

MINES and MINERAL DEVELOPMENT



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DISCLAIMER

The purpose and scope of this Booklet is to provide an insight on technical details with respect to prospecting, development and operations of Minerals in Pakistan. All the material included in this Booklet is based on data / information gathered from relevant sources, believed to be reliable. Although, due care and diligence has been taken to compile this document, we do not make any representation, warranty or assurance nor assert that all the information provided therein is absolutely accurate or complete. ICMA Pakistan does not assume any liability for any financial or other loss resulting from this book and as such the content of this Booklet should not be relied upon for making any decision, investment or otherwise. The content of the Booklet does not bind ICMA Pakistan in any legal or other form. Reading this publication stipulates that you have also read this disclaimer.

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Foreword



It gives me immense pleasure to present this booklet titled **‘Mines and Mineral Development’** authored by a very senior Fellow member of our Institute, Mr. Abdur Rashid Khan who has over 26 years of extensive experience in Auditing, Accounting and Financial matters, especially in the mineral and mine development sector. Based on his practical experience of working at different senior positions in the Pakistan Mineral Development Corporation, Mr. Abdur Rashid has developed these guidelines which would be a useful reference guide for our members and students aspiring to join this sector.

Pakistan is home to many varieties of minerals, some of which make it prominent to the mineral world. Pakistan is full of significant mineral resources and emerging as a very promising area for exploration of mineral deposits like gold, copper, silver, platinum, chromites, iron, zinc, lead, coal, rock salt, natural gas and crude oil. Many industrial minerals like marble and other dimensional stones of high quality are also being exported and a source for earning foreign exchange for the country.

I congratulate Mr. Abdur Rashid Khan and the Research and Publications Committee of the Institute for accomplishing this task and presenting such a useful publication for benefit of professionals, industrialists, businessmen, researchers and students.

Zia Ul Mustafa, FCMA
President and Chief Executive

Preface



I would like to congratulate Mr. Abdur Rashid Khan for making a worthwhile contribution by developing this '**Mines and Mineral Development**' which, I am sure, would prove to be a useful reference guide for those who want to understand the accounting procedure and the books of accountants being maintained by mining companies.

The book covers the technical aspects of prospecting, development and operations of mineral in Pakistan with special reference to underground coal mining. It also covers the specific legal provisions with regard to coal mining underground as per the Mine Act, 1923 such as ventilation, underground fire and mining accidents. Moreover, the book also covers the physical and financial aspects on procurement of material / machinery; engagement of manpower and payment of bills of material / machinery and wages to miners / other workers and supervisory personnel. Furthermore, the returns and notices on production, accidents as well as the annual accounts to be submitted to the concerned government authorities have also been explained in a lucid manner.

I am really thankful to the Research and Publications Committee and the Secretariat for their efforts in developing this booklet on such an important topic of national relevance. I hope that the publication would provide a useful source of reference not only for our members but also for the students and government. I am sure that this book would be warmly received and appreciated by the members and other interested readers.

Shahzad Ahmad Awan, FCMA
Chairman, Research & Publications

About the Author



Abdur Rashid Khan, FCMA

Mr. Abdur Rashid Khan is a Fellow Member of Institute of Cost and Management Accountants of Pakistan(FCMA) as well as Associate Member of Corporate Secretariat of Pakistan (ACIS). He has at his credit over twenty six (26) years of extensive experience in Auditing, Accounting, Financial and Secretarial affairs.

He joined Pakistan Mineral Development Corporation (PMDC), a Federal Government Corporation under Ministry of Petroleum and Natural Resources in 1976. He worked as Accountant Incharge / Deputy Chief Accountant at all PMDC Projects in Baluchistan and then as Manager Finance at PMDC Regional office Quetta from 1976 to 1984. As Manager Finance, he was responsible for supervision of accounting matters of the Projects/Regional office Quetta and also as Financial advisor to General Manager Quetta. His other responsibilities included pre-audit of all payments, preparation of accounts; budget estimates and periodical budget performance review. As member of Project Committees, he also dealt with purchases and investigation of financial irregularities.

Mr. Abdur Rashid Khan also worked as Chief Accountant/Company Secretary at Makerwal Collieries Ltd. - a subsidiary of PMDC from 1984 to 1995. On privatization of Makerwal Collieries Ltd, he was posted at PMDC (Head Office) Islamabad as Manager Audit, Deputy General Manager Audit, Deputy General Manager Finance and General Manager Finance from 1996 to 2002.

Chapter 1

Minerals and Mining

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Chapter 1

Minerals and Mining

The minerals are considered as back bone of the economy of any country. It plays a vital role in the industrial and economic advancement of the country. The base mineral such as iron, copper and lithium are used for manufacturing of industrial plants and various equipments. The minerals like oil, gas and coal are the primary sources of energy for running industrial plants, transport as well as for household purposes.

Precious minerals such as gold and silver are considered the strength of the monetary policies of a country. Mineral like uranium is used in manufacturing of defense weapons, medical treatment as well as in the generation of electricity. Salt is the essential ingredient for preparation of various items of food. The same is also used in production of various chemical. China clay is used in ceramic.

1. Definition of Minerals

A mineral is a naturally occurring inorganic substance with a definite and predictable chemical composition and physical properties that has been formed as a result of geological process.

A mineral can be distinguished from one another by individual characteristics that arise directly from the kind of molecular structures that they contain and the arrangements the same make inside them.

2. Definition of Mining

Mining is the process of prospecting, exploration, mine development and extraction of valuable minerals or other geological material from the earth from a body ore, vein or seam. This term may also include the removal of soil.

Materials recovered by mining include base metals, precious metals, iron, uranium, coal, diamonds, limestone, rock salt, oil, gas, and potash etc. Any material that cannot be grown through agricultural process or created artificially in a laboratory or factory is usually mined.

3. What is Mine?

As per Mine Act 1923, mine means any excavation where any operation for the purpose of searching for or obtaining minerals has been or is being carried on and includes all works, machinery, tramways and sidings, whether above or below ground in or adjacent to or belonging to a mine provided that it shall not include any part of such premises on which a manufacturing process is being carried on unless such process is a process for coke making or the dressing of mineral.

4. Ownership of Minerals

Oil, gas and atomic minerals are the ownership of federal government of Islamic Republic of Pakistan. All other minerals (major and minor) such as salt, coal, iron, tin, lithium, silica sand and china clay etc. are the ownership of respective provincial governments.

The licensing authority for minerals falling in provincial category is the Director General, Mines and Minerals Development of Directorate of Minerals Development of the respective province whereas the for minerals falling in Federal category the licensing authority is the concerned Federal Ministry.

The Mining concession rules of the respective province/Federal govt. are applicable for grant of prospecting license as well as for the grant of mining lease. The business entity of mining business has to obtain prospecting license/Mining lease before conducting prospecting survey/start of mining operations.

The technical control of mining operation rests with Chief Inspector of Mines of the concerned province where the area of mines falls.

Chapter 2

Setting up a Mining Business and Project Management

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Chapter 2

Setting up a Mining Business and Project Management

The method for establishing a business entity for exploration, development and extraction of minerals and mining is similar to the procedure used for establishing entities in other fields of business and may take the forms of a sole proprietorship, partnership or a company as defined here-under:

- a) Sole proprietorship
- b) Partnership
- c) Public limited companies Listed / Un-Listed
- d) Private limited companies
- e) Foreign companies
- f) Companies limited by guarantee

The sole proprietorship may be established by a single person.

The partnership business is established by joining two or more persons. This may be registered or non-registered.

The companies as mentioned in S.No (III) to (VI) are established under the relevant provisions of the Company Ordinance, 1984 by submitting the Memorandum and Articles of Association.

1. Project Management of Mines

The project management of mines is controlled by the owner himself or he may appoint his agent as project manager. The Project Manager should have prescribed technical qualifications, such as degree in Mining Engineering, with relevant / special experience of underground mining of not less than three years.

2. Mine Operating / Working Plan

In the office of Project Manager, there should be Mine Operating / Working plan of each mine sections which should be kept up-dated from time to time by the Mine Manager. This plan that is kept on durable paper should show the following details:

- a) Name of the Mine
- b) Scale with magnetic meridian inked on durable paper or tracing paper.
- c) Scale of 100 ft to the inch
- d) Position of last survey marked with date of last working all galleries, shafts, inclines, opening, gofs, rises, excavations
- e) Passage and boundaries of underground lease and surface
- f) Other features such as railway, road and buildings with overlie the working of mine measured on horizontal plan within 600 ft. of the working
- g) A separate plan for system of ventilation specially the current point and measurement of quantum of air and destitution of air
- h) Position of underground telephone and ambulance station

The project manager should send the Mines working plan to the Chief Inspector of Mines within three (3) months for the abandoned mine and within fifteen (15) months for mine discontinued. This working plan should be prepared and duly signed and dated by a competent surveyor.

The span of management is achieved by the project manager by decentralization to different departments which are mentioned as under:

- a) Mining Department
- b) Administration Department (Human Resource and Secretarial)
- c) Account Department
- d) Geology Department
- e) Survey Department
- f) Store Department
- g) Marketing Department
- h) Legal Department
- i) Internal Audit Department

3. Mining Department

The Mining Department is headed by the Mine Manager (Colliery Manager in Coal Mine). All sections managers are under his control. In small mines, the Project Manager himself controls this department. Every underground working, where access from any part of working to another part is practical, is treated as one mine.

The Mine Manager and sections Managers should have technical qualifications of degree in Mining Engineering. In addition, mine officials should have the following qualifications / certifications for working in Coal Mines.

- a) **Competency Certificate:** 1st and 2nd class to manage a mine
- b) **Supervisor's Certificate:** Certificate of competency to survey working of a mine
- c) **Sirdar Certificate:** to make inspection of the working of a mine
- d) **Short Firer Certificate:** to fire short in a mine

The owner or agent of mine should not take part in technical management of the mines unless he holds qualification equivalent or higher than those as specified. The Chief Inspector of Mine may, however, authorize any person to act as a manager of any Mine for specified period, even if he does not possess the required qualifications as mentioned above.

The personals employed underground in a mine as an official subordinate to Mine Manager/ Section Manager should hold at least Mining Sirdar Certificate. In case the manager is unable to exercise personal supervisions, the owner, agent or manager shall authorize, for a period not exceeding one month, a person to act as manager provided he holds a 'Sirdar certificate' under intimation to chief Inspector of Mines.

4. Types of Mine Officials

There are following three types of employees and workers at a mine.

a) Supervisory staff:-

The following supervisory staff is working at each mine and responsible for the supervision of mine as well as other technical matters.

- Mining Supervisor
- Over-man
- Assistant Over-man
- Mining Sirdar

A Mine Munshi/ Clerk is also hired who deals with all matters of employees working at a Mine i.e. names of employees, their attendance, leave, absence, record of sanctions for engagement of workers for mine extraction work.

b) Underground workers:-

The underground workers are of following two types:

- **Piece rated workers** who are paid on the basis of volume of work. They are called miners and work in groups.
- **Daily paid/monthly paid workers** who are paid on the basis of their attendance such as timber man, timber colliers.

c) Surface workers:-

These workers/ employees work at the surface for various works and may be on daily paid/ monthly paid basis such as haulage drivers, loco drivers, loading/un-loading workers and electricians.

5. Inspection Books

An Inspection Book is kept and maintained by the Mining Department which shows the name of mine; name and address of owner or Agent of Mine; name and address of Manager of Mine and the details of the important happenings in the mine and inspection thereon.

6. Administration and HR Department

This Department deals with all administrative and human resources matters such as hiring and firing of employees, leave matters; liaison with the other departments and governments agencies etc. In case of Public/Private Ltd. Company, the Company Secretary deals with all these matters in addition to his Secretarial work.

7. Accounts Department

This Department deals with all accounting matters such as preparation of payroll; checking and payments of minerals extracted; daily wages payments; preparation of periodical accounts; budget preparation; preparation of periodical budget performance review; cash fund management; payments of material purchased; final payments as well as member of procurement committee. This department is headed by an executive who acts as Advisor to project manager on financial matters.

8. Geological Department

This department plays a major role in the exploration of minerals, preparation of feasibility studies and day to day exploration matters. In case public funds are needed, this department also develops schemes for submission to the government.

9. Survey Department

This department deals with all matters relating to the survey of underground tunnels and levels; their gradient as well as measurement of dead work done in association of mining section employees.

10. Store Department

This department is responsible for the management of store procured, issued, returned as well as the recording of minimum and maximum level of all store items on bin cards in central store.

11. Marketing Department

This department deals with all matters of minerals received from the mines, as well as sale of minerals on day to day basis.

12. Legal Department

This department deals with all legal matters of the project.

13. Internal Audit Department

This department deals with periodical management audit of project. The annual audit is conducted by external Auditors. For enterprises having majority shares of government, the government audit is conducted by the auditors appointed by the Auditor General of Pakistan. Proper liaison is maintained with outside auditors through the Internal Audit Department of the government entity.

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Chapter 3

Mineral Prospecting, Exploration and Feasibility Study

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Chapter 3

Mineral Prospecting, Exploration and Feasibility Study

1. Prospecting and Mineral Exploration

First of all, the minerals prospecting is necessary to know the possibility of the existence of minerals for which the prospecting license is obtained from the appropriate government licensing authority. The detailed exploration of minerals is thereafter carried out by the technical employees of the geological department of the business entity. The report of the Geological Survey of Pakistan is also kept in view. The detailed exploration is, however, conducted by the Geological Department of the business entity to assess the following:

- underground strata conditions
- seam thickness and its gradient
- total minerals reserves available
- department at which minerals are available

2. Feasibility Study Report

On the basis of detailed exploration conducted by the geological department, a feasibility report is prepared which covers the following aspects:-

- a) Quality and quantity of mineral
- b) Depths at which minerals exist
- c) Condition and width of minerals seam
- d) Underground strata conditions
- e) Method of mineral extraction
- f) Number of levels and shafts with length to be driven
- g) Plant and machinery required
- h) Details of infrastructure to be established

- i) Cost benefit ratio
- j) Marketability
- k) Return on capital employed
- l) Payback period
- m) Social and economic impact on the country as well as on general standards of living of the people of that area from where minerals are to be extracted.

3. Grant of Mining Lease

The next step is to obtain mining lease from the concerned Licensing Authority for which an application is submitted and lease of the concerned area is obtained by the business entity before the start of mining operation.

4. Approval of Mine Development Plan

Based on the feasibility study report, a long term development plan is prepared and approved by the Owner/Board of Directors of the entity. In the case of government sponsored entity/ corporation, PCI and P II are prepared and got approved from the appropriated government.

The total development cost involving plant and machinery and Mine development covering entire development period is worked out. However the same is broken down into annual basis. The annual capital budget covering plant and machinery and Mine development shows the specification of machinery; source of procurement (local or foreign); the drivage (shaft and levels) with length and size and cost involved there in. Tenders for plant and machinery are floated showing the nature and specification of each machinery item. For those to be imported, tenders are floated at least six months before the time it is needed at the project.

Chapter 4

Commencement of Mining Operations

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Chapter 4

Commencement of Mining Operations

The Project Manager or the owner/agent shall send a notice in writing within 15 days before the start of mining operation to the Chief Inspector of Mine as well as the District Magistrate of the concerned District.

In case the mining operation is not started within 60 days from the date on which the notice was given, the said notice shall be deemed to have been expired and no operation should commence except after issuance of a fresh notice to this effect.

The mining operation commences with the arrangement of following infrastructure facilities, including manpower, material and machinery:

1. Office and Housing Colony

The required land is purchased and the Civil Department of the Project invites tenders for construction of the offices and Housing Colony. The work is entrusted to the competitive bidder and work is to be completed within the specified period.

2. Power House

In order to ensure un-interrupted power supply, the owner/agent or Project Manager should establish own powerhouse, as a standby arrangement, in addition to making arrangement for obtaining electricity supply from WAPDA. WAPDA is approached to provide electric connection by establishing the grid station. Separate electric supply connection for offices/Housing Colony and for Mines is also obtained.

3. Mining Plant and Machinery

The following plant and machineries shall be required at the Site to start mining:

- a) **Rail Lines:-** Levels is laid for narrow gage rail track from central Mine Depot to each Mine Mouth as well as for underground Tunnels.
- b) **Locomotive:-** These are imported by calling Venders.
- c) **Dumper/ Turks:-** These are needed for transportation of Minerals from those mines where rail track is not laid or not possible to the sub-depot at each mine as well as to the Central Mine Depot

- d) **Water Pumps:-** Flame-proof water pumps are installed for pumping water from underground to sub-storage tank and then at mine mouth surface
- e) **Haulages:-** These are installed for hauling of Mineral to surface. Flame-proof Haulages are also installed underground for hauling of Minerals from one level to another in the underground
- f) **Safety Helmets:-** These are kept at mine in sufficient quantity for distribution to workers, supervisors and Inspectors for mining operation underground
- g) **Mining Safety Lamps:-** As per rules, mining safety lamps are required for each worker working underground as well as for each Supervisory person. These are charged at safety lamp room office at Mine mouth and issued to each worker and are taken back on charge after end of each shift underground
- h) **Mining Tubs:-** Small mining tubs of various capacities are used for transportation of minerals from underground working point to the surface of each mine which are attached with locomotive or pushed manually by the workers. The capacity of each tub is marked on the outer surface of the tub to determine the weight in tonnage mineral/ debris to be transported outside
- i) **Weigh Bridge:-** It is installed at Central Mine Depot for weighing mineral at the time of arrival at the central mine depot as well as at the time of its sale
- j) **Hand Picks / Pneumatic Picks:-** minerals are extracted from underground mineral seam by cutting through hand pick or flame proof pneumatic picks
- k) **Rescue Station / Operations:-** The government may make rules for establishing rescue station or helping required rescue operations as under:-
 - Establishment of Rescue Station at Mine or group of Mines
 - Making rules for the management of rescue station as well as for the functions/powers of authority/owner/Manager of Mine
 - Equipment, control and function of Rescue station
 - Rules for composite training and duties of Rescue Team
 - The owner, agent or project Manager may make by-laws as required by the Chief Inspector of Mines for control and Management of Rescue persons for safety, discipline and prevention of accident
 - Make Rules for conduct of rescue work at Mine and extracts of such by-laws, regulations/rules should be kept posted near each mine

Chapter 5

Special Precautions against Underground Fire

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Chapter 5

Special Precautions against Underground Fire

1. Detection of Carbon monoxide gas

In a mine where chances of underground fire exists, two or more small birds or other means duly approved by the Chief Inspector of Mines should be kept constantly for detecting the carbon monoxide gas.

2. Flame-proof Safety Lamps

Two or more locked flame-proof safety lamps should be available in the mine for testing of fire or other gases.

3. Non-Flame-proof Surface Structure

All surface structure, in the horizontal distance of 25 feet from shaft, covering of all ventilation shafts, fan draft casing should be of non-flame proof material.

4. Non-Inflammable material at Air Crossings

All air crossings in the main intake/main return airway, all ventilation doors in the fan house/ fan drift and in the vicinity of shaft bottoms of air crossing in main return airway should be of non-inflammable material.

5. Fire Extinguishing equipments

Adequate means and equipments of fire extinguishing should be provided at a mine where timber or other inflammable material is stored.

6. Water Taps and Hose Pipes

In each mine where there is water pipe or other pipe containing water under pressure, sufficient number of taps should be provided. Hose pipes of not less than 200 feet with fittings should be made available in mine and the distance between two adjacent taps should not exceed the length of hose pipe.

7. Portable Fire Extinguishers and Water Tanks

In mines where arrangements for extinguishing fire cannot be made in the opinion of Chief Inspector of Mines, then one or more of the following should be provided:-

- Portable fire extinguisher
- Portable water tank fitted with hand pressure pumps with adequate length of hose pipe or
- Adequate quantity of sand or incombustible dust

Note:

- (1) *Water should not be used for putting out electricity or oil fire.*
- (2) *No person should light a fire within 40 feet from any shaft.*

8. Withdrawal of Workers in case of Fire Detection

In case smoke or other sign of fire is detected, all workers should be withdrawn and no one be admitted until the fire has been extinguished and examination report as to safety of mine by the Manager and competent person has been made.

The examination report should be recorded in the Inspector Book. The examination should be made with approved locked safety lamp and electric torches and with a cage containing small birds or other means of detecting carbon mono-oxide gas.

9. Ventilation Section Precautions

In a Mine Ventilation section which is not naturally wet and where underground fire exists or extraction of pillars is in hand, following pre-cautions should be observed:

- Air haulages, traming roads should be kept clear of accumulations of dry flammable dust.
- In order to prevent explosive from such dust, all roads should be treated with water and this pre-caution should be observed at all faces with in 400 ft area.

10. Precautions to prevent Air Passage through broken Strata

Working mine in which fire exists, adequate precautions should be taken to prevent passage of air through broken strata connected with fire. Further, mine work should not be done which is not sealed off from such goaf or broken strata.

Chapter 6

Explosives and their Management

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Chapter 6**Explosives and their Management**

An Explosive Magazine need to be constructed at the surface of each mine, as required under the Explosive Act, 1884 and, where permitted, explosives such as cartridges, fuses, detonators and loose gun-powder is to be kept for under-ground usage. It should, however, be kept in mind that use of underground Explosive Magazine is allowed only with the approval of the Chief Inspector of Mines.

Management of Explosives

The explosives magazine have to be managed in the following manner:

- a) The manager of office mine should appoint a competent person as 'In charge' of Explosive Magazine who will keep proper record of explosives received, issued and returned. He should keep record of quantity of gunpowder, NOS of all kind of explosive and detonator received and issued from mine as well as explosives returned to the magazine.
- b) Where an underground Explosive Magazine has been established, the same should be at sufficient distance from one another and from any position of mine where mine working is going on or which is used as travelling passage. The quantity of explosives stored underground magazine should not exceed the supply requirement of two days.
- c) No explosive should be taken underground except in locked case/ canister containing not more than 5 pounds.
- d) No gunpowder or any other explosives, except fuses and detonators, shall be issued for blasting operation in a mine, except in the form of cartridge.
- e) Preparation of cartridge, gunpowder, drying of gunpowder and reconstruction of damp cartridge should be done by authorized person and in accordance with the laid down rules under the Explosive Act, 1884 and for the place approved by the licensing authority.
- f) All blasting operations should be conducted by the competent person not below the age of 18 duly authorized by the manager.
- g) In any mine having more than 50 workers underground, no one shall perform duty of short Firer who is responsible for making inspection at least in every shift to ascertain the condition of ventilation of roof, side and general safety.

- h) The number of shot fired, quantity of explosive used and number of misfired shorts should be recorded in the book and all un-used explosive should be returned to the Magazine without delay. Such returned explosive should be issued before the issuance of fresh stock.
- i) At the time of changing a hole, no person shall use an iron or steel tool, scraper or tamping rod nor shall use un-due force in pressing the explosive into the hole at the bottom of hole.
- j) Only those holes which are to be fired in the next round shall be charged and fuses which have been charged shall be detonated together.
- k) One warning should be given before a shot is fired and every entrance should be guarded.
- l) When two underground working places have approached to within 10 feet of one another, no blasting shall be done in any one of the place unless the workers have been withdrawn.
- m) In open working, blasting shall not start until workers have been given signals.
- n) The number of fired shots should be counted by at least two persons and lowest count should be taken as correct and no person shall re-enter such place until 30 minutes after the blasting cable.
- o) If shots have been fired by electrical means, the interval may be reduced to not less than two minutes after source has been disconnected from the cable.
- p) If the charge has been burnt away without exploding, no person shall re-enter the working place for about an hour.
- q) After a shot has been fired, the competent person appointed by manager shall make examination and no person shall enter the place until the completion of such examination.
- r) Any hole within 12 inches of misfired hole should not be drilled. The new hole should be bored in the presence of an authorized short firer. The debris lying within 6 feet of misfired hole should be removed in presence of short firer.
- s) The place where misfire has occurred is fenced and in an open working the place of misfire should be marked with a red flag.

Chapter 7

Methods of Mining

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Chapter 7

Methods of Mining

The choice of mining method to be adopted is determined by the geology of the minerals deposits, in particular the depth of seam of minerals below the surface. The majority of world's coal deposits are recovered from under-ground mining and currently, two third of coal production comes from underground mining.

Three main methods of mining viz. Surface Mining, Under-ground Mining and In-Situ Leach Mining are used in the world, which are discussed below in detail:

1. Surface Mining

Ore reserve suitable for Surface Mining can be classified as under:

- a) Relative horizontal stratified reserves with a thin or thick covering of overburden.
- b) Stratified vein type deposits with an inclination steeper than the natural angle repose of material, where that waste cannot be dumped inside the pit.
- c) Massive deposits, deep and very large laterally of such that dumping of waste within the pit is not possible.

The three most common methods of surface mining are described here under:

a) Strip Mining

This method is suitable where the surface of the ground and the ore body itself are relatively horizontal and not too deep under the surface and wide area is available to be mined in a series of strips.

The favorable conditions for this method are:

- a) Having relatively thin overburden of 0-50 meters maximum.
- b) Regular and constant surface topography and coal layer more than 20 variation from horizontal on the coal seam.
- c) Extensive area of reserves to give adequate life of mine to pay back all capital cost within 20 years at 4-4 MT per annual production.

Due to flexibility, utility and availability as well as low operating cost, the walking drag-lines are the most popular machine for this method of mining. The dragline is a typical combine cyclic excavator and material carrier without the use of truck or conveyer belt. The machine sits above the overburden block on the high wall side and excavate the material in front of it to dump it on the low wall to uncover the coal seam below.

For maximum productivity, longer strip is required to reduce excessive dead work time. However, low bits increase the risk of slope failure and takes large surface area that causes rehabilitation and transport problem. In case of coal mixing to meet the sole specification, the longer striping length is problematic in term of active mining front available. Where floor dip is in the direction of high wall, it is essential to improve the stability of waste dumps.

b) Terrace Mining

In this method, trunks and shovels are used to expose coal seam underneath. The upper most layer of overburden is mined using hydraulic excavators and trunks or by using a bucket wheel excavator and conveyer belt. Where over-burden is too thick or the floor of pit is too steeply dipping to allow waste dumping directly over the pit, it is necessary to use intermediate cyclic or continuous transport i.e. trucks or conveyers to transport the overburden to place where it can be tipped back into the previously mined place. This is a multi-benched sideways moving method. The whole mine moves over the ore reserve from one end to other but not necessary in single bench. The number of benches used is function of excavation depth and type of machinery used.

c) Open-Pit Mining

This is traditional cone-shaped excavation used when the ore body is typically pipe shaped, vein type steeply dipping stratified or irregular, depending upon the suitability of geometry. The excavation is normally by rope or hydraulic shovels with trucks carrying both ore and waste. Drill and blast is most often used which make the process cyclic. Waste is dumped outside the mine mouth area since no room is available within the pit. The waste is placed as close to the edge of pit as far as possible to minimize the transport cost.

Benches are normally excavated from 2 to 15 meters in height in stack of 3 to 4 in between which is a crest on which the hard road is placed. When the number of benches in the stack increases, the round gradient increases too. Bench in a stack have a steep face angle, whilst the stack and overall flatters thereby helping to prevent the slope failure.

The minerals and waste transport cost is the highest in open pit mining method. In order to reduce this cost, especially when the pit gets deeper, the following options may be considered:

- a) Use of in pit crusher together with a conveyer, instead of continuous transport system
- b) Use of faster trucks on main land road with computerized dispatches.
- c) Steeper bench slope angle where stability allows

As a result of highest cost of truck transport i.e. 50% of total pit operating cost, considerable saving in transport cost (ore or waste) can be achieved with the continuous transport system.

2. Underground Mining

Underground Mining is most popular than surface mining and almost 60% of world coal production is through underground mining. In Pakistan as well the underground mining method is pre-dominantly used by miners with several variations. The common feature of all forms of underground mining is the creation of tunnels from surface to mineral, seam and use of machinery to extract minerals. The following three modes of access to underground mining are used:

- **Drift** mines enter horizontal into the side of a hill and mine the mineral within the hill.
- **Slope** mines usually begin in valley bottom and a tunnel slopes down to the actual mineral seam to be mined.
- **Shafts** are the deepest mines. A vertical shaft with an elevator is made from the surface down to the mineral seam.

The actual mining includes (1) Room and Pillar mining and (2) Long Wall Mining.

a) Room and Pillar Mining Method

In this method, coal seams are mined by miners by cutting a network of “rooms” into the seam. As the rooms are cut, the miners load the mineral into the mining tubs from which the same is placed in conveyer that keep bringing the minerals (coal) to the surface. The pillars consisting of coal are left behind unmined at a regular distance to support roof of the tunnel/passage. Each room alternates with a pillar of greater width for support. As mining continuous, roof bolts are placed in ceiling to avoid roof collapse.

b) Room and Pillar Retreat Mining Method

This is similar to the Room and Pillar method with the only exception that in this method, pillars of coal mineral are removed at the end of driveage in the opposite distance from which the mine is advanced.

c) Long Wall Mining Method

This method is used where the mines advance deep underground and levels and tunnels are driven to the coal seam face. In this method, the whole length of coal is extracted without leaving behind the pillars as in the case of room and pillar method of mining. During extraction of whole slice of coal is mined with the advancement of driveage, and hydraulic pioneered support holds up the roof of passage during extraction of coal. After the extraction of coal and advancement of working tunnels, the roof is collapsed behind. This method is most efficient in terms of its capacity for safety and volume of mineral extraction i.e. 75% as well as the cost saving in the mining operation.

d) High Wall Mining Method

This method involves the use of a remote controlled mining machine which is driven into a coal seam to extract the coal. It is often used to extract coal often left behind from previous mining operations or when difficult geological conditions restrict the use of other mining methods. Coal is extracted from the base of a cliff (a high wall) using horizontal drilling to create hole in the coal seam whilst pillars are left in the place to support roof from collapsing. High wall mining is relatively new mining method and is not in use in Pakistan.

The following two types of high wall mining are used:

- **Continuous High-wall Mining:-**

This method involves use of a continuous mining machine that creates rectangular opening into the coal seam of a high wall. Coal is hauled to the surface by using the conveyer system.

- **Auger Mining Method:-**

This method uses an auger mining machine to extract coal. This operates like a drill with cutter head rotating into the coal seam and creating circular holes to access the coal. The extracted coal is sent to the surface by using auger machine and a convey or system.

3. In-Situ Leach Mining

In-Suit leach mining method is used in place of surface mining or underground mining when the ore deposits are either too deeper or too thin or where the underground strata condition is so weak that it does not help in holding up the roof of the underground working passages.

The process initially involves drilling of holes into the ore deposits by using explosive or hydraulic fracturing to create open pathways into the deposits for solution to penetrate. Leaching solution is pumped into the deposits where it makes contact with the ore. The solution bearing the dissolved ore content is then pumped to the surface via second bore and processed. This process allows the extraction of mineral without using the conventional mining methods of surface or underground. The leach solution varies according to the nature of ore deposits as explained below:-

- a) **Soluble salt:-** In salt deposits of potash, rock salt, sodium chloride and sodium sulfate pure water is used.
- b) **Uranium:-** The solution used to dissolve uranium is either acid (sulfuric acid or nitric acid) or carbonate (sodium bicarbonates, ammonium carbonate or dissolved carbon dioxide). Dissolved oxygen is something added to the water to mobilize uranium. About 41% uranium is extracted by this method which is mostly used in Australia, USA and other countries.
- c) **Copper:-** The soluble includes carbonates malachite, azurite, oxide tenorite and silicate chrysocolla. Other copper minerals (oxide cuprite's and sulfide chalcocite) may require addition of oxidizing agents. Copper ISL is often done by close by stop leaching in which broken low grade ore is labeled in current or former conventional underground mining.
- d) **Gold:-** In-Suite Leach mining of gold with chloride and iodide, solution is also done but not on commercial scale.

- **Advantages and Disadvantages:-**

This method is most suitable where either the ore deposits are too deep or too thin or where the underground strata conditions are too weak that does not help in maintaining the underground working passages. It is also used when mine has no ventilations or there is no underground fire problem.

The following are the disadvantages of using In-situ leach mining method:

- a) Acidification of ground water.
- b) Mobilization of potentially hazardous heavy metals and in the case of uranium, radioactive heavy metals.
- c) Disturbance of ground water table, mixing of ground water aquifers and general disturbance of the land atop the ore body.
- d) Destruction of habitat and other inhabiting organisms, bacteria.
- e) Potential spills of acidic and metal bearing or salt bearing leaches upon the surface.

Chapter 8

Mine Development – Levels and Shafts

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Chapter 8

Mine Development – Levels and Shafts

The mine development in underground system of mining involves the development of levels and shafts. These are explained as under:

1. Levels

Levels are driven for entrance to the mine from surface having suitable height, width and gradients and length for taking in men, materials and machines as well as for handling out men, materials and machinery and minerals extracted. These are called level / galleries. The same are fitted with narrow gage rail track. These levels are also developed in parallel in depth for extraction of minerals for further in the depth.

2. Shafts

- a) Shaft is driven as passage to connect one level to the other and have steep gradient used for taking in and out men, material, machinery and minerals to the appointed places in level. In certain cases where the gradient is too steep, the same is used for taking in men, material, machinery and mineral direct to the surface.
- b) No person shall be employed in mine or be present unless there are at least two shafts not less than 20 feet away to one another, having separate entrance and proper arrangements should be made for persons to go up and down. However the above condition will not be applicable in cases when shaft, being sucked on an outlet, is being made or when communication between two or more shafts or outlets are established. In the conditions as mentioned above, not more than 20 persons be engaged.
- c) A competent person appointed by the manager should inspect the working at least once before the start of each shift to assess the condition of ventilation, roof, sides and general safety and record the results in the Inspection Book being maintained at each mine.
- d) The condition of shaft being used for ascending or descending should be examined by competent person once a week and record in Inspection book.
- e) In case more than 20 persons are employed, a report of such inspection should be written.

- f) The authorized competent person (Mining Sirdar) should be constantly present in the mine assigned to him when the work is being carried on.
- g) If the working place or passage is found to be unsafe, all persons should be withdrawn immediately from the place. All accesses and entrances should be stopped by proper fencing except for the purpose of removing damages.
- h) All entrances between top and bottom of shafts and any opening into more than 20 feet deep between a drive and other dangerous openings should be provided with a permanent removable barrier to prevent persons/material falling there in.
- i) All ladders/ ladder ways, platforms, doors, fences or other appliances in use should be withdrawn and kept in proper condition.
- j) Where working is approaching to a place containing dangerous accumulation of water, the working shall not exceed 6 feet in width or height and borehole shall be kept at such a distance in advance of the face and at such angle from working, as is necessary to avoid the danger of erupting water.
- k) Adequate ventilation should be provided in every mine to keep the working in safe conditions.
- l) Underground working and shaft which are not in use should be examined before use in order to ascertain the conditions of roof and sides and to know whether dangerous gases are accumulated therein.
- m) In any underground working where adequate stationary heights are not in use, every person shall carry light in the shape of mining safety lamp.
- n) No person shall work in any place, other than place in which he has been ordered to work.

3. Raising and Lowering of Persons or Materials

At every shaft or incline where persons or materials are lowered or raised by mechanical means, the following provisions should be observed:

- a) A single linked chain should not be used for lowering or raising persons in any working shaft except short coupling chain attached to cage, wagon or bucket.
- b) Ropes used in raising and lowering persons and also coupling and shackles should be of good condition.

- c) One or more breaks should be attached to every machine of sufficient power to hold the cage, wagon or bucket when loaded in the shaft and a proper indicator be provided to show the position of cage, wagon or bucket in the shaft. In the case of a shaft not exceeding 100 feet in depth or a shaft in the course of sinking, the conditions of indicator shall not apply.
- d) An adequate overhead cover should be provided on every apparatus on which persons ride in a raising shaft.
- e) In the working shaft used for hauling out minerals or for lowering or raising persons of exceeding 150 feet, proper means of communication with definite signal should be provided from bottom to surface and from surface to bottom and to every entrance between the surface to bottom.
- f) There should be proper signals from top of every winding shaft to winding engine. All signals should be transmitted by mechanical or electrical means, the first three or principal signals shall be as under:

One bell-----Raise when engine at rest
One bell-----Stop when engine in motion
Two bells-----Lower
Three bells-----Men ready to ascend or descend
Three bells-----Men may enter the cage

- g) Every shaft used for lowering or raising persons by mechanical means if exceeds 150 ft in depth should be provided within not less than 100 ft from the bottom of shaft, adequate stationary heights and used during working. This applies to all places where persons have to work underground in the immediate vicinity of shafts as well as after dark at the top of all working shafts and at all winding machine used for raising/lowering of persons.
- h) There should be horns on the drum of every machine so that the rope may not slip. The rope should be fastened to the drum and have two turns on the drum when the cage/ bucket/box are at the bottom of shaft.
- i) Every cage should be provided with catches to prevent the tub from falling. The cage should be covered at the top and closed at the two sides if used for lowering or raising persons. Suitable gate or fence should be provided.
- j) The competent person should at least every 24 hours examine the state of the external parts of machinery as well as head gear, ropes, cages and conductors in the shafts and other appliances of mine in use both underground and at surface. The report of examination should be written by him.

- k) No person should get on or off the cage, bucket, and tub after the same has been set in motion until it reached the appointed stopping place.
- l) No person when ascending or descending a shaft shall take with him any bulky tool or material except when engaged in repairing the shaft.
- m) No person shall ride on a shaft in loaded cage, skip, bucket or box.
- n) Only authorized persons be allowed to ride in cage/tub/bucket/skip one time.
- o) At the top of every incline on which the haulage in working by mechanical power or gravity, there should be stop blocks to prevent tub/wagon/skip/train from running away.
- p) Additional stop block for arresting tubs or skips should be fixed below the first stop block at a greater distance than the length of train of tubs or wagons. A back stay should be attached behind the ascending skip tub or train.
- q) Every haulage road on which haulage is working by gravity or mechanically shall be provided sufficient refuge holes.
- r) Every haulage road exceeding 100 feet in length on which haulage is working shall be provided with proper means of communication, having distinct signals from all regular stopping places to places at which persons controlling the haulage are stationed. The 1st four or principal signals will be as under:
 - Three ropes-----start when at rest
 - One rope-----stop when in motion
 - Two ropes-----lower slowly haul in slowly
 - Four ropes-----raise slowly haul out slowly
 - All other signals shall be in addition.
- s) A printed copy of the code of haulage signals shall be posted at brake wheel or on engine and at both sides of haulage road and at every signaling station.
- t) The signals handle and attachment at every stopping place on any haulage shall be placed in such condition as will enable the person operating the signals to be safe in case of runaway of tub on the incline.
- u) When hauling is by means of endless rope or chain, automatic catches should be fixed at such point on haulage road as to prevent tub from running away.
- v) When wagon are moved by hand, the same shall not be left uncontrolled.

4. Ladder Ways

- a) In ladders-shaft making an angle of 25 degrees or less with the vertical, platform shall be provided at an interval not exceeding 25 feet.
- b) Ladders should not be placed to cover the opening in platforms. In cases where timber and supplies are handled, a portion of that opening should be to one side of the ladder and in the opposite corner of the platform.
- c) For lowest 30 feet of sinking shafts, ladders will be fixed at an inclination of not less than 1 feet horizontal for every 10 feet vertical.
- d) Platforms will be placed at intervals of not more than 55 feet along the slope of shaft in ladder shafts where slope is less than 65 degrees and more than 30 degrees on horizontal line.
- e) The platforms should be fenced and ladders fastened to the side of timbering of shaft.
- f) The ladder-way shall be closed off from other compartments to prevent injury to the workers passing through the ladder-way.
- g) No person shall carry any drill, tools or any loose material on the ladder way in a vertical or steep incline shaft except for repair work.
- h) All ladders and platforms must be made of good material and breaking load of ladders and platforms should not be less than three times of the working load.
- i) All ladders and platforms should be examined by the authorized person within two hours before commencement of the work in shaft and results should be recorded in the Inspection Book.

5. System of hauling of Minerals from Underground Mines

- a) The haulage is installed at the top of every incline/ shaft which works by mechanical power or gravity and is fitted with steel wire rope. The other end of steel wire rope is attached with the mining tub/bucket/cage for taking in mining timber, other mining material/tools and for hauling out the minerals from the lower level/place of working to the surface/upper level. The haulage installed underground should be flame proof.

- b) The stop block should be provided at the top of every shaft in which haulage is working for preventing tubs from running away. Add stop block should also be fixed below the first stop block at a greater distance than the length of train of tubs for arresting of descent of tubs in the event of runaway.
- c) When main haulage road extends beyond 3000 feet from shaft, proper means of communication should be maintained at station and entrance to mine.
- d) Main haulage and travelling roads should be kept clear from accumulation of fine coal dust.

6. Ventilation and Lighting System in Underground Mines

- a) Working places of shafts, levels and workings of mine as well as travelling roads to and from these working places should be in safe working condition. To achieve this purpose adequate ventilation should be ensured in every mine so as to protect the persons from harmful noxious gases.
- b) Mechanical ventilation must be installed in mine, in addition to provision of natural ventilation if desired by Chief Inspector of Mines.
- c) In a mine where mechanical ventilator has been installed, the mine manager should withdraw workers in the event of stoppage of mechanical ventilator.
- d) In a mine in which inflammable gas has been detected within previous 12 months or where workers have left the work due to gas, the quantity of air must be measured as under and measurement of air should be recorded in a book kept at the mine:
 - In the main intake air-ways of every seam as far as practical to the shafts downward
 - In every split to the point at which split commences
 - In every ventilation district to a point where the air is sub-divided at the end of a main split or where the air enters the working place.
- e) No Artificial light other than the locked safety lamp should be used in any seam in which explosion or inflammable gas has occurred; or in any place in mine where there are any inflammable gas enabling the use of naked lights dangerous; or in any working place/ventilation district where gas has occurred in previous 12 months; and where the coal dust can ignite/ explode in case there is naked light.

- f) In a mine where mechanical ventilator has been installed, the mine manager should withdraw workers in the event of stoppage of mechanical ventilator.
- g) Except in condition stated at (e) above, fixed electric lights from power point may be used in any mine which is not within 600 feet of any working face provided this complies with the Electricity, Act 1910 relating to use of Electric energy in mines.
- h) No advance gallery more than 10 feet ahead of widened gallery, where inflammable gas has been found in previous 12 months, such length of ventilation should be provided up to the working face.
- i) In any mine where use of safety lamps is required, the following provisions shall be applicable:
 - A competent person appointed by manager should clean, examine and lock all such lamps before their use in underground working.
 - No safety lamp should be unlocked except at the lamp station.
 - Every lamp should be examined on its return and if found damaged, this fact should be recorded in the book.
 - In addition to above-stated provisions, a competent person other than the above, should examine all safety lamps at least once in every week and record the facts in the book.
 - No person should have unlocked safety lamp.
- j) Where use of safety lamp is required, one or more lamp stations should be established at mine mouth. However, lamp station should not be placed in a return airway. The safety lamp station should be in the charge of a competent person appointed by Project Manager and he should only issue safety lamp.
- k) In underground mine, every person should carry the locked safety lamp except the place where adequate stationary light are made available.
- l) In mine where use of safety lamp is required, no person should keep any apparatus for match smoking or for striking light except apparatus required for short firing or relighting lamps as the Chief Inspector of Mine authorizes.
- m) A competent person should search all persons employed underground before their entrance into mine to ensure as to whether they have any such article as mentioned at serial (k) above.

Chapter 9

Health and Safety

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Chapter 9

Health and Safety

1. Provision of Drinking water and Latrine / Urinal Facilities

Adequate drinking water facilities should be provided at every mine. Further latrine and urinal facilities should be provided at each mine.

2. Canteen

At any mine where more than 100 persons are employed, a canteen should be provided as per prescribed standard.

3. Shelter

During intervals, a shelter for workers/employees should be provided at mine as per prescribed standard.

4. Medical Appliances

At every mine first Aid appliances should be provided as per prescribed standard.

5. First Aid Rooms

At every mine first aid rooms, equipment's and staff should be provided as prescribed by the government.

6. Notice of Accident

The owner, agent or Manager shall give notice to appropriate authorities i.e. Chief Inspector of Mines and District Magistrate, in such form and within such times as may be prescribed on the occurrence of following:

- Accident for loss of life or serious bodily injury.
- Accidental explosion, ignition, spontaneous heating, fire, water eruption etc.
- Discovery of inflammable or noxious gases.

- Breakage of ropes, chains by which persons or material are taken in and out the Mine.
- Electricity shock or burn caused by the electric devices of more than 25 volts
- Any other accident

When an accident occurs which results in loss of life, the Chief Inspector of Mines should make an enquiry within 3 days during which period the place of accident should not be disturbed. However, if in the option of Manager of Mine, disturbance of place is necessary for safety of mine or person, the place of accident may be disturbed after ensuring the following:

- The representative of workers has been given opportunity to inspect the place of accident
- An authentic plan of accident has been made with copies to Chief Inspector of Mines and workers representative.
- Everything relevant to accident has been preserved.

6. Notice of Occupational Disease

In case any person contracts any disease notified by the appropriate government, the owner agent or manager should give notice of the same to the Chief Inspector of Mine within such time and form as may be prescribed.

Chapter 10

Procurement, Physical Handling, Financial and Accounting Matters

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Chapter 10

Procurement, Physical Handling, Financial and Accounting Matters

The major items in the procurement category are plant and equipment and Raw Materials. The procedure for their procurement is as under:

1. Plant and Equipment

- a) The major plant and equipments are locomotive, rail track, haulage (flame proof or otherwise), hand picks, pneumatic picks, safety lamps, power house machinery, mining safety lamps, mining helmets, drilling rigs and accessories, transport machinery (mining tubs, Trucks, jeeps, dumpers), road rollers, water pump (flame proof or otherwise), gas plant and pipe line for new development project.
- b) The total plant and machinery and its cost, as provided in the feasibility study report for the whole period is segregated on yearly basis and approved on annual basis as provision of approved capital budget.
- c) The majority of plant and machinery, as per approved capital, is imported for which procurement period is of 6 months to one year. The Mine Development Cost as approved in capital budget is booked on Mine/tunnel wise.
- d) Tenders are invited through press along with the earnest Money.
- e) Comparative bids are prepared by the project management committee of technical; Mining, Accounts and orders are placed at the lowest bidder who has to deposit security money in the shape of bank draft.
- f) The local items of plant and equipment are procured locally by inviting bids through press advertisement. The project Management Tender Opening Committee comprising technical mining, admin and accounting executives open the bids and a comparative statement is prepared.
- g) The purchase order after approval of proposal of Tender Opening Committee is placed at lowest bidder who has to deposit security money for compliance of the terms and conditions of the purchase order in the shape of pay order.

- h) All imported and locally procured machinery is inspected by Technical officer in association with Administrative Officer. Receiving Reports are prepared and a Satisfactory Certificate is recorded there-on by concerned Technical officer. Its copies are sent to store Department and the Accounts Department.
- i) The Store Department records units in Bin Cards and items are stored in Store.
- j) The Accounts Department on receiving the receiving report, calculate the cost and record the quantity and cost in Stork Ledger, based on entries in receiving report. The Plant and Machinery items are issued to concerned Department (Mines and others) on the approved store requisitions and then installed.

2. Raw Material

The raw materials consists of timber, petrol, lubricants and other store as approved in the feasibility study and then allocated on yearly basis. In coal mines the major items of material consist of mining timber, petrol and lubricants, gunny bays, steel wire rope. The Material items are purchased locally.

For the major items the Provision of Purchase Manual of the Organization are kept in view while processing materials and the procurement is made on annual basis with in the approved budget allocation.

2.1 Mode of Material Procured

The mode of material procured is as under:

- a) **By inviting tenders** through press if cost of material exceeds the specific limit.
- b) **By repeat order** if the prices have not fallen from the recent previous past purchased prices, in case the material is needed urgently.
- c) **By spot purchase** in case the quantities and value of material is very low and item is needed urgently. Spot purchase is made through Project Purchase Committee by collecting quotation from market on spot based at competitive lowest rates and by paying cost of material on spot within the monthly limit.

2.2 Collateral Securities

- a) **Earnest Money**
Earnest money @ 2% to 5% of the offered bid price is obtained at the time of inviting bids along with the tender bid.

b) Security Deposit

Tenders are opened by the Tender Opening Committee of the project and orders are placed at the lowest bidder who has to deposit security money before the supply of the material. The security money is the amount fixed by the organization keeping in view the value of purchase order. The security is 10 to 15% of the purchase order.

3. Store Department

The Store Department at the project is under the charge of Store Officer. The store is divided on the nature of store items for which Bin cards are maintained for each item. Bin card has various columns i.e. Bin card No, details description of material, quantity, minimum and maximum levels as well as re-order level. The store items are recorded on Store Bin card of each store item. The Mining section places indent called "Store Requisition" for the quantity of machinery and store required from time to time. Other sections also adopt the same procedure. The Store Department also stores the used machinery returned to store in the respective Bin card.

4. Dead Work in Solid underground Strata for Development of levels/shafts

The drivage of particular level and shaft in solid underground strata, duly confirmed by Survey and Geological departments, is proposed by the Mine Manager showing the place, length and width. Based on this proposal, the project manager issues sanction order in favour of particular group of piece-rated workers in the name of its group head. This section order contains the following particulars:

- a) Name of Mine
- b) Place where the shaft or level is driven
- c) Name of group leader of the piece rated labour called dead worker
- d) Total length, height and width of shaft/level
- e) Period within which work is to be completed
- f) Dead work drivage rate per feet

5. Bill of Dead Work Drivage in Solid Strata

The dead work completed out of total length of sanction order is measured by the joint team of Survey Department and representative of the Mine Manager and bill for the period (it may be on weekly or monthly basis as per practice) is prepared by the Mine Manager. This bill is called 'goshwara' and contains the following details.

- a) Name of Group Head of workers.

- b) Name of mine
- c) Sanction order No and date
- d) Name/place of level/shaft
- e) Size and length, width and height
- f) Total length Mines previous drivage
- g) Rate per feet/ meter
- h) Total cost of the bill

The bill of dead work is signed by the In-charge of mine, Surveyor of mine and after counter signature of the Project head, the same is sent to the Accounts Department.

6. Checking of Bill by Accounts Department

- a) The goshwara/dead work bill on its arrival in Accounts Department is checked with reference to details given in the Sanction Order as well as the previous period bill.
- b) The bill after due checking is passed for payment under the joint signature of the head of Accounts Dept and the Project Head. The cost of goshwara is booked under the head "Dead work Development-Labor cost".
- c) The cost of material used in the level/shaft as per details in Store Requisition is also recorded in this particular shaft level as material cost under the head "Dead work Development-Material cost".

7. Bill for Dead Work Cutting in Mineral Seam

- a) Dead work cutting is also required on the sides of mineral seam in case the mineral seam is small as compared to size of tunnel/passageway from where work or mineral extraction is being done. This is called dead work in Mineral-seam. For this, sanction order of dead work is issued as per details given earlier with the exception that the dead work cutting volume is determined after deduction of size of the mineral.
- b) The other details are same as per bill of dead work in solid strata. The bill for the dead work in Mineral seam is prepared after taking the network (After deducting the volume of the minerals seam from total work of the tunnel).
- c) The counter check as to correctness of bill of dead work in mineral seam is exercised by Accounts Department by ascertaining as to whether bill of mineral extraction in that tunnel has been prepared and already paid.
- d) The bill of dead work in mineral seam is then passed for payment under the joint

signatures of accounts head and project manager and amount paid to the head of the gang of miners. The amount of such goshwara is booked under revenue head "Dead work-Labour cost". The cost of material such as timber, gunny bud etc as worked out from the store requisition for this tunnel is charged to revenue head "Dead work-material cost".

8. System of Hauling out of Mineral and Dead Work Cutting

- a) Piece-rated workers are engaged in Dead work cutting and extraction of minerals under their group leader. The dead work cutting debris and mineral volume is determined on estimation basis by marking tonnage on each mining tub on outer side which is treated as volume for tonnage calculation purpose.
- b) The minerals and dead work in tonnage so determined are hauled out through mining tubs (pulled by haulage) on the mine surface. Proper record of mineral tonnage and dead work tonnage is maintained for each group of miners.
- c) The wages for piece rated work for dead work cutting and minerals extraction are paid on weekly /quarterly/monthly basis as per established practice.

9. Bill for Mineral Extraction

- a) Goshwara/ Bill for Mineral extraction is prepared for each group of Miner based on the already notified mineral extraction rate per ton multiplied by tonnage as per practice on weekly/quarterly /monthly basis.
- b) The bill is signed by the Over man/ Assistant over man and counter signed by Manager/Project Manager, which is then sent to the Accounts Department where the quantum of mineral is counter checked with reference to daily production reports received from the Mine and standard notified mineral extraction rates.
- c) The bill is then passed for payment with joint signature of the Accounts Head and Project Manager. The payment is made generally by cash at the pointed place at each mine by cashier to the head of the group of Miners.

10. Cost of Living Allowance and Holiday Wage Bill of Piece-rated Workers

- a) The goshwaras/Bill of cost of living allowance and holiday wage of piece-rated miners, working at each mine, are prepared by the Mine Manager and duly counter signed by the Project Head.
- b) The bill is then submitted to Accounts Department where it is checked with

reference to copies of daily attendance reports received from mines and then passed for payment under joint signature of Head of Account and Project Manager.

- c) The cashier makes payment at the already approved place at mine on monthly basis. The per day rate is calculated by dividing monthly cost of living allowance by 26 days.

11. Bill / Goshwaras of Daily Paid Workers

- a) In addition to piece rated miners, there are daily paid workers who are working at each mine for various services.
- b) The goshwaras/Bill of daily paid workers for monthly attendance as well as the paid holidays are also prepared by the Mine Manager and sent to Accounts Department of the Project which after checking with reference to daily attendance reports, appointment orders and the standard established daily wage rate are passed for payment under joint signature of the Accounts Head and Project Head.
- c) The payment is made in cash by the cashier at the pointed place at the Mine.

12. Pay Roll of Monthly Paid Employees

- a) Monthly pay roll of employees, supervisory staff and officers, both working at Mines and in other departments such as Mine sections, Admin Department, HR Department, Store Department, Survey Department, Geological Department, Accounts Department, Civil Department, and Marketing/ Sale Department is prepared by Account Department (based on attendance reports, appointment/promotion orders and leave/absence reports).
- b) The bill is passed under the joint signatures of the Account Head and Project Manager and payment is made through cheque to each employee by sending cheques to concerned bank for crediting the amount of salary to the bank Account of each employee.

13. Sale of Minerals

- a) Mineral extraction from the mines are transported to Central Minerals Store at mine by means of locomotive train of tubs, trucks/dumpers. The minerals are then weighed at the Central Sale Depot and recorded on mine-wise basis. The coal is stacked in small separate heaps of specific height to avoid chances of catching fire.

- b) Sale from Central Sale Depot is made to the parties either by inviting annual tenders or through open sale at the approved rates duly weighed on Project weighbridge.

14. Annual Physical Stocktaking

- a) Annual physical verification of all plant and machinery/equipments, materials, minerals and other store is conducted by physical verification project team.
- b) The stock verification report showing the book and physical balance as well as shortage and excess in terms of quantity and value is prepared at the end of each financial year. The Report is then submitted to project head and after approval, the shortages and excesses are incorporated in books of Accounts.

15. Annual Budget

- a) The next year's capital budget proposals for plant and machinery requirement and mine development as well as for Revenues Budget as received from each mine and other departments are forwarded to the Accounts Department.
- b) The capital budget and revenue budget proposals are discussed in a meeting headed by the Project Manager before the closure of financial year.
- c) The budget proposals for next year along with actual achievements for the current year (actual for 9 months and estimated for 3 months of current year) along with the approved budget for the current year and variances thereon are prepared by the management and submitted to owner/ Board of Directors with full justifications. The Board then approves the Budget (Capital and revenue budget) for the next financial year.

16. Preparation of Accounts

The Accounts are prepared on monthly, quarterly and on annual basis for the project which covers the expenditure and revenue income, along with the necessary schedules for the period. The Accounts consists of profits and loss Account for the period; balance sheet as on the closing date of the period and the cost sheet.

- a) **Chart of Accounts** - The first step is to have a modified Chart of Accounts tailored according to specific terminology used in mining.
- b) **Profit and Loss Account** - The periodical profit and Loss Account is prepared

according to generally accepted Accounting principles, keeping in view the requirement of law along with the necessary schedules.

c) **Balance Sheet** - The balance sheet is prepared as per requirement of law.

d) **Cost sheet** - The periodical cost sheet is prepared on the specific Performa of Cost Sheet which is given reproduced below:

Name of Project.....

Cost sheet for the period ended as on.....

Heads	Budget (Rs.)		Actual (Rs.)	
	Total	Per Unit	Total	Per Unit
A. <u>Under Cost</u>				
1. Material Cost (U.G)				
• Timber				
• Other Material				
Sub-total Material (U.G)				
2. Labour Cost (U.G)				
• Piece Rated				
• Wages daily paid				
• Other Salary and Wages				
Sub-total Labour Cost (U.G)				
Total Cost at Pit Mouth (1+2)				
B. <u>Surface Cost</u>				
• Material				
• Labour				
• Salary and Wages				
Total Cost at Mine Mouth (A+B)				
C. <u>Service Department Cost</u>				
• Material				
• Repair & Maintenance				
• Salary and Wages				
Total Cost Service Department				

D. <u>Office and Others</u> • Salary and Wages • Others				
Total Cost Office and Others				
E. <u>Over Head Cost</u> • Leave Salary • Gratuity • Provident Fund • Others				
Total Over Head Cost				
Total Cost of Production (A to E)				
F. <u>Change in stock</u>				
Grand Total cost of Sale				

Signed-Chief Accountant

Signed Project Manager

17. Budget Performance Review

- a) The Budget Performance Review on quarterly and annual basis both for Capital and Revenue items is prepared by the Accounts Department of the Mining Entity, showing budgeted as well as actual figures of the variance from the budget for capital and revenue items.
- b) The variances may be favorable or unfavorable. The detailed analysis of each variance and reasons of the same are incorporated in the last column of performance review for each item of capital and revenue nature, and the remedial measures taken by the management.

18. Management of Case Funds

- a) Cash fund generated from the sale of minerals and mine sources is deposited into the Bank Account on daily basis.
- b) Payments for salary and wages, materials, overheads and plant and machinery are made through cheques.
- c) Surplus funds are invested in various short term and long term securities with the approval of project head/ Board of Directors.

19. Audit of Accounts

- a) **Commercial Audit By Chartered Accountants Firm**
Annual Audit of accounts of the Mining entity is conducted by the Chartered Accountants. The report and audited accounts is presented in the meeting of Board of Directors and at the AGM of the share- holders for their approval.
- b) **Management Audit by Internal Auditors**
Periodical Management Audit (on quarterly, half yearly and on annual basis) is conducted by the Internal Auditor of the Mining Entity, highlighting the efficiencies and pilferages. The report is submitted to the project head for his comments/justifications and remedial measures taken by the Management.
- c) **Government Audit**
For business Entity having majority ownership of the Federal and provincial Government, the Department of Auditor General of Pakistan conduct the Audit on annual basis.

20. Return Notices and Records

- 1. On or before the tenth of every month, the owner, agent or manager of the mine shall send to the Chief Inspector of Mines, the return - showing production and dispatches for previous month in the prescribed form I.
- 2. On or before the 21st of the January of each year, returns for the previous year are sent on prescribed forms II, III, IV, V, VII and VIII to the District Magistrate and Chief Inspector of Mines.
- 3. In case any change occurs in the name or ownership of a mine, a notice of such change should be sent to Chief Inspector of Mines within one month.

4. In case of new appointments of agent or manager or in case of any change in address, a notice of such change should be sent to the Chief Inspector of Mines within one month.
5. In case of transfer of ownership, the previous owner or agent will hand over all the plans, books or other records to the new owner.
6. In case of accident causing loss of life/serious body injurious, or in the case of explosion, out-break of fire/ smoke/fire or eruption of water, noxious gases in a mine; the owner, agent or manager shall inform the Inspector on phone or by telegraph forthwith and to the Chief Inspector of Mines within 24 hours of any such happening as well as to the District Magistrate/sub-divisional Magistrate.
7. In the case of death from injury already reported as serious, the owner, Agent or Manager should send notice within 24 hours to the Chief Inspector of Mines as well as to the District Magistrate/Sub-Magistrate.
8. Pursuant to section 242 of the Companies Ordinance, 1984, it is mandatory to file annual audited accounts ended 30th June of each financial year with the Registrar of Companies latest by 45-days for listed companies and 30-days for other companies of the holding of AGM each year.
9. The listed companies shall, in the addition to above, send five copies of Annual Audited Accounts to Securities and Exchange Commission of Pakistan as required under Section 233(5) of Companies Ordinance, 1984.
10. Form 29 of election/appointment of Directors/Officers shall have to be submitted within 14 days of such appointment to the Securities and Exchange Commission of Pakistan.

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Annexure

**Consolidated
Mines Rules, 1951**

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Annexure**Consolidated Mines Rules, 1951**

[Rules framed in exercise of the powers conferred by section 30 of the Mines Act 1923, as required by sub-section 31(1) of the said Act.]

1. (a) These rules may be called the Consolidated Mines Rules, 1952.
2. (b) They shall apply to all the Mines in all provinces and the Capital of the Federation.

In these rules, unless there is anything repugnant in the subject or context: ----

- (a) "Act" means the Mines Act, 1923 (IV of 1923).
- (b) "Section" means a section of the Act.
- (c) "Chief Inspector or Inspector of Mines" means Chief Inspector of Mines or Inspector of Mines appointed under the Act.
- (d) "Form" means a form appended to these rules.

Chapter I - Sanitary and Health Provisions

1. At every mine, a sufficient supply of wholesome and cool drinking water shall be provided and maintained on the surface for all work-person at suitable points close to the place where they are employed and reside within the mine premises and if the Chief Inspector so directs in the case of any mine or class of the mines, also below ground at points reasonably accessible to the person employed. All such points shall not be situated within twenty five feet of any washing place, urinal or latrine. Drinking water shall in all cases be supplied to employees free of cost and shall be periodically examined by qualified medical practitioner who shall certify in writing that it is whole-some or not.
2. At every mine arrangements shall be made for keeping all the under-ground working places and travelling roads clean from excreta.
3. At every mine latrine and urinal accommodation shall be provided on the surface and also, if the Chief Inspector so directs, in the underground workings of the mine for all persons at suitable points close to the places where they are employed and reside within the mine premises and the scale of the accommodation shall be, in case of----
 - (a) latrine, four seats for the first fifty persons and two seats for every additional fifty persons or less working at the mine or residing within its premises.
 - (b) urinal, half the number of seats provided for the latrine:
Provided that the Chief Inspector may reduce the number of urinal seats by such number as the latrine seats are increased.
 - (c) Each latrine and urinal on the surface shall be of water flushing type and, in case the public sewage system is not available for disposal, suitable and adequate soak pits shall be constructed.

4. Every latrine erected on the surface for the use of the work-persons of a mine hall is so partitioned off as to secure privacy and if a latrine is intended for the use of the other sex, the approaches shall be separate.
5. All latrines in or above a mine shall be kept in a sanitary condition.

Chapter II - First Aid

1. It shall be the duty of the owner, agent and manager of mine to see that adequate arrangements are made for the training of men in ambulance work.
2. In every mine, one or more of the persons employed according to the subjoined scale shall be trained in ambulance work to the standard of St. John's First Aid Certificate:- Where the number of persons during any period of 24 hours does not exceed 50, not less than one person, exceeds 50 but does not exceed 100, not less than 2 persons exceeds 100 but does not exceed 150, not less than 3 persons exceeds 150 but does not exceed 200, not less than 4 persons exceeds 200, one person for every completed fifty persons of less employed.
3. In or at every mine there shall be provided and kept in good conditions and ready for immediate use at a convenient place on the surface and also, if the Chief Inspector by order in writing directs in the case of mines, underground:-
 - a) a suitable constructed stretcher or stretchers[with blankets and hot water bottles].
 - b) a box or boxes containing sufficient supply of suitable splints and triangular bandages, sterilized wound and burn dressing, sterilized cotton wool, adhesive plaster, roller bandages, two percent alcoholic solution of tincture iodine, a bottle of meat or coffee extract or other stimulant with a drinking vessel, a bottle of eye drops, a tourniquet, scissors, safety pins and other materials, medicines or appliances which the Chief Inspector may deem necessary for the treatment of injuries or diseases and may require the provision of the same by a written order.
4.
 - (1) At every mine in respect of which section 18 A of the Act applies, there shall be provided first-aid room at a convenient place on the surface having a floor space of not less than 100 square feet with adequate arrangement for lighting and ventilation.
 - (2) The first-aid room shall be exclusively used for the first-aid purposes and marked "FIRST AID" on the door.
 - (3) The first-aid room shall be placed under the charge of such person or persons who are qualified medical practitioner or compounder-cum-dressers and are always readily available during the working hours.
 - (4) In addition to the equipment and appliances specified in rule 10, the first-aid room shall also be provided with:-
 - (a) a table, with a cupboard, of convenient height and size where on the stretcher could be placed;
 - (b) a bench or four chairs and one screen;
 - (c) a glazed sink with running hot and cold water;

- (d) soap, towels and nail brush;
- (e) a pair of artery for ceps;
- (f) one eyebath;
- (g) two clinical thermometers;
- (h) two hypodermic syringes (5CC) with suitable needles;
- (i) one sterilizer with arrangements of boiling water;
- (j) one stethoscope;
- (k) and adequate supply of anti-tetanus serum and morphine ampuls; and
- (l) means of conveyance, always readily available, for the speedy and safe removal of serious cases of accidents or sickness to hospitals:

Provided that, where the owner of mine has provided a hospital which, in the opinion of the Chief Inspector, conforms to the provisions of this rule, he may exempt that mine from providing the first-aid room referred to in this rule.

10B. At every mine where person work above ground there shall be constructed, close to the places where they are employed, shelter rooms for rest during intervals, which shall conform to the following standards:-

- (i) they shall be constructed of brick and mortar, having a floor space not less than six square feet for each person to be accommodated;
- (ii) the flooring shall be of cement or stone and the ceiling shall not be less than ten feet high from the floor and shall not be of corrugated sheets or other metal unless covered by a heat resisting material;
- (iii) they shall be adequately lighted and properly ventilated and shall be maintained in a clean and sanitary condition;
- (iv) they shall be furnished with adequate number of chairs and tables; and
- (v) They shall be provided with adequate supply of cool and whole-some drinking water during the working hours of the mine.

Chapter II-A - Canteens

1. The owner of every mine where in more than one hundred persons are ordinarily employed shall provide for the use of such persons a canteen at his mine according to the standards prescribed in this chapter by the 31st December, 1974. Provided that :-
 - (a) the Federal Government may, for sufficient reasons by order in writing, extend, from time to time, the said date in respect of any specified mine;
 - (b) the Federal Government may , for any mine or class of mines, directs that this sub-rule shall not apply, or shall apply subject to any conditions that may be specified in writing by the Chief Inspector, where it can be shown that suitable alternative arrangements for the supply of food to workers are available.
 - (c) The Federal Government may, for any mine or class of mines, vary the standards prescribed for the canteens in this chapter.

2. The owner, agent or manager of the mine shall submit for the approval the Chief Inspector plans and a sit plan, in duplicate, of the building to be constructed or adopted for use as a canteen.
3. The canteen building shall be situated at a distance of not less than fifty feet from any latrine, urinal, boiler house, coal stocks, ash dumps and any other source of dust, smoke or obnoxious fumes.

Provided that the Chief Inspector may, in respect of any mine, vary the provisions of this sub-rule to such extent as may be necessary in the circumstances:

Provided further that in the case of Permanent canteen buildings where flush system is available the provisions of keeping the canteen buildings at a distance of fifty feet from any latrine or urinal shall not apply.

4. The canteen building shall be constructed in accordance with the plans approved by the Chief Inspector and shall contain at least a dining hall, kitchen, store-room and pantry, and separate washing places for
 - (I) Male workers.
 - (II) Female workers.
 - (III) Utensils.
5. The minimum height of the canteen building shall not be less than twelve feet from floor level to the lowest part of the roof and all the walls and roofs shall be of suitable heat-resisting materials and shall be water-proof.
6. The floor and inside walls up to the height of four feet from the floor shall be made of smooth and impervious materials; the remaining portion of the inside walls shall be made smooth by cement plaster or in such other manner as may be approved by the Chief Inspector.
7. The doors and windows shall be of fly-proof construction and shall allow adequate ventilation.
8. The canteen shall be sufficiently lighted at all times when any person has access to it.
9. In every canteen,
 - (I) all inside walls of room and all ceilings, passage, and staircases shall be lime-washed or colour-washed at least once every three year:
Provided that the inside walls of the kitchen shall be lime-washed once in every in every four months or once a year where natural gas is used as fuel for cooking.
 - (II) All wood-work shall be varnished or painted once every three year.
 - (III) All internal structural iron or steel work shall be varnished or painted once in a year.

10. Records of dates on which lime-washing colour-washing, varnishing or painting is carried out under sub-rule (9) shall be maintained in a register kept at a canteen for the purpose.
11. The precincts of canteen shall be kept in a clean and sanitary condition and waste water shall be carried away in suitable covered drains and shall not be allowed to accumulate so as to cause nuisance, and suitable arrangements shall be made for the collection and disposal of garbage.
12. Effective and suitable provisions shall be made in every part of the canteen for securing and maintaining adequate ventilation by circulation of fresh air.
13.
 - (1) The dining hall shall have the capacity to accommodate at a time at least thirty percent of the workers working at that time.
 - (2) The floor area of the dining hall, excluding the area occupied by the service-counter and any furniture except the tables and chairs, shall not be less than ten square feet per worker to be accommodated as prescribed in sub-rule(1): Provided that where, in the case of a canteen already in existence, it is impracticable, owing to lack of space, to provide ten square feet of floor area for each worker, such reduced floor area per worker shall be provided as may be approved in writing by the Chief Inspector.
 - (3) A portion of dining hall and service-counter shall be partitioned off and reserved for women workers in proportion to their number. Washing places for women shall be screened to secure privacy.
 - (4) The dining hall shall be furnished with adequate number of tables with impervious tops and chairs or benches for the use of workers to be accommodated as prescribed in sub-rule (1)
Provided that where the Chief Inspector is satisfied that satisfactory alternative arrangements have been made, he may exempt any particular mine or lass of mines from the provisions of this sub-rule.
 - (5) A sufficient supply of soap and clean towels shall be provided at the washing places in the canteen for the use of workers.
14.
 - (1) There shall be provided and maintained sufficient utensils, crockery, furniture and any other equipment necessary for the efficient running of the canteen. An adequate supply of cool and wholesome drinking water for the workers using the canteen and suitable clean clothes for the employees serving in the canteen shall also be provided and maintained.
 - (2) The furniture, utensils and other equipment shall be kept hygienic. A service counter, if provided shall have a top of smooth and impervious material suitable facilities including an adequate supply of hot water shall be provided for the cleaning of utensils and equipment.
 - (3) Adequate steps shall be taken at every place in the canteen to prevent contamination of food, utensils, cutlery and other equipment.
 - (4) The expenditure of starting a canteen and the extension thereof, including provisions for equipment, furniture and utensils, shall be borne by the owner of the mine.

- (5) The owner, agent or manager of the mine shall appoint supervisory and other staff sufficient for the proper working of the canteen, and expenses in his behalf shall be borne by the owner of the mine.
15. (1) The manager of the mine shall appoint a Canteen Managing Committee which shall be consulted from time to time, but not less than once a month, as to:-
- the quality and quantity of food to be served in the canteen.
 - the arrangement of the menus.
 - the time of meals in the canteen.
 - Any other matter concerning the management and working of the canteen.
- (2) The Canteen Managing Committee shall consist of an equal number of persons nominated by the manager and by the collective bargaining agent of the mine as determined under the provisions of the Industrial Relations Ordinance, 1969 (XXIII of 1969), elected by the workers, if there is no such collective bargaining agent. The number of workers nominated or elected shall be in the proportion of one for every one hundred workers employed in the mine, provided that in no case shall there be more than five or less than two workers on the Committee.
- (3) The manager of the mine shall appoint a person, from among the persons nominated by him, the Chairman of the Canteen Managing Committee who, shall preside at its meetings. The proceedings of the meetings shall be recorded in a minute book and signed by the Chairman.
- (4) The manager of the mine shall determine and supervise the proceedings for elections to the Canteen Managing Committee when held under sub-rule (2). Should there be any dispute in regard to the election of workers' representatives; the manager shall refer the matter to the Chief Inspector, whose decision in the matter shall be final.
- (5) The Canteen Managing Committee, notwithstanding any by-elections, shall be reconstituted every two years, the previous Committee holding office till such time as the new Committee takes over the charge.
16. (1) food, drinks and other items served in the canteen shall be sold on non-profit basis and the prices charged shall be subject to the approval of the Canteen Managing Committee. In the event of the Committee not approving the price list or where the Committee is equally divided on the issue, the price list shall be sent for approval to the Chief Inspector whose decision in the matter shall be final.
- (2) The charges of the food-stuff, beverages and any other item served in the canteen shall be conspicuously displayed in the canteen in Urdu and in the vernacular of the majority of workers.
17. (1) All books of accounts, registers and any other document used in connection with the running of the canteen shall be produced, on demand, to an Inspector.
- (2) The accounts pertaining to the canteen shall be audited, once every twelve months, by registered accountants and auditors. The balance sheet prepared by the said auditors shall be submitted to the Canteen Managing Committee not later than two months after the closing of the audited accounts.

18. (1) In case of mines belonging to the same business group or amalgamation, where centralized cooking in an approved canteen is arranged, the provisions of the rules in this Chapter may be relaxed by the Chief Inspector, subject to such conditions as he may deem fit. Adequate arrangements to the satisfaction of the Chief Inspector shall, however, be made in such cases for the conveyance and proper distribution of food to the workers concerned as if a separate canteen had actually been provided at each mine covered by this relaxations.

Chapter III - Registration of Work-people

1. The register of all persons employed in the mine shall be maintained, as required by sub-section (1) of Section 28 of the Act, in the form shown in Schedule 'A'. The registers shall be kept at each office of the mine and entries in respect of persons employed in the mine shall be revised once in every month.
2. The register required by sub-section(4) of Section 28 of the Act shall be maintained in the form shown in Schedule B and all entries there in shall be made at the entrance of entrances to the mine and at the time when the person against whose name the entries are made entered or left the mine. The register shall be kept at the entrance of the mine.
3. Before any person who has not completed his seventeenth year is employed [in any mine] the manager shall arrange to have him examined y a qualified medical practitioner, and if after examination the medical by a qualified medical practitioner is of opinion that such person is fit for employment [in ay mine] he shall grant him certificate in the form in Schedule C.
4. Provided that such person shall not be permitted to work in a mine, or in any part thereof either below ground or above ground between the hours 6 p.m. and 6 a.m.
5. Provided further that the restrictions contained in the proceeding provision shall not apply to any such person who is employed as an apprentice or for the purpose of receiving vocational training, if:-
 - He is declared in writing medically fit by a qualified medical practitioner to work to work between the hours of 6 p.m. and 6 a.m. and the declaration is maintained in the office of the mine;
 - he is employed between the hours of 6 p.m. and 6 a.m. under the personal supervisions of a person of more than 18 years of age;
6. The galleries in which he is employed are not less than five and a half feet high and have a gradient of not more than one vertical and two horizontal.
7. Every certificate granted by a medical practitioner shall be prepared by filling up the foil and counterfoil both which shall be impressed by the left thumb mark of the person in whose name the certificate is granted.

8. The qualified medical practitioner shall, when satisfied as to the correctness of the entries made therein, sign the foil and initial the counter-foil and shall deliver the foil to the manager for safe custody.
9. No certificate granted under rule 13 shall be valid for a period exceeding twelve months. Every person in respect of whom certificate of fitness has been issued shall be re-examined within twelve months of the last previous examination unless in the meantime he has completed his seventeenth year and the qualified medical practitioner making such re-examination may renew the certificate for a further period not exceeding twelve months or may suspend or revoke the said certificate.
10. A qualified medical practitioner who refuses to grant a certificate referred to in Rule 13 or suspends or revokes an existing certificate under Rule 16 shall state the reasons for refusing to grant a certificate or for suspending or revoking the certificate as the case may be, If the manager of the Mine disagrees with the opinion of such medical practitioner, he may refer the case to the Chief Inspector or Inspector. The Chief Inspector or the Inspector shall refer the case for decision to a second qualified medical practitioner and such decision shall be final.
11. Every person who has been certified as fit for employment under-ground before he is so employed is provided by the Manger with a metal token. Such token shall be stamped with the letter 'P' and numbered. The number shall be the same as that of certificate of fitness.
12. A record of every token so issued and the person to whom it was issued shall be maintained in the office of the Mine.
13. The notice required under section 23 B (1) of the Act shall be in the form shown in Schedule D and shall be posted in Urdu and local vernacular.
14. For the purpose of section 23 B (1) read with section 23 B (3) of the Act, all work persons employed below ground shall be reckoned from the time such person leave the surface of the Mine to the time at which they finally return thereto at the end of employment.
15. The following persons shall be deemed to be persons holding responsible positions of a managerial or technical character or employed in health and welfare service or employed confidential capacity within the meaning of section 24 of the Act, namely:-
 - a. Assistant managers, under-managers, over man, or any person holding the position under the manger equivalent to that of Assistant Manager, Under-Manager or over man;
 - b. Mechanical engineers, engineer-wrights, electrician, electrical engineers, drillers-in-charge; Surveyors, inspectors or works or overseers;
 - c. Clerks, accountants, time keepers, administrative officers and superintendents ; and
 - d. Doctors, Dispensers, Health officers, Welfare and Labour inspectors.

16. The following processes shall be deemed to be processes which are required by their nature to be carried on continuously within the meaning of sub-section (3) of section 25 of the Act, namely: -
 - a. Mechanical ventilation of mines.
 - b. Pumping of water from mines.
 - c. Generation of electricity, system or compressed air for use in mine.
 - d. Any other process that may be notified by the Federal Government in the official Gazette.
17. The registrar of overtime referred to in sub-section (3) of section 25-A of the Act shall be maintained in the form shown in Schedule F.
18. At every mine a register of annual leave with wages in the form shown in Schedule G and a register of casual leave, sick leave and festival holidays in the form shown in Schedule H shall be maintained.
19. The owner or agent of a mine shall provide to the Manager of the mine, appointed under section 15 of the Act, adequate security of service and administrative and financial powers for enabling him to efficiently discharge his duties in accordance with the provisions of the Act.
20. The owner or agent of a mine shall, in the case of a manager already appointed under section 15 of the Act by the 31st July, 1974, or in the case of a new appointment of a manager, within seven days of such appointment, send to the Chief Inspector the terms and conditions of his appointment and the details of administrative and financial powers delegated to him.
21. The owner or agent of a mine before he discharges or dismisses a manager, who has rendered service of one year at his mine, shall, before doing so, consult the Chief Inspector.

Chapter IV - Safety of Surface

1. If the owner, agent or manager of mine intends to commence or extend any mining operation under his control at or to any point within 50 days of any ground on which are situated public roads, buildings structures, works or rivers not belonging to the owner, or in respect of which the Central Government has not issued any general or special order under clause (u) of section 29 of the Act, he shall not less than 60 days before commencing to carry out his intention, give notice in writing to the Chief Inspector.
2. If the operations in respect of which notice is given under rule 24 are not commenced within 12 months from the expiry of the period of 60 days therein referred to the notice shall be held to have expired and the provisions of that rule shall apply as if no such notice has been given.

3. The notice to be given under rule 24 shall specify the position of the workings of the mine in relation to the public roads, structures, works or rivers, manner in which it is proposed to carry out the intended new operations, the limits to which it is proposed to carry the said operations, and whether the operations are actually in progress, and shall include a plan showing the existing and intending operations in so far as they affect the public roads, buildings, structures, works or rivers in question.
4. Mine working beneath land within 50 feet of public road, building, structure, works or river shall be made only in accordance with restrictions laid down by the Chief Inspector of mines, and when a mine owner wishes to extract pillars under such land he shall not commence such operations until a diversion of roads, or rivers has been made, and buildings structure or works are removed or other precautionary measures taken to the satisfaction of the Chief Inspector.
5. “Explanation:--- The expression ‘public road’ where it occurs in rules 24, 26 and 27 means road maintained for the use of the public by Government of any local authority and river means a regular water course.”
6. Any dangerous place in or about an excavation or which has subsided or likely to subside shall be kept securely fenced on the surface. Should any doubt arise as to whether a place is dangerous or not, the opinion of an Inspector or of the District Magistrate shall be conclusive on the point.
7. When any excavation, which has been formed as the result of any mining operation or any subsidence of the ground extends within fifty feet of public road or dwelling house, and persons are likely to be endangered thereby, substantial fencing shall be erected and maintained around the excavation or the subsidence.
8. When there is possibility of instability of occupied building on the surface of a mine within the boundaries of the mineral lease-hold being affected by extraction, reduction of underground pillars, or deterioration of under-ground working, notice in writing shall be sent to the Chief Inspector by the owner, agent or manager of the mine not less than one month before the commencement of the operations or soon after deterioration of underground working is detected. The notice shall be accompanied by a plan showing the position of building in relation to the underground works. Before such operations of extraction and reduction are commenced or when deterioration of underground working is detected the owner, agent or manager shall withdraw the person occupying the buildings and keep the area, likely to be affected securely fenced.

Chapter V - Abandonment of Mines

1. In the case of any mine which is abandoned or the working of which are discontinued, the owner, or manager of the mine shall be bound before the mine is finally abandoned or immediately after the working thereof has been discontinued, to cause the tip or entrance of every shaft and opening into the mine to be fenced by a structure of a permanent character sufficient to prevent persons inadvertently falling into or entering the shaft or openings.

2. Where the working of any mine or part of a mine which are under-ground, on which is situated property vested in the Government of Pakistan or any local authority or any railway Company as defined in the Railway Act 1890, or buildings structures or works, not belonging to the owner, are discontinued or abandoned, intimation in writing shall be sent by the owner to the Chief Inspector not less than 30 days before the date of such discontinuance or abandonment.
3. When a notice of discontinuance of abandonment in conformity with rule 32 has been received, the Chief Inspector may order an inspection of such working to be made as soon as possible to ascertain what protection is necessary in order to prevent injury to any property vested in the Government of Pakistan or local authority or Railway or building structure, works not belonging to the owner.

Chapter VI - Inquiry in the Case of Accidents

1. A court of inquiry appointed under section 21 of the Act shall in the case of a person whose death may have been caused by an accident in a mine with respect to which an inquiry is being held permit any of the following persons to attend and examined any witness, either in person or by his counsel, solicited, pleader or agent, subject to the power of the court to disallow any question which, in its opinion, is not relevant or proper:-
 - (a) A relative of the deceased person.
 - (b) The owner, agent or manager of a mine in which accident occurred, and
 - (c) A person appointed by an order in writing in that behalf by
 - i. a majority of the workmen employed at the said mine.
 - ii. An association of the workmen to which the deceased belonged at the time of hisDeath.
 - iii. An association of the employers of which the owner of the said mine is a member.
 - iv. An association to which any official or workmen employed in the said mine belongs.
2. If a court of inquiry appointed under section 21of the Act finds that the accident was due to any carelessness or negligence on the part of the management, the court may order the owner, agent or manager of the mine to pay all or any order the owner, agent or manager of the mine directed to be paid may, on the application of the Chief Inspector of an Inspector to a Magistrate having jurisdiction at the place where the mine is situated, or where such owner, agent or manager is for the time being resident, be recovered by the sale of any movable property within the limit of the Magistrate' s jurisdiction to such owner, agent or manager.

Chapter VII - Miscellaneous

1. Sufficient materials and appliances shall be kept in stock for the proper carrying out of all necessary operations in a manner consonant with the provisions of the Act, regulations, rules and bye-laws.

2. No person shall, without the consent of the manager, take or consume any intoxicating drink or drug while at work in or about a mine and no person shall enter or may be in or about a mine in a state of intoxication.
3. The prescribed abstracts of the Mines Act, 1923 (IV of 1923) regulations, rules and bye-laws applicable to the mine shall be posted up at or near every mine in Urdu or local vernacular.
4. All plans and books which are required to be kept under the Act, regulations, rules and the bye-laws made hereunder shall be kept at an office or other building as near as conveniently may be to, and used in connection with the working of the mine, and shall be produced to the Chief Inspector or an Inspector or any person authorized in that behalf by the appropriate Government.
5. If the Chief Inspector is of the opinion that muster roll or register regular maintained for a mine gives, in respect of any or all of the workers in such mine, the particulars required to be maintained in a register under these rules, he may, by order in writing, direct that such muster roll or register shall, to the corresponding extent, be maintained in place of and be treated as the register required under these rule.
6. The originals, or true copies, of reports made or the registers maintained in conformity with the Act or with the regulations, rules or bye-laws made there under shall be maintained at the mine for a period of five years after the date of such report or the date of last entry in such register.
7. No person shall pull down, injure or deface any abstract of the Act or any copy of the regulations, rules or bye-laws made there under which is posted up at any mine or any notice up in pursuance of the regulation of the mine.



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