dumpers and other Heavy Earth Moving Equipment (HEMM) on haul roads, drilling operation, overburden and reject dumping, handling of coal through conveyers etc., loading of coal onto trucks or wagons, exhaust emissions from heavy machines, gaseous emission from blasting. Land degradation is directly related to air pollution. During excavation of coal the dust and trace elements released in air. These dust particles and element deteriorated air quality and create major health problem.

Air pollution impacts due to open cast coal mining can be summarized as follows:

- Rise in SPM level while/due to removal of vegetation cover from the area designated for mining (Ghosh, 1985).
- Removal, handling, transportation and storage of topsoil and sub soils cause rise in SPM level. In case diesel equipment is used it can increase NOx level also.
- Dry drilling causes rise in SPM level. Diesel drills adds NOx.
- Blasting of overburden and coal generate air borne fines. NOx, SO_2 etc are also released.
- Loading and transportation of blasted rock/coal rise in SPM level. Exhaust emissions from Dumpers, Trucks etc contain SO_2, HC, NOx etc. (Choudhary, et. al., 1995).
- In-pit crushing of coal causes rise in SPM level. Exhaust emissions from dumpers contain SO_2, HC, NOx etc. .
- If rock masses having pyrites and sulphides there are possibilities of these reacting with moisture and oxygen and producing CO.
- Dumping/backfilling will cause SPM rise in SPM level.
- Coal seams and carbonaceous shales may emit methane and thus contribute it to the atmosphere.
- Coal Handling plant (CHP) in the mine produces dusts (Choudhary, et. al., 1995).
- Open burning of coal for domestic and other purposes in the vicinity of the mines can contribute SPM, SO_2, CO_2 to the atmosphere (Sachdev, 1995).

Water Pollution

Due to excavation of coal, the strata are usually disturbed very much and as a result, water regime is affected. The disturbance causes various problems including seepage or sudden inrush of water into the extraction areas. The major sources of water pollution due to mining are mine drainage, water seepage through waste dumps, surface runoff and ground water interception with excavation. It is found that majority of people in the mining areas are affected with water borne diseases like skin abdominal disease etc.

The most affected part of the natural resources is water in this region and thereby human health. Environmental implications of coal mining under Indian conditions are already illustrated (Dhar, 1993).

Mine water and runoff through overburden material of open cast mines also contribute towards pollution of nearby water resources of the area. Though acid mine drainage problem is not acute in this area due to low sulphur content in the coal (Rawat, 1982). Huge amount of overburden materials have been dumped on the bank of the river, which finally get spread in the river especially in rainy season. These activities have resulted in the visible deterioration of the quality of the river water (Tewari et. al., 1995).

The impacts of open cast coal mining on water regime can be summarized as follows:

- Removal/diversion of surface water bodies from the area designated for opencast mining.
- Water table aquifer also gets mined along with coal.
- In case a high pressure aquifer is presented below the coal seam to be mined, the aquifer is drained out to reduce the pressure in aquifer (Mehta, 1985).
- Pollution of water in nearby surface water bodies due to leaching from dumps, discharge from open pit mine water and other activities in and around mine. Surface fires may cause additional water pollution (Tewari, et.al., 1995).
- Pyrites and Sulphides in mine water and leachets make the water acidic and thus enhance chances of Heavy pollution (Rawat, 1982).

Air Pollution Management

Air pollution from open cast coal mining operations will be effectively controlled by:

1. Laying of haul roads as per the standards, black topping of service roads to avoid or eliminate air borne dust.
2. Provide mobile sprinklers in the coal haulage and transportation roads to suppress generation of fugitive dust.
3. Development of green barriers around mine, along the road, workshop, colony and the industrial area.
4. Providing suitable types of dust extractors in drill.
5. Frequent water spraying/sprinkling on the roads, stockpiles, OB dumps and transfer point where dust is produced.
6. Providing fixed sprinklers at the coal transfer and feeding points in the Coal handling plant (CHP) and auto sprinklers around CHP.
7. Improved maintenance of machinery for reducing gaseous and noise pollution.
8. Adopting controlled blasting technique by using advanced non-electric detonator. Avoiding blasting during high wind periods.
9. Providing cover over conveyor belts to control air borne dusts.
10. Dust suppression by hydro jet spraying at receiving pit, loading point etc.

Water Pollution Management

The opencast mine would interfere with the natural drainage of the surface water regime in the area. The quality of water would also be affected due to mining operations. The following control measures are to be implemented

- Leak proof containers will be used for storage and transportation of oil & grease. The floor of area wherever oil/grease is handled will be kept effectively impervious.
- Any wash off from the oil/grease handling area are workshop will be drained through impervious drains, collected in specially constructed pit and treated appropriately before releasing it into the natural drains.
- All stacking and loading areas will be provided with proper garland drains equipped with baffles

to prevent wash off from reaching the downstream natural channels.

- The surface runoff from the overburden dump to be collected in garland drain provided at the foot of the dump. This foot drain would carry water to a sedimentation tank from where the over flow would be directed to natural drain through controlled discharge outlet.

Drains are to be provided around the coal dumps to collect runoff for diverting into sedimentation tanks before discharge into natural drain.

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