

# Analytical study of Safety Management in Coal Mines.

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## ABSTRACT

Coal is rich mineral and very important source for producing electricity in Thermal Power Station and also widely used in Cement, Steel, Fertilizer, Railways and many more industries, coal fulfill the 70% need of human life. Coal is found in deepland and its excavation and production is very hazardous for workers in mines. Therefore for giving protection to workers working in mines government has provided several directives by the authority like Director General of Safety in mines who is working as Regulator for safety in mines issues the directives & circular for working in mines for workers for their protection from hazardous conditions of work and protection from unexpected accidents in mines. Therefore Director General of Safety in mines issues safety norms & guidelines for working in mines by workers. The operational Executives is responsible to implement the safety norms & safety guidelines for workers working in mines and ensure safe working in workers which protect the workers from hazardous conditions & from unexpected accidents in mines. Thus by implementation of safety norms which can boost the morale of workers which ultimately helps to increase the productivity of coal in coal mines.

## Introduction

Coal is rich mineral and very important source of energy. No life exists without coal. Coal is also known as black diamond which is very important source of energy generation to generate electricity, since due to scanty rainfall hydroelectric generation becomes less hence for getting electricity who have to more depend on coal. Coal is used in Thermal power stations to generate electricity which is very essential for human life. Coal is also used in other sectors widely like in Cement, Steel, Railways, Fertilizers and other important Industries, coal fulfills the 70% needs of human life. Coal is found in deep of land hence the production of coal is hazardous. Coal is produced systematically by the mines by doing mining work with the help of skilled/semiskilled and unskilled workers and operational executives in mines with the help of tools, equipments and machineries and by making use of advanced technology.

Since the process of producing coal is hazardous in operational area, the more focus is needed at safety area. Safety is the area where authorities have to give more importance because it leads to achieve the higher productivity with systematization of work in mines. From time to time the competent authority

Director General of Safety in mines who is working as regulatory body issues directives in the form of circular to the mines for its regulation in mines for to improve better working conditions in mines.

It has been observed from time to time through the media publication that Safety in mines at staked which resulted in to accidents in mines hence strictly adherence to safety norms is very important in mines and it is the duty of executives to operationalize safety norms in mines in the interest of worker, which may boost the morale of workers, which ultimately helps to increase the productivity of coal in mines.

### **(1.a) Employee Safety & Physical Hazard**

The main purpose of effective safety programme in an organization is to prevent work related injuries and accidents. A well managed factory will see to it that there are no physical hazards such as (i) Slipping and falling hazards, (ii) Collision and obstruction hazards, (iii) Equipment hazards, (iv) Fire hazards, (v) Hazards from falling objects.

#### **(i) Slipping, tripping or falling on the floor hazards**

People fall when they sleep, highly polished surfaces, accumulation of water soap or oil etc. on the floor, torn or loose covering cause the floor to be slippery.

#### **(ii) Obstruction and Collision hazards**

When the factory layout and space management are poor it results in improper placement of furniture and equipment causing collision of employees with equipment and machinery tables chairs etc. further overcrowding and a narrow space for movement also results in accidental collision between employees.

#### **(iii) Equipment hazards**

Quite often underground moving parts, wiring, switches and cards, edges of metal equipment can cause injuries to employees working in these surroundings, further waste paper baskets, lobbies, plumbing fixtures and small snail carts also cause problems for employees. All these should be guarded against.

#### **(iv) Hazards from falling objects**

When the cabinets lockers and shelves are not properly placed they could fall on employees and injure them, also the stoked materials, paper, and stands when placed on the working tables might fall on employees.

#### **(v) Fire hazards**

The places when paperwork is heavy and precautionary measures taken are nil, the possibilities of accidents are high. Improper disposal facilities for smokers lack of provision of safety cans for inflammable materials non existence of fire escapes and exist are the factors that contribute to fire accidents.

### (1.b) Accidents in Mines causes & prevention

There are two basic causes of workplace accidents, apart from chance occurrences which are beyond management control, unsafe condition and unsafe acts. Unsafe conditions include such facts as improperly guarded equipment, defective equipment, dangerous procedure in or around machines or equipment congestion and overloading improper illumination and ventilation. In addition to these other work related factors may also cause accidents. The job itself might be quite dangerous, long work scheduled might lead to fatigue and cause accidents.

The psychological climate of the workplace may be quite hostile. Accident may be the result of unsafe acts. Such as throwing materials, operating machines at unsafe speed, making safety device inoperative by removing, adjusting, disconnecting them, using unsafe equipment or employing equipment improperly, using unsafe procedure in loading, placing, mixing, combining, lifting improperly, taking unsafe position under suspended loads, distracting, testing, abusing, storing, quarrelling, horseplay etc. workers, personality traits, may complicate the issue further especially if they have a tendency to take high risk suffer from poor vision and emotional instability.

#### Causes of Accidents

- i) Improper guarded equipments.
- ii) Defective equipments, machines.
- iii) Unsafe storage, congestion, overloading.
- iv) Improper illumination, glare, insufficient light.
- v) Improper ventilation.
- vi) Falls on stairs, ladders, and walkways.
- vii) Congested workplace.
- viii) Unsafe acts such as throwing materials.
- ix) Unsafe procedures in loading, placing or mixing or by lifting improperly.
- x) People with impaired vision, under the influence of drugs or alcohol and who exhibit negative violent behaviors.

#### Indian Scenario

Apart from mechanical failures, unsafe physical conditions, employee negligence, there could be several other reasons heading to industrial accidents in India. There are of course innumerable laws governing employee's safety (such as the Factories Act, the Indian Electricity Act, the pesticides Act, the mines Act) but the elaborate provision contained therein are not strictly enforced.

Often the inspectors appointed for this purpose are made to cover lot of ground leaving very little time for a stringent inspection of various factories within their jurisdiction (each inspector covering more

than 150 factories in an average in a year) to comprehend the problem further. The inspectors are more than willing to bend the rules for a price they are ready to approve anything and everything if the employer is willing to please them. As a result we have large factories employing hundreds of workers without fire fighting equipment and safety devices. The private sector is not surprisingly guilty of negligence on the safety front. They are mostly concerned about cutting costs on all fronts to remain competitive instead of protecting the lives of workers. The employment of women and child labour on dangerous machines is another complicating facts.

### **Role of Managers**

Managers have a great role to play in reducing unsafe condition and unsafe acts, for example a supervisor in a ball bearing plant may discharge his health and safety responsibilities thus reminding an employee to wear safety goggles, checking on the cleanliness of the work spot, observing employees to see if any of them have alcohol, drug, or emotional problems that may affect there work behavior and suggesting equipments changes (such as screens railings or other safety devices) to safety exports in the factory/mines he can reduce unsafe acts by screening out accident prone persons before they are selected.

Safety training propaganda through posters, framing safety rules, regular inspection may also help supervisor in making employees more safety conscious. Where employees carry out repetitive operations, they are likely to pay less attention to there tasks or they develop bad work habits that can cause accidents and injuries, one way to deal with workers boredom and monotony is to redesign the job. Studies could also be undertaken to look in to fatigue factors, lighting tools, equipments layout etc. so as to improve the work environment and climate of employees.

### **(I.c) Effective Safety Management**

Effective safety management considers the type of safety problems, accidents, employees and technology in the organizational setting. The role of human beings in related problems should also be looked in to safety efforts will not be successful if we try to engineer machines without paying attention to behavioral relations of employees. A comprehensive approach to safety includes the following steps.

#### **1) Safety policy**

Every factory must formulate and implement a safety policy. The objective of such a policy should be to eliminate or reduce accidents and injuries in the workplace.

#### **2) Top Management Support**

The safety policy must be supported by top management firmly. Safety commitment should begin with top management. The commitment manifest itself in top managements being personally involved in safety activities in a routine way giving matters top priority in company meetings and production scheduling, giving company safety officers high rank and status and including safety training in new workers training.

### 3) **Safety Committee**

To promote safety consciousness among employees, safety committees could be constituted under the chairmanship of a safety officer. The committee should consist of representative from workers and supervisors from various departments and levels. It must meet regularly to conduct safety changes necessary to avoid future accidents.

### 4) **Safety discipline motivation**

Safety rules must be enforced strictly. Violations should not be tolerated, frequent reinforcement of the need for safe behaviour and feedback on positive safety practices have been found to be extremely effective in improving workers safety rewards and certificates could be offered to employees for good safety records to promote employee involvement and motivation Safety contest could be held followed by incentives for safe work behaviours.

### 5) **Safety Engineering**

To minimize workplace accidents, proper engineering procedures could be followed. Fencing of machineries, adequate space between machines, ports and equipment use of material handling, equipment safety devices, proper maintenance of machines etc. are undertaken to prevent accidents from occurring.

### 6) **Safety training and communications**

Safety-training can also reduce accidents. It is especially useful in case of new recruits. Training in safe practices, procedures, material handling, first aid, fire prevention etc. could be offered to them, posters, newsletters, displays, slogans, and signs, could also be used to promote safety; consciousness throughout the organization. Another way to communicate safety ideas is through safety films and videotapes.

### 7) **Accident investigation and research**

When accidents takes place, they should be thoroughly investigated to find the actual reason (poor lighting, poor ventilation, wet floor) as early as possible such an early probe is necessary to ensure that conditions under which the accident occurred have not changed significantly, photographs, videotapes could be used to gain better view of the injured employee or his supervisor should be interviewed to find out what happened and how the accident occurred in the third place an accident investigation report should be prepared indicating what has happened and recommending steps to prevent similar accident from occurring.

### 8) **Evaluation of Safety effort**

Organization should monitor and evaluate safety efforts by conducting safety audits at intervals. Accident and injury statistics should be periodically compared with previous accident patterns to find any important changes. This analysis should be designed to measure progress in safety management.

## 9) Government support

To extent support to safety related activities the government of India established the National Safety Council in 1966. The principal job of this council is to promote safety consciousness at the plant level and conduct safety programe. The National Safety Day is celebrated every year to signify the foundation day of the council, national safety award are given every year to industrial units for ensuring accident free environments.

### Safety at Work

By its very nature extraction of coal from the bowels of earth is fraught with innumerable hazards. It is so, because it is a war with unpredictable forces of nature and unpredictable because despite all the advancements of modern times, a miner or for that matter even an experienced mining engineer cannot foresee the behaviour of geo-mining characteristic beyond a point as newer grounds are penetrated and exposed, equilibrium of the ground forces get disturbed and condition of roof and sides at working places deteriorate to varied degrees. Also lethal gases in unknown quantities get liberated without any prior warning, the unpredictable and often changing nature of work environment are in fact the two special features that particularly distinguish mining from other industrial activities.

Apart from the hostile natural factors operation of powerful and complex machinery in cramped, dark and polluted work environment belowground as well as bulk use of inherently hazardous explosive add to the risk of injury or death in mining and tend to make mining one of the most hazardous occupations. When the first Indian Mines Act was enacted and foundation of states intervention for ensuring occupational safety and well being of the segment of its citizen who lived by labour in mines was laid since then and more so in the post independence period with the principle of securing just and human condition of work enshrined in the constitution there have been many movements developments in safety movements mostly under the impart of legislative measures and the critical catalytically influence exercised by the Directorate General of mines and safety.

### Safety Policy of Coal India ltd.

- 1) Operations and system will be planned and designed to eliminate or materially reduce mining hazards.
- 2) Implement statutory rules and regulation and strenuous efforts made -for achieving superior standards of safety.
- 3) To bring about improvement in working conditions by suitable changes in technology.
- 4) Provide material and monetary resources needed for the smooth and efficient execution of safety plans.
- 5) Deploy safety personals wholly for accidents, for accident prevention work.
- 6) Organise appropriate forums with employees, representative for joint consultations on safety matters and secure their motivation and commitment in safety management.

- 7) Prepare annual safety plan and long term safety plan at beginning of every calendar year unit wise and for the company to effect improved safety in operations as per respective geo-mining needs to prepare the units for onset of monsoon, to fulfill implementation of decisions by committee on safety in mines and safety conferences and to take measures for overcoming accident proneness as may be reflected through study of accident analysis. Keeping priority in sensitive areas of roof falls, haulage, explosives, machinery etc.
- 8) Set up a framework for execution of safety policy and plans through the General Managers of Areas, Agents, Managers and other Safety personals of the Units.
- 9) Multilevel monitoring of the implementation of the safety plans through internal safety organization at the company headquarters and area safety officer at area level.
- 10) All senior executives at all level or management will continue to inculcate a safety consciousness and develop involvement in practicing safety towards accident prevention in their functioning.
- 11) Institute continuous education training and retraining all employees with the accent placed on development of safety oriented skills.
- 12) Continue efforts to better the living conditions and help of all the employees both in and outside the mines.

**(1-e) Safety monitoring agencies at different levels in CIL**

- 1) Workmen's Inspectors as per mine rules 1955.
- 2) Safety committee at mine level as per mine rule 1955.
- 3) Area level Tripartite Committee.
- 4) Tripartite Safety Committee at subsidiary headquarters level.
- 5) Coal India Safety board at corporate level.
- 6) Standing Committee on Safety in coal mines.

**Safety of mine workers at staked**

Even as stone quarrying is a thriving business in the district. Those running it seem to have little concern for the safety of its workers. Although 1500 mining leases have been granted for quarrying in Nagpur district, the directorate general of mines safety has a list of not more than 15 such firms.

The DGMS is a central government organization that monitors safety in mines. It is mandatory for mining firms to send a notice to the DGMS in case of mining activities are undertaken using explosives, the mines go deeper than six meters or heavy machines are used for mining activity.

However out of 1500 leases granted only few have sent notices to the central body. This is despite the fact that most of them have been invariably been using explosives in their operations moreover most of them are seasonal quarries which carryout operations on the basis of orders and are later shut down.

Once the notices are sent the DGMS keeps a list of such mines so that regular inspections are conducted there. The DGMS also suggests safety measures if required.

The data on the mine lease are provided from the district administration, around 250 workers work here on regular basis in any case notice from only 15 firms as against 250 regular quarries in the district is a dismal figure indeed. There are chances of accidents taking place due to explosives blasts taking place in the quarries. While there is a chance of the side walls of the mines collapsing if adequate measures are not taken.

The DGMS is concerned about the situation and an all out effort is required from the state government and the mine owner.

### **Conclusion :**

Coal is an important raw material for human being it is found in deep of land and widely used for generation of electricity and other sectors of industries like cement steel, Railways & fertilizers and other important industries, excavation of coal is very hazardous the more Focus is to be given in safety excavation of coal by the skills unskilled and semiskilled workers in coal mines by adhering safety rules & safety norms the Director General of Safety in mines which is regulatory authority for mines issues regulations and circular for mines should be adapted by workers while working in mines. It is the duty & Executive who manages the work in mines should strictly adhere the safety norms for workers which can protect the workers from accident in mines which can boost the morale of workers which helps to increase the productivity of coal in mines.

Reference Book : Analytical study of Effect of Safety measures on productivity and morale of Employees in coal mines of W.C.L. Nagpur.