



Skill India
कौशल भारत-कुशल भारत



सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP



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Transforming the skill landscape



SCMS

2. Comply with Worksite Health & Safety

- Unit 2.1 - Health and safety
- Unit 2.2 - Rules and Regulations
- Unit 2.3 - Provision of Rest shelter
- Unit 2.4 - Assistant Support and its relevance in open cast mining
- Unit 2.5 - Personnel Protective Equipment (PPE)
- Unit 2.6 - Safe Operating Procedures (SOP)
- Unit 2.7 - Tool Box Talk
- Unit 2.8 - Safety lectures
- Unit 2.9 - Accident-Incidence-Near Miss
- Unit 2.10 - Housekeeping and 5 S model
- Unit 2.11 - Blasting shelter
- Unit 2.12 - Construction and maintenance of machinery
- Unit 2.13 - General safety requirements for pneumatic machines and compressed air
- Unit 2.14 - Safety precautions in lifting, handling and transport of heavy material
- Unit 2.15 - Safety precautions regarding working at the edge or height
- Unit 2.16 - Safety precautions for use of oil, grease and other fluid material and their disposal
- Unit 2.17 - Complete and proper lubrication system
- Unit 2.18 - First aid
- Unit 2.19 - Fire fighting and Safety



MIN/N0901

Key Learning Outcomes

At the end of this module, you will be able to:

1. Brief about Safety Management Systems (SMS) and Safe Management Practices (SMP)
2. Explain & demonstrate about Personnel Protective Equipment (PPE) and Fire Fighting Equipments
3. Explain duties and responsibilities of persons working in mines
4. Describe housekeeping and 5S concept
5. Discuss Safety Precautions while working with various equipments and machineries
6. Explain & demonstrate First-aid and first aid treatment

Unit - 2.1 Background and Brief History of Mining

Unit Objectives

At the end of this unit, you will be able to:

1. Explain Safety management systems (SMS) and Safe management practices (SMP)
2. Elaborate on Safety awareness, communication, use of PPE in safety and handling of emergency
3. Describe Safety and health standards and its importance for better productivity
4. Discuss Safety & health policy and its effective implementation to minimize risks
5. Explain about formation of the benches and faces in an open cast mine

2.1.1 Health and Safety Standards

1. Health and safety of employees at the workplace plays an important role in the overall productivity of an organization.
2. To minimize the employee's exposure to risk, organizations usually put some processes or systems in place, for instance, using Safety, Environment and Health Policy, evacuation routes and other safety equipment and instructions as per the requirements.
3. Apart from this, organizations may have detailed guidelines on how to ensure safety and health of employees. This is especially important in mining, as this is a hazardous profession where workers are expected to work in dangerous conditions.

Figure 2.1.1 is about safety health and policy in organization.



2.1.1 Safety, health & environment policy

2.1.2 Safety Management Systems (SMS)

1. Guidelines and procedures enforcing safety training of employees
2. Authorization levels for specialized personnel to handle special work and equipment
3. Provision protective appliances.
4. Effective communication protocols and their training
5. Accident enquiry and action plan
6. Quality assurance of materials and equipment
7. Inspection of workplaces
8. Disaster preventive plans
9. Safety in Transportation and traffic control rules
10. Safety Audits
11. Emergency medical aid and transportation

2.1.3 Safe Management Practices on Traffic in a Mining Complex (SMP)

Following actions are required as per SMP:

1. SMP's are to control risks due to heavy equipment & light vehicles and prevent accident.
2. Traffic signals & sign boards displays on roads and other locations in mines helps in improving awareness about safe practices & helps in pro-active attitude & approach.
3. Parking of HEMM & light vehicles should be done separately in the designated areas.
4. Extra precautions should be taken by heavy machine operators or technicians while crossing the site roads due to movements of light vehicles and persons.
5. Haulage Roads in mines are made with sufficient width for safe movement of two dumpers or widest HEMM with sufficient margin for safety in both the sides & drains.
6. Separate lane or roads are provided for ancillary machines light vehicles where ever possible

Figure 2.1.2 shows essential PPE and Figure 2.1.3 shows mandatory and warning road signs as part of safety awareness and publicity in any open cast mines:



Figure 2.1.2 Safety Guards-PPE Essential in Mines



Figure 2.1.3 Mandatory & Warning Road Safety Signs

2.1.4 Objectives for Secure Work Place

1. It is the responsibility of both the organization and its employees to follow the safety management systems and guidelines in place and ensure a risk-free work environment for all.
2. Essentially, a healthy and safe workplace is an important factor for enhanced employee productivity.
3. The Government of India recognizes that safety and health of workers has a positive impact on productivity as well as the economic development. Therefore, its objective is to create a more secure workplace for sustainable growth.

2.1.5 Benches and Haul Roads

1. Haul roads and Benches in the mine are designed & maintained as per the rules and SMS to ensure smooth & safe movements of HEMM; barriers are provided to prevent accidents.
2. Proper slopes and water drainage are provided to accommodate water flows on roads during rains and due to regular water spraying.
3. Mine roads are provided with proper lights to ensure sufficient illumination & clear visibility.
4. Relevant safety signs are kept on roads i.e. siren, right or left turnings, speed limits etc.
5. Bunds of sufficient height & width are provided on all benches and roads which run alongside free edges are there to ensure safety of machines and persons.

2.1.6 Persons Movement in Mines

1. Only authorized persons can enter in operational areas in mines.
2. Pedestrian's routes or zones are designated with suitable signs, barriers, road markings etc.

2.1.7 Speed Limits

1. Mining conditions may change every day; hence heavy machines & vehicles must be operated & driven safely at speed which is consistent and as per the prevailing conditions.
2. As weather conditions also plays an impact when visibility is effected speed limit is important.

Sign boards on speed limits as given below in fig. 2.1.4 and 2.1.5



Figure 2.1.4 and 2.1.5 Sign boards on speed limits

Some safety slogans boards on general safety are given below as Fig. 2.1.6 & 2.1.7



Figure 2.1.6 and 2.1.7 Safety Slogan Boards used in Open Cast Mines



Figure 2.1.8 Poster on Mines safety Awareness and General Safety

Unit - 2.2 Rules and Regulations

Unit Objectives

At the end of this unit, you will be able to:

1. Explain about risks and dangers involved in mining as it is a hazardous profession
2. Discuss about Rules, Regulations, safety guidelines and SOP
3. List duties and responsibilities of persons working in mines
4. Discuss General safety, PPE and Precautions while various equipments and machineries
5. Describe safety committee and workmen inspectors

2.2.1 Overview

1. Mining is hazardous profession as it involves lot of risk and dangers.
2. Mining Rules, Regulations, safety awareness programme on SOP i.e. Standard operating procedure are there but it needs to be followed to ensure safety.
3. As it is joint responsibility of the management & workmen to follow the guidelines & SOPs, sincere work by each individual & team work is necessary to achieve safe production.

2.2.2 Some Definitions As Per Mines Act, Mines Rules & Metalliferous Mines Regulations

Important and relevant definitions of have been discussed below as mentioned in the Mines act, Rules and regulations and DGMS guideline applicable for the open cast mines:

Persons Employed in Mine

1. A person is “employed “in a mine as manager or person employed by the owner, agent or manager of the mines in any mining operations or services as under mining Operations within the premises of mine including loading of minerals for dispatch.
2. Any Office of the mine; any welfare, health, sanitary or conservancy services required under mines act or watch & ward within mine premises excluding residential area.
3. Any work which is preparatory to, or connected within mining operations.

Mine

1. It means any excavation where any operations for searching for or obtains minerals has been or is being carried on and includes following.
2. Borings, bore holes, oil wells and necessary crude conditioning plants including pipes conveying mineral oil within the oilfields.
3. All shafts, Edits, inclined planes or all levels & working in an underground mine.
4. All open cast working.
5. All conveyors or aerial rope ways provided for transport of minerals or material in mines.
6. All workshops, power stations, transformers, substations, converters and stores situated in premises of a mine used for one mine or no. of mines.

Competent Person

1. In relation to any work or any machinery, plant or equipment, means a person who has attained the age of 20 years & appointed in writing by the manager as a person competent.
2. He is responsible to supervise the mine operation, machinery, plant or equipment, and who is responsible for the duties assigned to him and includes a blaster.

Face

It means the moving front of any working place.

Mine benches and face is shown in figure 2.2.1 as given below:

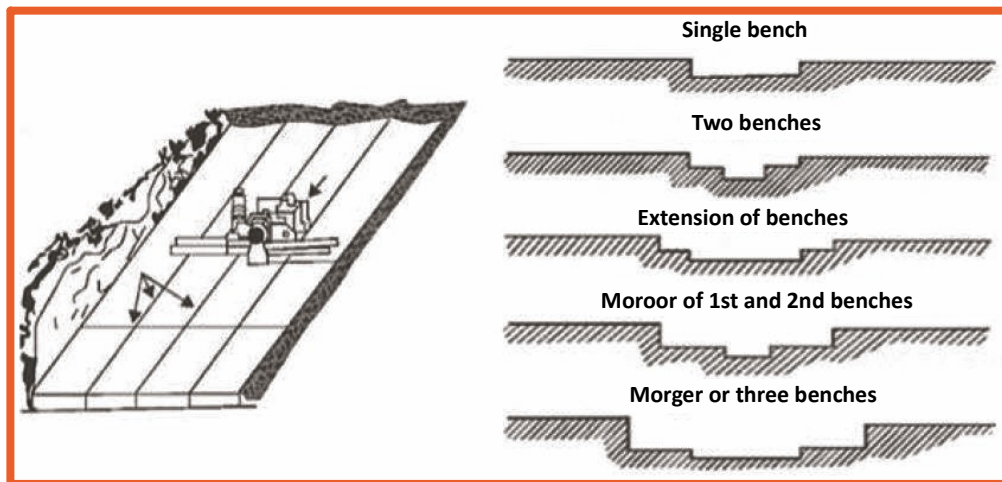


Figure 2.2.1 Mine face and benches



Figure 2.2.2 Air Compressor

Machinery

It means any locomotive, engine, air compressor, boiler or steam apparatus which develops power and used for mining operations.

Material

It Includes rock, debris, stone, mineral, ore or any other material.

Mine Foreman

It Includes rock, debris, stone, mineral, ore or any other material. A person possessing a Manager's or Foreman's Certificate and appointed by the manager in writing to perform the duties of supervision of mine or part of mine as competent person.

Mining Mate

A person possessing a Manager's, Foreman's or Mate's Certificate and appointed by the Manager in writing to perform the duties of supervision or control any part of mine as competent person.

Misfire

It means the failure to explode of an entire charge of explosives in a blast-hole.

Month

It means a calendar month.

Official

It means a person appointed in writing by the owner, agent or manager to perform duties of supervision in a mine or part thereof and includes an assistant manager, a mine foreman, a mining mate, an engineer and a surveyor.

Permitted Explosive

It means an explosive manufactured by such firm and of such type as the Chief Inspector may from time to time specify by notification in the Official Gazette.

Public Road

It means a road maintained for public use and under the jurisdiction of any Government or local authority.

River

It means any stream or current of water, whether seasonal or perennial, and includes its banks extending up to the highest known flood level.

Working Place

It means any place in a mine to which any person has lawful access.

2.2.3 General Precautions

1. Where several persons are working together in any place, one of them is made as in charge to supervise the work and takes care of the safety.
2. No person should work in any place other than his authorized working place.
3. Every person should carefully examine his working place before commencing work and at intervals during the shift.
4. If any dangerous conditions are observed, he should stop all work at that place and should either take immediate steps to remove such danger or inform an official or the competent person in charge of the mine or district.
5. No person should work or travel on any ledge or footpath less than 1.5 M wide, from which he will be likely to fall more than 1.8 M, unless he is protected by guard rails, fence or rope suitably fixed and sufficiently
6. No person should carry or be permitted to carry any load along a road or footpath having an inclination of 30 degrees or more from the horizontal.

2.2.4 Apparatus Under Pressure

1. All apparatus or part of the equipment which contains or produces air, gas or steam at a pressure greater than atmospheric pressure are so constructed, installed and maintained as to avoid any risk of fire, bursting, explosion or collapse.
2. Every air receiver of a compressor plant is fitted with a safety valve and an air gauge which shows pressure more than the atmospheric pressure.
3. Air receiver are passed through a hydraulic test at a pressure at least 1.5 times of the maximum permissible working pressure.
4. The supply of air for air-compressors shall be drawn from a source free from dust and fumes.

2.2.5 Precautions Regarding Moving Parts of Machinery

1. Every winch is provided with a stopper, pawl or other reliable holder.
- 2a. Every fly-wheel and every other dangerous exposed part of any machinery are adequately fenced by suitable guards to prevent danger.
- 2b. Such guards should be kept in position when parts of the machinery are in motion or in use.
- 2c. They can be removed for carrying out any examination, adjustment or repair if adequate precautions are taken.
3. No person should repair, adjust, clean or lubricate machinery in motion where there is risk.
4. No person should shift or adjust a driving belt or rope while the machinery is in motion unless a proper mechanical appliance is provided and used for the purpose.
5. No person near moving machinery should wear loose outer clothing.
6. No unauthorized person should enter any engine room or interfere with the engine.

2.2.6 Engine Rooms And Their Exits

1. Every engine, motor and transformer room on the surface or every room in which highly inflammable materials are stored on the surface should be kept clean.
2. It should be provided with at least two exits, every such exit should be properly maintained and kept free from obstruction.

2.2.7 Working and Examination of Machinery

1. No machinery should be operated otherwise than by or under the constant supervision of a competent person.
- 2a. Every person in charge or assistant support working on any machinery, apparatus or appliance should before commencing work, see that it is in proper working order;
- 2b. If any defect is observed, it should be reported to the operator or technician.
3. Every person checking an air-receiver should see that no extra weight is added to the safety valves and that the permissible pressure of air is not exceeded.

A Heavy Earth Moving Machine (HEMM) figure is given below as 2.2.7



Figure 2.2.7 HEMM-Wheel Loader

2.2.8 General Safety

No person should negligently or willfully do anything likely to endanger life or limb in the mine, or negligently or willfully omit to do anything necessary for the safety of the mine or of the persons employed therein.

2.2.9 Personnel Protective Equipment (PPE)

1. PPEs are supplied for personnel protection of every individual working in the mines.
2. No person should go in or work in a mine, unless protective footwear is worn; safety helmet and other PPE i.e. Safety goggles, gloves, shin- guards etc. as provided by mines management.

Figure 2.2.5 and 2.2.6 as given below are about PPE and its importance:

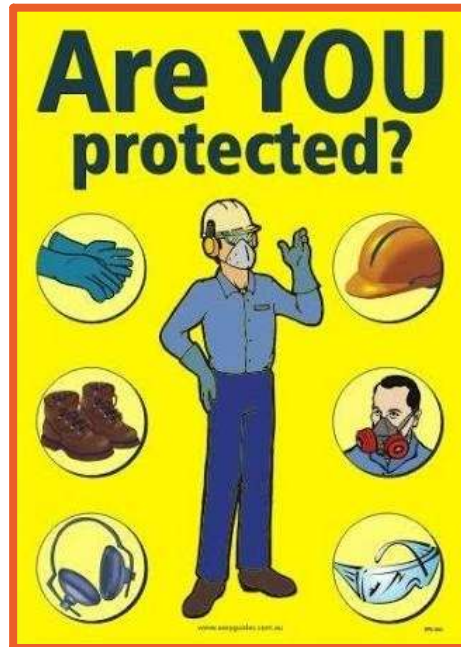


Figure 2.2.9 Personnel Protective Equipment [PPE]



Figure 2.2.9a On importance of PPE

2.2.10 Safety Committee

1. As per the Mines Rules 1955 every mine where more than 150 persons are ordinarily employed, a pit safety committee under chairmanship of mines manager function for promoting safety in the mines with following as members as members:
 - a. Five officials as nominated by the chairman.
 - b. Five workmen of the mine as nominated by the trade unions.
 - c. Workmen Inspectors of the mines.
 - d. The Safety officer as secretary to the Committee.
2. The committee meets at least once in 30 days to discuss all above and any other issue related to safety and occupational health matters.

2.2.11 Workmen Inspectors

1. For every mine, wherein 500 persons are employed; the mines manager designates three [3 Nos.] suitably qualified and well experienced competent employees of the mine in consultation with the registered trade unions.
2. They are kept as technical experts, to carry out inspection of the mine on behalf of the workers employed therein, one each for mining, electrical and mechanical sections.
3. Workmen Inspectors inspect all roads, workplaces and the equipment and inform the safety officer about his observations and suggest remedial measures.

2.2.12 Mine Owners

1. Any person who is the immediate proprietor or lessee or occupier of mining lease; he is responsible for the workings, following all the terms & conditions mentioned as per the agreements and provisions made by the Govt. of India & State Govt.
2. He is also responsible for making financial & and taking all such actions as required to meet all the provisions of mines act or of the regulations, rules, bye-laws or order made there under.

2.2.13 Agent Mines

1. A person, who, takes part in the management, control, supervision or direction of the mine of any part thereof.
2. He may also work in an administrative capacity and work as facilitator in arranging all necessary & justified requisitions in meeting the safety standards and social obligations.
3. He is also responsible for compliance of all the conditions of agreements, various approvals & permissions granted by the govt. & regulatory bodies for smooth function of the mine.

2.2.14 Mine Managers

1. A person, who is responsible for the overall management, control and supervision and direction of the mine.
2. His duty is to take all the required steps as may be necessary for the compliance with all the provisions of the mines act and the regulations, rules, byelaws and orders made there under and responsible for the safety of mine and the persons employed therein.

2.2.15 Engineer

1. The engineer is overall in charge of all machinery at the mine; and responsible for the proper installation, maintenance and safe working of such machinery;
2. He is also responsible for safety & compliance of the provisions made in the mines act & regulations etc. relating to the installation, maintenance, operation or examination of the equipment, machineries and other facilities in workshop.

Unit - 2.3 Provision of Rest Shelters

Unit Objectives

At the end of this unit, you will be able to:

1. Explain about Rest shelter provision in mines and its necessity
2. Understand that rest shelters are for protection from weather and have drinking water supply

2.3.1 Provision of Rest Shelters

1. Rest shelters are provided at or near opencast workings, workshops and mine entrances where 25 or more persons are ordinarily employed, for taking food & rest.
2. It is for protection from the weather & supply of cool and wholesome drinking water during the working hours of the mine, it should be always kept in a clean and tidy condition.

Figure 2.3.1 shows a rest shelter and mine officials wearing regular PPE:



Figure 2.3.1 Rest Shelter and use of PPE

Unit - 2.4 Assistant Support & Its Relevance In Open Cast Mining

Unit Objectives

At the end of this unit, you will be able to:

1. Explain Programme objectives, functions of assistant support, job requirement & relevance