

## 7.1 RISK ASSESSMENT & MANAGEMENT

Mining and allied activities are associated with several potential hazards to both the employees and the public at large. A worker in a mine should be able to work under conditions which are adequately safe and healthy. At the same time, the environmental conditions should be such as not to impair his working efficiency. This is possible only when there is adequate safety in both opencast and underground mines.

### Significance of Risk Management (Safety Management System (SMS))

Minimize adverse effects of the risk, to which the workers are exposed in execution of different activities. Risk management involves the entire staff in the realization of safety improvement programme with responsibility and accountability sharing proportionately with the decision-making authority.

The Directorate General of Mines Safety issued following Technical Circular to implement SMS:

- a) DGMS. Tech. Cir.13 of 2002 - Safety Management System - A guideline for Implementation.
- b) DGMS. Tech. Cir.8 of 2009 - System Study and Safety Audit for the purpose of eliminating the Risk of Accidents & Dangerous Occurrences.
- c) DGMS (Tech) (S&T) Circular 2 of 2011 - Provision for Audit and Review of SMS.

### Safety Management System (SMS)

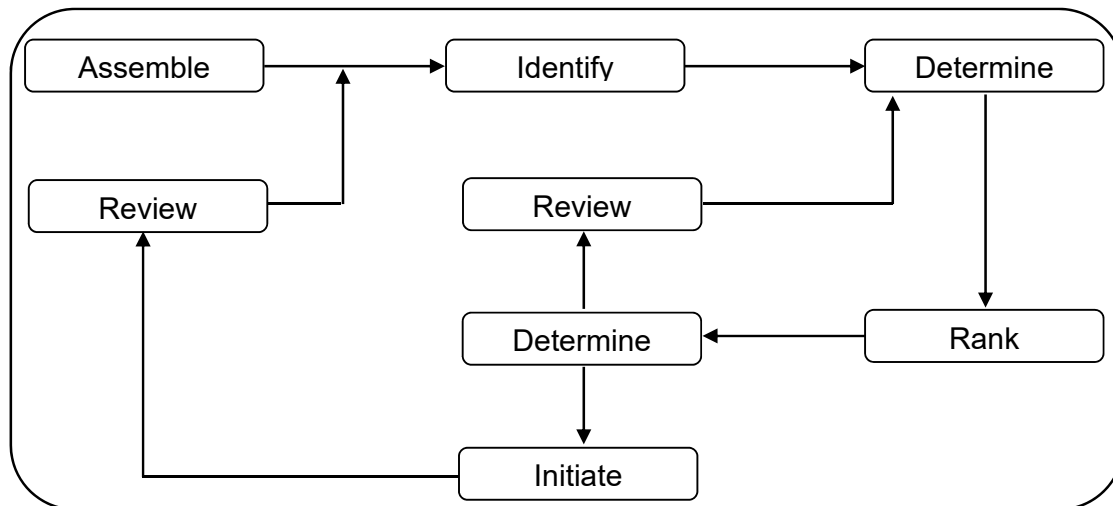
- Identify the hazard.
- Dissect each activity to as smallest node as possible,
- Assess risk by considering the exposure, probability and consequence
- Prioritise and implement control measures
- Find out the residual risk, if any and procedures for handling of situations
- Continual improvement by adopting new methods and procedures

Hence, **Safety Management System** is one of the most essential aspects to operate the mine in safe way.

### Risk Assessment Process

Risk Assessment is to be performed on a regular basis. The goal for each risk assessment session is to identify hazards, determine risk rating and controls, and to review the implementation of risk controls from previous risk assessment sessions.

The following workflow diagram illustrates the areas involved in performing a risk assessment session.



### Identifying the Hazards

The process of identifying hazards is possibly the most important part of the whole risk assessment process.

The Naini Coal mine Project is a new mine proposed to operate in the Angul district, Odisha State.

Hazard Identification can be done in many ways but the objective is to ensure that all of the possible Hazards are identified.

Naini Coal mine Project is a new mine proposed for mining (i.e. Opencast with Surface Miner and or Shovel Dumper combination technology), the Hazards were identified basing on the previous experience of the technology applied for opencast with the following criteria.

- Design parameters of the proposed mine
- Work process evaluation
- Accidents or occurrences
- Consultation with employees.
- Safety statistics
- Significant incident, near miss or accident reports
- Inspection in the mine

The following are the possible hazards identified for the proposed project basing on the Tasks / Activities / Work places involved and control measures to be taken for each hazard for elimination or reduction of risk involved.

| Identified Hazards | Mechanism  | Control  | Action  |
|--------------------|--|--|---|
| (1)                | (2)  | (3)  | (4)   |
| 1. Inundation      | Three nalla passes over the proposed quarry area.<br><br>The embankment envisaged against the Gaudani nallah to the north of the mine is more than | An embankment is proposed along the quarry limit line to avert the danger of in rush of water from Gaudani Nallah which is flowing from West to East.<br>The embankment is proposed all along the nallah towards | Shift In charge will inspect on fortnightly basis as per CMR-2017 (Reg. 149(9)) and pre-monsoon inspections, in particular. |

| Identified Hazards | Mechanism  | Control  | Action  |
|--------------------|--|--|---|
|                    | <p>3.00 m above the HFL of the nallah. The RL of the top of the embankment is 836 m, which is +5m over the HFL of the nallah, 828 m.</p> | <p>quarry side<br/>The length of the embankment is 3720 m.<br/>The parameters of embankment are 5 m height, 10 m top width. Sides will be sloped at 1 in 1.5 gradient.<br/>Nallah on downstream side will be inspected for any blockages in the flow and clear the blockages, if any to prevent abnormal water flow towards quarry.</p>  |   |
|                    | <p>Catchment Area water during Rains</p>   | <p>All around the dumps drains are to be prepared to collect the rain water from the catchments of the dumps. In case of any siltation or damage, the drain may cause water entry into the quarry.<br/><br/>De-siltation will be done every year before onset of monsoon and when ever required during monsoon.<br/><br/>Sufficient height bund shall be maintained all along the edge of the quarry to prevent inadvertent entry of water<br/><br/>A berm with dimensions of not less than two metres height and 2 metres width at the top shall be made in trapezium shape all along the edge of each deck to prevent erosion of dumps and gully formation.<br/><br/>The terrace shall be kept free of obstructions (OB heaps), sloped in bye and maintained with uniform gradient for</p> | <p>Periodical inspection of the drains by competent person will be arranged during monsoon.<br/><br/>Sufficient capacity pumps shall be maintained by making proper fund allocation for pumping.<br/><br/>Manager, Asst Manager, Under Manager should inspect the protective works.</p> |



| Identified Hazards | Mechanism   | Control  | Action   |
|--------------------|---|--|--|
|                    |   | <p>To leave safe margin between the dump and quarry.</p> <p>To protect the dump from getting water charged.</p>  | <p>A minimum width equal to the height of the dump shall be maintained between the toe of the dump and the line of the excavation.</p> <p>No water shall be allowed to accumulate / stock over any dump top particularly near the edge of the dumps</p> <p>Surveyor should ensure frequently.</p>  |
| 5. Sliding         | Sliding of OB or coal due to more height of the bench than the digging height of the machine. | <p>a) The height of the benches shall be planned in such a way that they match the digging height of the shovels.</p> <p>b) Not to deploy the shovels where the bench height is more than its digging height.</p> <p>c) No bench shall be allowed to merge with another bench, resulting in increase of bench height.</p> <p>d) Overall pit slope shall not exceed 70°</p> | <p>a) Drilling should be done in such a way that the bench height will not be more than the digging height of the shovel.</p> <p>b) The excess height of the blasted material should be reduced to match the digging height of the shovel</p> <p>Further where ever the soft layers at the bottom of the bench the same may be reduced by dozing to match the digging height of the shovel.</p> <p>c) Progress of any bench towards a top bench should be stopped at a distance of equal to the height of bench.</p> <p>d) Surveyor should ensure frequently</p> |
|                    | Sliding of OB / Coal while excavation near fault plane.                                       | a) No bench shall be worked parallel to fault planes.  | a) i. A plan indicating all the faults position running over the different benches should be maintained and same may be indicated in the parting plan supplied to operation staff and the  |

| Identified Hazards | Mechanism   | Control  | Action   |
|--------------------|---|--|--|
|                    |   | <p>b) Cleaning of top and hade portions of the fault planes must be ensured, whenever the shovel works near fault plane.</p>   | <p>marking of the same in the field should be ensured always.</p> <p>ii. Benches shall be planned always at right angles or oblique to the fault plane but definitely not parallel to the fault plane.</p> <p>b) While working near fault plane, see that, the reach of bucket is more than the height of fault plane</p>  |
|                    | Sliding of dump slopes / edges  | <p>Not to allow excess dump heights or merging of any two dump decks. The height of each deck is limited to 30 m and overall dump height shall not exceed 120 m for Naini Coal mine Project.</p> <p>a) Not to allow any Dumpers / Tippers to move over the un consolidated the dump edge / slope</p> | <p>i) Top of the dumps up to the edges shall be thoroughly compacted to prevent any possible ingress of rain water and also to provide a gentle slope towards toe drains.</p> <p>i) Individual dump deck height shall be maintained around 30 metres. Merging of any two dump decks in any case is not allowed.</p> <p>ii) No movement of Dumpers / Tippers is allowed over the edge of un-consolidated dump / dump having excess height.</p> <p>iii) However HEMM can be allowed up to a distance of 3.00 mtrs. from the edge of consolidated dump with the provision of a berm at the edge of the dump as required by law.</p> |
|                    | Fall of hot material or ash on men and machinery while excavating fiery material. | No hot / fiery material shall be handled with any machine as it is.  | Thorough quenching of hot / fiery material shall be done before it is handled.   |
| 6. HEMM movement   | i. Failure of vehicle stability resulting toppling.                               | i) Ensure placement and movement of HEMM only on the   | a) Level and compact the blasted material before allowing any HEMM to  |

| Identified Hazards | Mechanism                   | Control  | Action   |
|--------------------|-----------------------------|--|--|
|                    |                             | <p>stable and level ground.</p> <p>ii) To provide IDEAL conditions at Loading, while Hauling and at unloading points for HEMM</p>  | <p>ply over it.</p> <p>b) Not to allow any HEMM movement within a distance of 5 m from the edge of blasted / loose bench.</p> <p>a) Provide stable and level ground at loading point for placement of HEMM.</p> <p>b) Berms shall be provided on both sides of the elevated haul roads as required by law.</p> <p>c) Ensure super elevation at curves of haul roads.</p> <p>d) Arrange level and stable platforms with suitable size of berms as required by law at unloading point with the help of dozer.</p> <p>e) Always ensure a minimum height of 1½ feet safety girder at the crusher unloading point.</p> <p>f) Unloading of material shall be done over the stable dumps at a distance of minimum 3.00 mtrs. from the edge.</p> <p>g) Ensure tyre height berm at the edge of the dump</p> |
|                    |                             | <p>iii) Run the HEMM with in permissible speed limits.</p> <p>iv) Using good quality tyres</p>                                     | <p>a) Ensure by surprise checks whether the HEMM is being operated within the speed limits as specified by the Manager.</p> <p>b) Arrange speed locking over HEMM where ever it is possible.</p> <p>a) Replace worn out tyres in time with good quality tyres.</p> <p>b) Not to use re treated tyres in front sides in any case.</p>   |
|                    | Run over by vehicles / HEMM | i) Persons/ conveyance vehicles to maintain a safe distance on haul roads and 50 mtrs at loading and unloading points from working | a) To develop awareness among employees to maintain a minimum distance of 30 mtrs. on haul roads and 50 mtrs. at loading and un-   |

| Identified Hazards | Mechanism   | Control  | Action  |
|--------------------|---|--|---|
|                    |   | HEMM.<br><br>ii) Prevent unauthorised drivers.   | loading points from moving and working HEMM.<br><br>a) Insist all Operators / drivers to wear identity cards while they are on duty.<br><br>b) Verify the validity of driver's license of operators and drivers before authorisations and identity cards are issued.<br><br>c) Verify the HEMM operations as per the allotment by surprise checks and also check up the details of drivers / operators and confirm. |
|                    |   | iii) Persons to maintain a safe distance from moving vehicles.   | a) To ensure no person shall be allowed to enter within a distance of 30 mtrs of moving vehicles.<br><br>b) To stop any vehicle / HEMM persons must use whistle / red flags / red light before going near to the machines for any reason.   |
|                    |   | iv) Prevent boarding / alighting the moving vehicles.  | a) Develop awareness among the employees not to board / alight from moving vehicles/ HEMM.  |
|                    |   | v) Persons shall not be allowed to take rest under / by the side of parked vehicles / HEMM.<br><br>Prevent sleeping of persons in mine premises. | a) Develop awareness among all the employees not to take rest under / by the side of parked vehicles / HEMM.<br><br>b) Educate all the operators / drivers to verify the surroundings including underneath the machine / vehicle for possible presence of any person before starting the same.<br><br>c) Create awareness among all the employees not to sleep while on duty in mine premises                       |
|                    | Sliding of dumpers / tippers / dozers at dump edge. | i) Restrict the deck height to 30 mtrs. only.<br><br>ii) No HEMM shall be allowed to work over the edge of any                                   | a) To ensure that the height of each deck doesn't exceed 30 m. under any circumstances<br><br>a) Always ensure sufficient size of berm at the edge  |



| Identified Hazards | Mechanism   | Control  | Action  |
|--------------------|---|--|---|
|                    |   | unconsolidated dump.   | <p>of the dump as required by law.</p> <p>b) Not to allow any HEMM over the edge of any unconsolidated dump.</p> <p>c) To deploy a spotter for guiding the tippers / dumpers at unloading point on elevated platform.</p>   |
|                    | <p>Simultaneous operations at loading and un-loading points. For this purpose, the following are considered as (separate) individual operations.</p> <p>i) Drilling<br/>ii) Charging &amp; Blasting<br/>iii) Dozing<br/>iv) Grading<br/>v) Loading<br/>vi) Un loading</p> | i) Not to allow more than one operation at the face at a time.   | <p>a) To maintain a minimum distance of 50 mtrs. between the places of<br/>i) Drilling &amp; Loading<br/>ii) Charging &amp; Loading.</p> <p>b) To maintain a minimum distance of 15 mtrs between drilling and charging operations.</p> <p>c) Except as above, no two operations shall be allowed to undergo at a time at one place.</p> <p>d) To maintain a minimum distance of 15 mtrs. between loading tippers / dumpers and dozer at unloading point.</p>            |
|                    | Crossing 3 way / 4 way junctions.   | i) Not to allow traffic in more than one direction at a time at junctions.   | <p>a) To engage a signal men at all the junctions.</p> <p>b) To ensure traffic controlling by surprise checks.</p>  |
|                    | Un authorised riding on HEMM.   | <p>i) Not to allow un authorised persons to ride on HEMM</p> <p>ii) To provide sufficient no. of suitable and comfortable conveyance vehicles to all the workmen, available at their reach whenever they want to move.</p> | <p>a) Educate all the employees about the danger involved in riding on HEMM</p> <p>b) Check the un authorised riding on HEMM by surprise inspections.</p> <p>c) Ensure even authorised person also travel by sitting in the cabin having pillion.</p> <p>a) Ensure whether sufficient no. of suitable and comfortable conveyance vehicles are made available.</p> <p>b) Ensure vehicle availability at the reach of the persons whenever they are required to move.</p> |

| Identified Hazards | Mechanism   | Control  | Action  |
|--------------------|---|--|---|
|                    | Spillage of boulders from loaded tippers / dumpers                            | i) Avoid over loading of tippers / dumpers.<br><br>ii) To control speed of the vehicles.<br><br>iii) To avoid sharp curves.  | a) Educate all the operators not to over load the dumpers / tippers.<br>b) Ensure the loading is up to the brim level of the tippers / dumpers.<br><br>a) Ensure strict implementation of code of traffic rules.<br><br>a) Haul roads shall be formed without sharp curves.<br><br>Where ever mild curves are inevitable suitable super elevation shall be provided   |
|                    | Stoppage of HEMM / vehicles on active haul roads due to break-down.           | i) Break down equipment from active haul roads must be attended immediately and repair / remove at the earliest possible.<br><br>ii) To provide protection against break down equipment an active haul roads.  | a) To keep emergency steering mechanism in order. So that operator himself can remove the equipment.<br>b) Immediate information to Engineers / Technicians about the break down machine on active haul roads.<br>c) Engineers / Technicians must repair / remove the equipment at the earliest possible.<br>d) Till the equipment is repaired or removed protection against hitting by running equipment shall be provided on both sides by dumping OB heaps.<br>e) To arrange red flags and lights on both traffic sides of the breakdown equipment |
| 7. Drilling        | Toppling of drill machine. Mast contact with overhead power transmission line | While transporting drill machine, its mast must be lowered, even with in the drilling area on inclined plane (High gradients) to avoid toppling of drill machine and in contact with over head power transmission line.<br><br>For positioning on inclined planes (High gradients), wedges | Transportation of drill should be done under the supervision of competent person.   |

| Identified Hazards | Mechanism                           | Control   | Action   |
|--------------------|-------------------------------------|---|--|
|                    |                                     | must be used under jack pads for levelling of the drill machine.  |  |
|                    | While changing drill barrels / rods | Ensure proper holding of drill barrels, while loading / unloading (Attachment / Detaching) on the drill mast.   | Drill operator should ensure.  |
|                    | While drilling                      | Prior to marking of drill holes as per the designed pattern, care shall be taken up to ensure proper blasting<br><br>All the holes drilled should be pegged to avoid leg in.  | Drill operator should ensure.  |
| 8. Blasting        | While transportation                | Transport the explosives and accessories in vehicle approved under explosive rules.<br><br>Standard Operating Procedures (SOP) should be followed   | Transportation of explosive should be done under the supervision of competent person.  |
|                    | While charging                      | i) Blasting design and initiation pattern such that the maximum charge per delay is within the stipulated range.<br><br>ii) Wherever possible, the progress of detonating holes, through delay intervals, should progress away from the structures to be protected.                       | 1. Blasting in charge should design the drilling pattern.<br><br>2. The blast parameters will be established during actual mining operations, after conducting field trial blasting considering the local geo-mining conditions. |
|                    |                                     | iii) Stray current from nearby power systems  | 3. Proper earthing of SMS vehicle while charging the holes.  |
|                    | While blasting                      | i) Avoid blasting during cloudy days and when the wind is blowing towards structures.<br><br>ii) All loose debris will be cleared off from the blasting site<br><br>iii) A free face will always be maintained.<br><br>iv) In multi row blasting, greater relief will be provided between | Blasting in charge should ensure.  |

| Identified Hazards | Mechanism  | Control   | Action   |
|--------------------|--|---|--|
|                    |  | <p>rows using suitable delay intervals.</p> <p>v) Proper use of different type of relay / delay detonator for proper sequencing of the blast will be used.</p> <p>vi) If required, all the holes will be suitably muffled before blasting to control the fly rock.</p> <p>vii) Standard Operating Procedures (SOP) should be followed</p> |  |
| 9. Electricity     | <p>Switching on power when persons are at work</p> <p>Dragging of cable by hoisted body of dumper, where the Transmission lines / cables cross the haul roads.</p> | <p>Shut down procedure shall be strictly implemented.</p> <p>Identification of cables and switches shall be displayed.</p> <p>Transmission lines / cables shall only be laid on 12 meter height towers, as per The Central Electricity Authority Regulations, 2010</p>  | <p>Supervisors having valid electrical supervisory certificate only shall be deployed on the jobs.</p> <p>Planning shall be done in initial stages for laying of 12 m height towers.</p> |
| 10. Lighting       | Insufficient lighting at work places   | <p>Working places shall be well illuminated as per the standards fixed by DGMS Circular No.02 of 2017. Dated 06.11.2017</p> <p>All persons shall wear radium jackets in during dark hours.</p> <p>All persons shall possess Cap Lamps in dark hours.</p> <p>All persons shall have whistles.</p>  | Engineer and electrical supervisor shall ensure the lighting as per the DGMS circular.   |

### Health Hazards

Occupational safety and health are very closely related to productivity and good employer – employee relationship. This subject is dealt with strictly as per circulars and orders of DGMS including the Mine Rules and Coal Mines Regulations, 2017. Some of the measures proposed for occupational safety and health have been listed below:

1. Effective dust removal system in the crusher house
2. Provision of wet drilling
3. Provision of rest shelters for mine workers with amenities like drinking water, fans, toilets etc.

4. Provision of personal protection devices to the workers.
5. Rotation of workers, if necessary, exposed to noise to reduce exposure time
6. Closed control room in crusher house with proper ventilation.
7. Dust suppression of haul road and dumps
8. First - Aid facilities in the mining area
9. Provision of communication network between pit working areas and manager.
10. Provision of alarm system at working areas
11. Training of personnel including contract workmen in Mines Vocational Training Centres to inculcate safety consciousness through modules, video clippings, slogans and posters and introduction of safety awards
12. Safe design of height, width and slope of working benches of OB & coal, overall pit slope kept less than 33°.
13. Safe design for formation of OB dumps, over all dump slopes kept at 26 degrees.
14. Safe design of haul roads.
15. Provision of fire fighting equipment
16. Safe storage of explosives and other inflammable substances.
17. Regular / periodical monitoring of mine environment to ensure the efficacy of various protective measures.
18. Initial and Periodical medical examination for the employees.

#### **Storage, Handling and Disposal of Hazardous Waste**

Hazardous waste generated such as used oil, waste oil, empty oil drums, batteries, non-ferrous scrap etc. Explosives, HSD oil, Hydraulic oils shall be handled, stored, disposed, transported as per Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2016 and CPCB guidelines.

1. The waste generated shall be disposed as per HWM rules within 90 days from date of generation to authorized recycler.
2. The handling, transport and storage of explosives shall be as per Indian Explosive Act.
3. Transportation and storage of explosive shall be as per the approved code of practice.
4. Flammable, ignitable, reactive and non-compatible wastes shall be stored separately and never stored in the same storage shed.
5. Adequate storage capacity (i.e. 50 % of the annual capacity of the hazardous waste incinerator) shall be provided in the premises.
6. Storage area shall be provided with the flameproof electrical fittings and strictly adhered to.
7. Adequate fire fighting systems shall be provided for the storage area, along with the areas in the facility.
8. There should be at least 15 meter distance between the storage sheds.
9. Loading and unloading of wastes in storage sheds shall only be done under the supervision of the well trained and experienced staff.
10. Fire break of at least 4 meter between two blocks of stacked drums shall be provided in the storage shed. One block of drum should not exceed 300 MT of waste.

11. Minimum of 1 meter clear space shall be left between two adjacent rows of pallets in pair for inspection.
12. The storage and handling shall have at least two routes to escape in the event of any fire in the area.
13. In order to have appropriate measures to prevent percolation of spills, leaks etc. to the soil and ground water, the storage area should be provided with concrete floor.
14. Measures shall be taken to prevent entry of runoff into the storage area. The storage area shall be designed in such a way that the floor level is at least 150 mm above the maximum flood level.
15. The storage area floor should be provided with secondary containment such as proper slopes as well as collection pit so as to collect leakages / spills etc.
16. All the storage yards should be provided with proper peripheral drainage system connected with the sump so as to collect any accidental spills in roads or within the storage yards as well as accidental flow due to fire fighting.
17. The stacking of drums in the storage area should be restricted to three heights on pallets (wooden frames). Necessary precautionary measures should be taken so as to avoid stack collapse. However, for waste having flash point less than 65.5°C, the drums shall not be stacked more than one height.
18. Drums containing wastes stored in the storage area shall be labelled properly indicating mainly type, quantity, characteristics, source and date of storing etc.
19. The storage areas shall be inspected daily for detecting any signs of leaks or deterioration if any. Leaking or deteriorated containers should be removed and ensured that such contents are transferred to a sound container.
20. In case of spills / leaks / dry adsorbents / cotton should be used for cleaning instead of water.
21. Proper slope with collection pits shall be provided in the storage area so as to collect the spills / leakages.
22. Proper records with type of waste received, characteristics as well as the location of the wastes that have been stored in the facility need to be maintained.

The Risk Management Plan (RMP) prepared for the project under the provisions of DGMS Circular and Recommendations of 9<sup>th</sup> National Safety Conference will be implemented to tackle risks associated with each and every operation(s).

The RMP will be modified periodically to the changed conditions / circumstances by the project authorities.

## **7.2 DISASTER MANAGEMENT PLAN**

Disaster Management Plan (DMP), a general plan of action for use in the event of inundation, fire, high wall failure, dump failure or any other dangerous occurrence or in the time of emergency. The DMP will have three stages:-

1. Information Stage
2. Assessment Stage
3. Action Stage

### **7.2.1 Information Stage:**

Any person employed in a mine observes / discovers any dangerous incident; he shall immediately inform to the Manway Clerk (Attendance Clerk) or the nearest official(s) available who shall inform to the Manway Clerk and Manager or Senior Officials in his absence.

The Manway Clerk shall immediately inform the Manager or Senior Mine Official in his absence, inform the rescue station and collect information regarding place of accident / occurrence, number of persons involved and nature of help required. He should record the above information with name of the person who informed and the exact time and pass on the same to the manager. He should not leave the place for any purpose what so ever.

The Manager shall inform the Project Officer, General Manager and Nodal Officer to initiate DMP and also rush to the spot / mine if he is at out of project premises. Personally, assess the gravity of situation by contacting the frontline supervisors / witness available or through wireless set.

Nodal Officer shall rush to the mine and inform: Chief GM (Safety), All Directors, SO to C&MD, DGMS Authorities, District Magistrate and Collector, Supdt. of Police, Mine / Area Level Representative and recognized Union Delegates, Local Dispensary, Chief Medical Officer and All Area Departmental Heads.

#### **7.2.2 Assessment Stage:**

The role and functions of following persons will be envisaged in the detailed DMP available during operation.

1. Role of Mining Sirdar, Overman and Foreman
2. Role of Manager, Project Officer and Area General Manager
3. Role of in-charge at operations or at place accident.
4. Function of Core Committees
5. Function of Support Committees
6. Functions of Surface Control Room

#### **Supporting Committees:**

The composition, functions, infrastructure required for core and supporting committees, etc. will be envisaged in the detailed DMP available during operation.

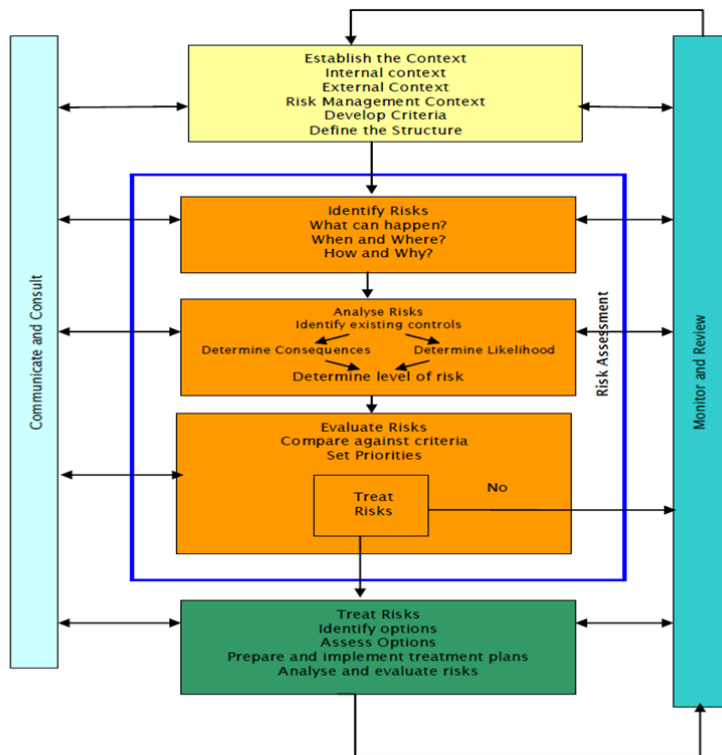
7. Public Relations Committee
8. Catering Committee
9. Medical Committee
10. Men and Material Management Committee
11. Transport Committee
12. Survey Committee
13. Casualty Committee
14. Security Committee
15. Cash Committee
16. Accommodation Committee.

#### **7.2.3 Action Stage:**

Action stage deals with the functions of Disaster Management Committee (DMC) and duties of following personnel.

1. Director, DMP
2. Area General Manager
3. CGM (Safety)
4. CGM/GM (E&M)
5. GM (Personnel)

The Risk Management Plan for proposed Naini Coal mine Project is enclosed as **Figure No. 7.1.**



**Figure No. 7.1 Risk Management Plan**

### 7.3 RISK ASSESSMENT AND DISASTER PREPAREDNESS AND MANAGEMENT PLAN OF COAL WASHERY

#### 7.3.1 Risk Management Plan for Coal Washery:

#### 7.3.2 Probable hazards

Based on risk assessment process, following are the major activities/hazards identified, which may cause risks/accidents/incidents in opencast project.

1. Fall of persons from heights
2. Movement of vehicles
3. Electricity
4. Fall of objects.



5. Loading, unloading and handling of heavy objects
6. Belt conveyors etc.
7. Welding
8. Fires

### **7.3.3 Precautions to be taken**

Based on the Risk Management process, the recommended controls and precautions to be taken at the project for the identified hazards to prevent accidents are as follows:

- To allocate sufficient resources to maintain safe and healthy conditions at work;
- To take steps to ensure that all known safety factors are taken into account in the design, construction, operation and maintenance of plants, machinery and equipment;
- To ensure that adequate safety instructions are given to all employees;
- To provide wherever necessary protective equipment, safety appliances and clothing, and to ensure their proper use;
- To inform employees about materials, equipment or processes used in their work which are known to be potentially hazardous to health or safety;
- To keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and up to date knowledge;
- To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work;
- To provide appropriate instructions, training, refresher programmes and supervision to employees in health and safety, first aid and to ensure that adequate publicity is given to these matters;
- To ensure proper implementation of fire prevention methods and an appropriate fire fighting service together with training facilities for personnel involved in this service;

## **7.4 DISASTER MANAGEMENT PLAN FOR COAL WASHERY**

### **7.4.1 Objectives of Disaster Management Plan (DMP)**

The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installations, restoration of production and salvage operations in this same order of priorities. For effective implementation of the Disaster Management Plan, it will be widely circulated and personnel training given through rehearsals/drills.

The Disaster Management Plan would reflect the probable, consequences of the undesired event due to deteriorating conditions or through 'Knock on' effects. Further the management should be able to demonstrate that their assessment of the consequences uses good supporting evidence and is based on currently available and reliable information, incident data from internal and external sources and if necessary, the reports of outside agencies.

To tackle the consequences of a major emergency inside the factory or immediate vicinity of the factory, a Disaster Management Plan has to be formulated and this in document is called "Disaster Management Plan".

The objective of the Industrial Disaster Management Plan is to make use of the combined resources of the plant and the outside services to achieve the following:

### **7.4.2 Emergencies**

The emergencies that could be envisaged in the plant are as follows

- Slow isolated fires in coal storage area;
- Structural failures;
- Sabotage/Social disorder

#### **7.4.3 Emergency organization Cell**

It is recommended to setup an Emergency organization cell. A senior executive who has control over the affairs of the plant would be heading the Emergency cell. As per the General Organization chart, would be designated as the Incident Controller.

Each Incident Controller, for him organizes a team responsible for controlling the incidence with the personnel under his control. Shift In charge would be the reporting officer, who would bring the incidence to the notice of the Incidence Controller.

Emergency Coordinators would be appointed who would undertake the responsibilities like fire fighting, rescue, rehabilitation, transport and provide essential and support services. For this purpose, Security In charge and Personnel Department would be engaged. All these personnel would be designated as Key personnel.

In each shift, electrical supervisor, electrical fitters, pump house in charge, and other maintenance staff would be drafted for emergency operations. In the event of power or communication system failure, some of the staff members in the office/plant offices would be drafted and their services would be utilized as messengers for quick passing of communications. All these personnel would be declared as essential personnel.

#### **7.4.4 Emergency Communication**

Whoever notices an emergency situation, such as fire, would inform his immediate superior and Emergency Control Centre. The person on duty in the Emergency Control Centre would appraise the incident Controller. Incident Controller verifies the situation from the Shift In-charge and takes a decision about an impending On Site Emergency. This would be communicated to the emergency warning system which would be activated on the instructions of the Incident Controller.

#### **7.4.5 Incident Controller**

- Assembles the incident control team;
- Directs operations within the affected areas with the priorities for safety to personnel, minimize damage to the plant, property and environment and minimize the loss of materials;
- Directs the shutting down and evacuation of plant and areas likely to be adversely affected by the emergency;
- Provides tools and safety equipment to the team members;
- Keeps in touch with the team and advise them regarding the method of control to be used;

#### **7.4.6 Emergency Coordinator - Fire Fighting**

- Ensure fire pumps in operating conditions and instructs pump house operator to ready for any emergency with standby arrangement;
- Guides the fire fighting crew i.e. firemen, trained plant personnel and security staff;
- Organizes shifting the fire fighting facilities to the emergency site, if required;
- Directs the security staff to the incident site to take part in the emergency operations under his guidance and supervision;

#### **7.4.7 Emergency Coordinator-Medical, Mutual Aid**

In the event of failure of electric supply and thereby internal telephones, sets up communication point and establishes contact with the Emergency Control Centre (ECC);

Organizes medical treatment to the injured and if necessary, will shift the injured to nearby hospitals;

Makes sure that all safety equipments are made available to the emergency team;

#### **7.4.8 General Responsibilities of Employees during an Emergency**

During an emergency, especially it becomes more enhanced and pronounced when an emergency warning is raised, the workers if they are In-charge of process equipment should adopt safe and emergency shut down and attend any prescribed duty as essential employee. If no such responsibilities are assigned, he should adopt a safe course to assembly point and await instructions. He should not resort to spread panic. On the other hand, he must assist emergency personnel towards objectives of DMP.

##### **7.4.8.1 Emergency Control Centre (ECC)**

As an emergency measure the Office Block is identified as Emergency Control Centre. It would have external Telephone, Fax, Telex facility and public address megaphone, hand bell, telephone directories etc. All the Site Controller/Incident Control Officers, Senior Personnel would be located here. Also, it would be an elevated place.

#### **7.4.9 Assembly Point**

Locations of assembly points, depending upon the plant layout and location would be identified wherein employees who are not directly connected with the disaster management would be assembled for safety and rescue. Emergency breathing apparatus, first aid and minimum facilities like water etc. would be organized.

#### **7.4.10 Emergency Power Supply**

Plant facilities would be connected to Diesel Generator and would be placed in auto mode. Thus, water pumps, plants lighting and emergency control centre, Administrative building and other auxiliary services need to be connected to emergency power supply. In all the blocks flame proof type emergency lamps would be provided.

#### **7.4.11 Fire Fighting Facilities**

First Aid, Fire fighting equipments suitable for emergency should be maintained in coal storage and reject area. This would be as per statutory requirements as per TAC Regulations. However, fire hydrant line covering major areas would be laid. Fire alarms would be located in the bulk storage areas.

#### **7.4.12 Ambulance**

An ambulance with driver shall be available in all the shifts. Emergency shift vehicle would be ensured and maintained to transport the injured or affected persons. A Number of persons would be trained in first aid so that, in every shift first aid personnel would be available.

#### **7.4.13 All Clear Signal**

At the end of an emergency, after discussing with Incident Controllers and Emergency Co-ordinators, the Incident Controller orders an all clear signal. When it becomes

essential, the Incident Controller communicates to the District Emergency Authority, Police, and Fire Service personnel regarding help required or development of the situation into an Off-Site Emergency.

#### **7.4.14 Occupational Health and Safety**

##### **Occupational Health**

Occupational health needs attention both during construction & erection and operation & maintenance phases. However, the problem varies both in magnitude and variety in the above phases. The occupational health problems envisaged at this stage can mainly be due to constructional accident and noise.

##### **Operation and Maintenance**

The problem of occupational health, in the operation and maintenance phase is due to Respirable dust and noise. With suitable engineering controls the exposures can be reduced to less than TLV limits and proper personnel protective devices should be given to employees.

The working personnel should be given the following appropriate personnel protective devices.

Industrial Safety Equipments:

- Crash Helmets
- Zero power goggles with cut type filters on both sides and blue colour glasses
- Chemical goggles
- Welders protective equipment for eye & face protection
- Cylindrical type earplug
- Ear muffs
- Dust masks
- Canister Gas mask
- Self-contained breathing apparatus
- Leather apron
- Aluminized fibre glass fix proximity suit with hood and gloves
- Leather hand gloves
- Asbestos hand gloves
- Acid/Alkali proof rubberized hand gloves
- Canvas cum leather hand gloves with leather palm
- Electrically tested electrical resistance hand gloves
- Industrial safety shoes with steel toe
- Rubber boots (alkali resistant)
- Electrical safety shoes without steel toe and gumboots

Full-fledged hospital facilities should be made available round the clock for attending emergency arising out of accidents, if any. All the working personnel shall be medically examined as per Statute i.e. Mines Rules, and related circulars.