RISK MANAGEMENT -- AN EFFECTIVE TOOL FOR ACCIDENT PREVENTION IN MINING INDUSTRY

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ABSTRACT

Indian Mining Industry is engaged in the exploitation of 65 major minerals and 22 minor minerals which contributes about Rs. 55,000 crores to the national exchequer with an aggregate production of more than 600 million tonnes and an average daily employment of one million workers. In India, the fatality rates of miner per 1000 person employed is of 0.33 for coal mining and 0.35 is for non-coal mining. The accident statistics in Indian Mining Industry shows that the fatalities rate per thousand persons employed in coal and non-coal mines has remained almost steady during last six decades whereas for the coal mines the same is for a period of around two decades. This Statistics is still quite high compared to the ideal situation of Zero Accident Potential (ZAP). There is a strong and stringent need for regulations of occupational health and safety of miner. The prevailing system of regulation, which is highly prescriptive, has the lacuna/drawbacks that it does not care all circumstances and it makes it more difficult to import successful safety practices from other countries.

Safety is the responsibility of a particular person rather than developing a culture in which safety should be of everybody's responsibility, viz. employees, employers, manufacturers and others. Each and every organisation should therefore, develop a system of occupational safety and health management which would have the following elements:

- Policy Implementation Organisation
- Planning Evaluation/Assessment Action for improvement

This clearly indicates that the existing traditional system of administration of Mines Act and sub-ordinate legislation made there under through inspection, statutory and other investigation into fatal accidents and dangerous occurrences. The follow up measures arising out of the traditional approaches should ensure that the risk is kept within acceptable levels have reached its limit of effectiveness. A modern concept of "Risk Management and Emergency preparedness" has come up as an effective tool for accident prevention in Mining Industry. This paper deals with the basic concept of Risk Management and its objectives. It outlines the important steps in carrying out Risk Assessment and Risk Management in mining industry through the case study taken up at Talcher Area of *Mahanadi Coalfields Limited*. It has also made an attempt to explain the '**Risk Management**'- a modern concept as an effective tool of accident prevention.

Keywords: Risk Management, Risk Assessment, Accident prevention, Hazard Identification.

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INTRODUCTION

Present Scenario

The Indian Mining Industry exploits 65 major minerals and 22 minor minerals contributing about Rs. 55,000 crores to the national exchequer with an aggregate production of more than 600 million tonnes and an average daily employment of one million worker.

In India, the fatality rates of miner per 1000 person employed is of 0.33 for coal mining and 0.35 is for non-coal mining. ***This Statistics is still quite high compared to the ideal situation of Zero Accident Potential (ZAP).***

Risk Management

A source of potential harm or situation with a potential to cause loss is called hazards.

In Risk Management, the first and foremost step is *Hazards identifications*. *The Risk Management is the modern concept of health and safety management, which develops, implements and controls before accidents.*

Preventive measures can't be taken until the causes or sources of accidents are known.

RISK MANAGEMENT

- Identifying the areas of high risk based on livelihood and potential consumption.
- Devising and implementing preventive actions to bring the risks to acceptable levels.
- Implementation of safety management plan/ preventive measures.

The Risk Management basically includes

1. Risk assessment

2. Implementation of safety management plan.

RISK ASSESSMENT

1. *The steps for a risk assessment are as follows*

- Hazards identification.
- Ranking the risks
- Measurement of the risks
- Development of the controls.

2.To control risk assessment the following points should keep in mind

1. Elimination
2. Training
3. Substitution
4. Administration
5. Separation
6. Personal protective equipment

IMPLEMENTATION OF SAFETY MANAGEMENT PLAN

1.Consequence: It is the outcome of an event of situation. In terms of health and safety, it is degree of harm that could cause to people exposed to the hazard. The potential severity of injuries or ill health depends on the number of people who could have potentially attended.

2.Exposure: Exposure consists of two factors:

- The frequency at which people are exposed to the hazard.
- The duration for which they exposed to the hazard.

3.Probability: It is the chance that a person will be harmed when they are exposed.

Calculating Risk: *Consequence x Exposure x Probability.*

Case Study

Talcher Colliery, Mahanadi Coalfields Ltd.

Hazards identifications:-

1. Fire/spontaneous heating
2. Inundation
3. Explosion
4. Roof/sidefall
5. Conveyor systems
6. Haulage/Locomotive
7. Electricals
8. Shaft drainage.
9. Travelling through locomotive roadways.
10. Emergency exit through coal winder/skip.
11. Inspection route of isolation stopping.
12. Effectiveness of evacuation of work persons through upcast shaft.
13. Explosives and Blasting
14. Heat & Humidity
15. Underground gas-cutting operations.

Consequence

1. Catastrophe=100
2. Disaster = 40
3. Very serious = 15
4. Serious = 05
5. Minor = 02
6. Insignificant = 01

Probability

1. Quite expected = 10.0
2. Quite possible = 7.0
3. Unusual but possible = 3.0
4. Only remotely possible = 2.0
5. Conceivable but unlikely = 1.0
6. Practically impossible = 0.5
7. Virtually impossible = 0.1

Exposure

1. Continuous = 10
2. Frequent (daily) = 05
3. Seldom (weekly) = 03
4. Unusual (monthly) = 02.5
5. Occasional (yearly) = 02
6. Once in 5 years = 1.5
7. Once in 10 years = 0.5

Max. Tolerable Risk is 400

S.No.	Hazard	Points	Rating	Rank
1	Fire/Spontaneous Heating	60	15%	II
2	Inundation	40	10%	III
3	Explosion	25	6.25%	VI
4	Roof and side fall	37.5	9.4%	IV
5	Haulage / Locomotive	70	17.5%	I
6	Conveyor systems	30	7.5%	V
7	Electricals	25	6.25%	VI
8	Heat & Humidity	05	1.25%	IX
9	Effectiveness of evacuation of work person through U.C. Shaft	15	3.75%	VII
10	Shaft drainage	12.5	3.1%	VIII
11`	Emergency exit through coal winder/skip	12. 5	3.1%	VIII
12	Travelling through locomotive roadway	15	3.75%	VII
13	Inspection route of isolation stopping	15	3.75%	VII
14	Explosive and Blasting	15	3.75%	VII
15	Underground gas cutting	12.5	3.1%	VIII
16	Miscellaneous activities	6.0	1.5%	X

The Risk Assessment of Talcher Colliery and its effect on management based on ranks :

1. Haulage and locomotive
2. Fire and spontaneous heating
3. Shaft
4. Roof and side fall

1.Haulage and Locomotive

1. Substitution with new locomotive & rehabilitation of old ones.
2. Separation by means of mechanical devices to be studied and implemented.
3. Trolley wire to be firmly installed and maintained at a uniform height.
4. Elimination by providing double track line at pit bottom & load line.
5. Substandard compiling drawbar buffer not to be used.
6. Elimination by providing travelling roadway separated from loco roadways.

2.Fire and Spontaneous Heating

a) Elimination by cleaning of coal.

b) Self contained self rescuer to be provided.

c) Continuous site monitoring to be done by modern methods.

d) Training and mock rehearsal to keep the persons informed about the procedure and to improve skill to deal with fire.

e) A more reliable and DGMS approved type of communication system to be provided.

3. Shaft

a) Elimination by providing an incline as intake.

b) Substitution by means of a skip having proper man winding facilities

4. Roof and Side fall

a) Administrative co-ordination of support material in time by various controlling agency.

b) Elimination by use of remote control drills, substitution by means of mechanical drilling machines.

c) Improve skills by means of special support workshops and Officer training is being done.

d) Design substitution for change of RMR to be studied for various insitu geological phenomena.

e) Quality of supports to be checked by anchorage testing machines. The quality control of supports material to be checked at various stages.

CONCLUSION

Safety and production should move simultaneously. This is only possible if the modern concepts of risk management, hazard analysis, safety audit etc. are implemented. As a result of which large scale mine mechanization can be invited. In recent years Liberalisation (L) Privatisation (P) and Globalization (G) took place in India. So it is essential to assess the financial risk before investing any capital in any mining industry. The objective of risk management is mainly to rank the hazard so that the major risks/hazards are given attention before time to prevent the accident or dangerous occurrences. Thus the application of risk assessment and risk management in mining industry will definitely improve the health and safety management, environmental management and financial management. Finally safety management will also work as an effective tool for accident prevention which will run parallel to production.

Thank you all for patience listening