

# POLLUTION IN COAL MINING AND MITIGATION MEASURES

Coal is an important fossil fuel for generation of electricity and for other industrial purposes. Its importance in electricity generation has become more prominent after increase in international price of crude oil. Therefore, coal mining is now essential part of civilization. Traditionally, coal mining and coal fired power plants are considered to be most polluted industry. We discuss below the environmental pollution issues involved with coal mining activities and ways to mitigate them.

A. In number of ways coal mining projects pollute environment. Environment problems related to coal mines are discussed below:

(1) Air pollution: Air pollution in coal mines is mainly due to the fugitive emission of particulate matter and gases including methane (CH<sub>4</sub>), sulfur dioxide (SO<sub>2</sub>) and oxides of nitrogen (NO<sub>x</sub>). The mining operations like drilling, blasting, movement of the heavy earth moving machinery on haul roads, collection, transportation and handling of coal, screening, sizing and segregation units are the major sources of such emissions. Under-ground mine fire is also a major source of air pollution in some of the coal fields.

High levels of suspended particulate matter increase respiratory diseases such as chronic bronchitis and asthma cases while gaseous emissions contribute towards global warming besides causing health hazards to the exposed population.

Methane emission from coal mining depends on the mining methods, depth of coal mining, coal quality and entrapped gas content in coal seams.

(2) Water pollution: The major source of water pollution in the coal mines is the carry over of the suspended solids in the drainage system of the mine sump water and storm water drainage. In some of the coal mines, acidic water is also found in the underground aquifers. In addition, waste water from coal preparation plant and mine water are other sources of water pollution.

(3) Land degradation: The opencast coal mines are developed at the surface, because of that these mines are also called surface coal mines. The overburden, i.e., the rock or soil overlaid the coal seam,

are removed before extraction of coal. This overburden is dumped on surface, preferably on mined-out or decoaled area. Therefore, this type of mining requires quite large area on surface. Many a times, large forest areas are transferred for coal mining purpose. The land degradation is the result of creation and expansion of opencast coal mines. The aspect of land degradation in underground coal mines is due to subsidence over the underground cavity resulted from underground caving.

(4) Noise pollution: Main sources of noise pollution are blasting, movement of heavy earth moving machines, drilling and coal handling plants etc.

(5) Solid waste: Major source of solid waste in a coal mine is the overburden. Segregation of the stones in the coal handling plants and the coal breeze also contribute to the solid waste generation. Overburden to coal ratio in the open cast mining is about 2 m<sup>3</sup>/tonne of coal or sometime more. Therefore, the quantum of overburden generated and its proper management is the main concern area in dealing with the environmental issue of opencast coal mines.

(6) Deforestation: As explained, the requirement of land for a big opencast coal projects are quite large. Many of the forest area, many a times, are converted to mining field. Therefore, large forest areas are deforested to make a way for large opencast coal mines.

B. The unscientific mining practices undertaken result in large degradation of land in the form of subsidence, underground goaf filled with water, mine fires, destruction of vegetation, generation of wind blow dust etc. To mitigate above environmental problems several control measures, generally, are adopted. Some of the control measures are discussed below:

(1) Subsidence: Subsidence of surface takes place due to extraction of coal by underground mining. Subsidence is exhibited by cracks on surface and lowering of land in the worked out areas compared to surroundings. The surface is rehabilitated by dozing and sealing of cracks followed by plantation of trees. The subsided areas with medium-sized depressions are ideal for developing water pools and sustain green vegetation and also to meet the water needs of local people.

(2) Abandoned mines: The mined-out areas are to be backfilled and then rehabilitated for development of vegetation. In the quarried areas water reservoir is developed for water harvesting. The big voids created by open-pit mining cause land degradation. These voids can be gainfully utilized to serve as water reservoirs. This water provides moisture for vegetation in the surroundings areas. The water is

used for domestic supply after necessary treatment. Irrigation to nearby agricultural land also may be thought off.

(3) External overburden dump: The external dump area presents an unaesthetic appearance unless rehabilitated. Vegetative rehabilitation of these dumps prevents erosion and also improves aesthetics.

(4) Mine fire: The measures for controlling the mine fires, include dozing, levelling and blanketing with soil to prevent the entry of oxygen and to stabilize the land for vegetal growth.

(5) Water and air pollution control: Mine water is pumped to a lagoon, which acts as a sedimentation pond. The overflow water, which is fairly clean, is drained out to natural drain or used for dust suppression activities. Similarly, washery effluent is re-circulated through thickener and slime ponds. For reducing air pollution, water spraying and sprinkling is done on the haul /transport roads to suppress the dust generation.

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