1.1 RISK ASSESSMENT

The complete mining operation will be carried out under the management control and direction of a qualified mine manager holding a First Class Manager's Certificate of competency to manage a metalliferous mine granted by the DGMS, Dhanbad. The DGMS have been regularly issuing standing orders, model standing orders and circulars to be followed by the mine management in case of disaster, if any. Moreover, mining staff will be sent to refresher courses from time to time to keep them alert. However, following natural/industrial hazards may occur during normal operation.

The risk assessment is carried out for all:

a) Routine or non-routine activities (specially product processing)
b) The activities, whether carried out by own personnel, suppliers and visitors to Premises.
c) Processes & facilities provided as required.

The risk assessment includes classification of risks and identifying suitable control measures to reduce / eliminate the impact.

Accordingly training needs of personnel are identified and operational control measures are developed for their effective and timely implementation. The register for risk assessment is reviewed by the departmental heads once every year or whenever there is a change in the process, equipment's or legislative requirements. They are updated as necessary.

The organization has established, implemented and maintains procedure(s) to:

a) Identify the potential for emergency situation;
b) Respond to such emergency situation.

The organization shall respond to actual emergency situations and prevent or mitigate associated adverse Process, Environmental and OH&S consequences. In planning its emergency response the organization has taken account of the needs of relevant interested parties, e.g. emergency services and neighbors.

The organization also periodically tests its procedure(s) to respond to emergency situations, where practicable, involving relevant interested parties/stake holders as appropriate. The organization periodically reviews and, where necessary, revises/amends its emergency preparedness and response procedure(s), in particular, after periodical testing and after the occurrence of emergency situations. Emergency plan is reviewed annually.

Factors of risks involved due to human induced activities in connection with mining & allied activities are:

- Accident due to handling of explosives
- Accident due to fly rocks flying due to faulty heavy blast
- Accident due to heavy mining equipment;
- Accident due to Blasting;
- Heavy Machinery;
- Transport of minerals
- Road accident
- Danger of Overburden
- Dust hazards
- Fire hazardous in stores

Other risk factors due to natural activities are:

1. Hazardous associated with electricity
2. Natural calamities

1.1.1 Slope Failure

Slope failure are affected by the following factors

- Slope geometry
- Geological Structure
- Lithology
- Mining method & equipments
- Angle of friction/repose

1.1.2 For the Various Risk likely to arise as above, Detailed Analysis of Causes and Control Measures for the Mine is presented in Table No. 1.1.2.1.

Table No. 1.1.2.1

Sl. No.	Factors	Causes of risks	Control majors
1	Accidents due to explosives and heavy mining machineries	Improper handling and unsafe working practice	• All safety precautions and provisions of Mine Act, 1952, Metalliferrous Mines Regulation, 1961 and Mines Rules, 1955 will be strictly followed during all mining operations; • Entry of unauthorized persons will be prohibited; • Firefighting and first-aid provisions in the mine office complex and mining area; • Provisions of all the safety appliances such as safety boot, helmets, goggles etc. will be made available to the employees and regular check for their use; • Training and refresher courses for all the employees working in hazardous premises; Under Mines vocational training rules all employees of mines shall have to undergo the training at a regular interval; • Working of mine, as per approved plans and regularly updating the mine plans; • Cleaning of mine faces shall be regularly done in order to avoid any overhang or undercut; • Handling of explosives, charging and firing shall be carried out by competent persons only under the supervision of an Assistant Mine Manager; • Provision of magazine at a safe place with fencing and earthern mound and necessary round the clock security arrangement; • Regular maintenance and testing of all mining equipment as per manufacturer's guidelines; • Suppression of dust on the haulage roads by regular deployment of water sprinklers; • Adequate safety equipment will be provided at explosive magazine; • Increasing the awareness of safety and disaster through competitions, posters and other similar drives.
2	Removal of O.B, ore& its dump	i. Sliding of benches due to its unconsolidated nature ii. Vibration due to movement of vehicles in the benches.	Mine face and dumps benches are maintained with proper height and slope to prevent slope failure. **MINE FACE:** • Height and width of the benches – 6 m and 10 m respectively in in iron ore zone.

		iii. Height and slope of the benches iv. Nature of materials v. Drainage facilities	• Individual benches will be kept nearly vertical (85^0) while ultimate pit slope angle will be maintained at around 45^0 in iron ore zone. **WASTE DUMP:** • Presently there are 6 waste dumps namely Dump D1,D2,D3,D4,D4(A),D5 • Slopes of external dump maintained at the angle of repose of the dump material. • Dumping in the waste dump in layers and dozing regularly. • Vegetation of the top and slopes of the dump to prevent erosion and providing water drainage channels • Providing proper drainage facilities in mine and dump area. • Construction of retaining wall around dump area to stop sliding of material. • Benches height maximum 15m • Angle of repose of each dump to be 37^0 & over all slope to be 28^0 • Garland drain to be made around OB dump area • Technical & Biological reclamation
3	Drilling	i. Due to improper and unsafe practices ii. Due to high pressure of compressed air, hoses may burst iii. Rod may break due to improper maintenance of the rod	• Safe operating procedure established for drilling (SOP) will be strictly followed. Only trained operators will be deployed. • No drilling shall be commenced in an area where shots have been fired until the blaster/blasting foreman has made a thorough Examination of all places, including remaining butts of old deep holes, for unexploded charges that the drill rod may strike. • Drill operator shall examine the drilling equipment and satisfy himself • Drilling and charging of deep holes shall not be carried out in the same area at the same time. • Drilling operations shall not be carried on simultaneously on the benches at places directly one above the other. • Periodical preventive maintenance and replacement of worn out accessories in the compressor and drill equipment. • As per manufacturers recommendation rod to be replaced and bits will be changed • All drills shall be provided with wet drilling arrangement and it shall be maintained in efficient working in condition. • Operator shall regularly use all the personal protective equipment.

4	Blasting	• Fly rock, ground vibration , Noise and dust. • Improper charging, stemming & Blasting/ fining of blast holes	• As recommended by CIMFR study report, by restricting the maximum charge per delay and by optimum blast hole pattern, vibrations will be controlled within the permissible limit and blast can be conducted safely. • SOP for Charging, Stemming & Blasting/Firing of Blast Holes will be followed by blasting crew. • Shots are fired during day time only. All holes charged on any one day shall be fired on the same day. • The danger zone is and will be distinctly demarcated (by means of red flags) at least 30
5	Excavation of waste & Ore	I. Hauling and loading equipment are in such proximity while excavation II. Swinging of bucket over the body of tipper III. Improper operation of equipment's IV. Improper operation of equipment's V. Inadequate knowledge, training and lack of safety regulation VI. Unauthorized and improper operation	• Safe Operating Procedure (SOP) for Excavator & Rock Breaker Operation are& will be followed. • Wear well-fitting helmet, safety shoes and working clothes, protective goggles while on duty. • Before starting the machine and moving it, the operator shall have clear view of his surroundings. • The operator sees that nobody remain within the swing area of the machinery & not allow any unauthorized person to ride on the excavator or to the bucket of the Excavator. • He shall swing over the body of the truck/ dumper and not over the cab. • Operator shall not operate the machine when person & vehicles are in such proximity. • Operate Audio-visual alarm at the time of reversing. Ensure no over speeding the machine, nor act in such a way to cause unsafe condition.
6	Transportation of Waste and ore, tipping in waste dump, ore dump	i. Potential hazards and unsafe workings contributing to accident and injuries ii. Overloading of material ii. While reversal & overtaking of vehicle v. Operator of truck leaving his cabin when it is loaded.	• Established Safe Operating Procedure (Sop) for Operational Trucks & Dumpers in Mines are and will be followed. • Only trained drivers are deployed. • Before commencing work, drivers personally check the dumper/truck/tipper for oil(s), fuel and water levels, tyre inflation, general cleanliness and inspect the brakes, steering system, warning devices including automatically operated audio visual reversing alarm, rear view mirrors , side indicator lights etc., are in good condition. • Not allow any unauthorized person to ride on the vehicle nor allow any unauthorized person to operate the vehicle. • While travelling the haul road, staying two dumper lengths or more behind the dumper ahead.

			• Keep the dumper in such a position near the Excavator, so that the excavator swing is 900 or less. • On haul roads and in pits, giving the right of way to loaded dumpers. • The vehicle shall not be left unattended, nor left unlocked. • Avoiding overloading of dumpers. • All the operators shall follow the guidance given by the spotter. They shall dump only in that place which is shown by the spotter. Dump spotter shall use the Red Flag, Whistle & Torch Light (In night hour) during dumping operation. • On entering a tipping area, the tipper operator shall visually check the dumping area. All care must be taken regarding the positioning of the tipper's rear wheels at the tipping face. A tipper shall not back up to an area, which has not been visually inspected by the operator.
7	Natural calamities	Unexpected happenings	• The mine management is capable to deal with the situation.

1.2 DISASTER MANAGEMENT PLAN

1.2.1 Objective of Disaster Management Plan

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

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

- Effect the rescue and medical treatment of casualties;
- Safeguard other people;
- Minimize damage to property and the environment;
- Initially contain and ultimately bring the incident under control;
- Provide for the needs of relatives
- Provide authoritative information to the news media;
- Secure the safe rehabilitation of affected area; and
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency.

In effect, it is to optimize operational efficiency to rescue rehabilitation and render medical help and to restore normalcy.

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

Badampahar iron ore mines, the complete mining operation is carried out under the management, control & direction of a qualified Mine Manager holding a First Class Manager's Certificate of competency to manage a metalliferrous mine granted by the Directorate General of Mine Safety (DGMS), Dhanbad. The DGMS have been issuing a number of standing orders, model standing orders and circulars to be followed by the mine management in case of disaster, if any. Moreover, mining staff is being sent to refresher courses from time to time to keep them alert. Although the mine does not come under the purview of earthquake zone, flood zone, etc.

In order to prevent or take care of hazard / disasters if any the following control measures have been adopted.

- All safety precautions and provisions of Metalliferous Mines Regulations (MMR), 1961 is strictly followed during all mining operations.
- Observance of all safety precautions for blasting and storage of explosives as per MMR 1961.
- Entry of unauthorized persons into mine & allied areas is completely prohibited.
- Firefighting and first-aid provisions in the mines office complex and mining area are provided.
- Provisions of all the safety appliances such as safety boot, helmets, goggles, dust masks, ear plugs and ear muffs etc. are made available to the employees and the use of same is strictly adhered to through regular monitoring.
- Training and refresher courses for all the employees working in hazardous premises.
- Working of mine, as per approved plans and regularly updating the mine plans.
- Cleaning of mine faces is regularly done.
- Handling of explosives, charging and blasting are carried out only by qualified persons following SOP.

- Checking and regular maintenance of garland drains and earthen bunds to avoid any inflow of surface water in the mine pit.
- Provision of high capacity standby pumps with generator sets with sufficient quantity of diesel for emergency pumping especially during monsoon.
- A blasting SIREN is used at the time of blasting for audio signal.
- Before blasting and after blasting, red and green flags are displayed as visual signals. Checking of blasting area for any un-blasted hole or material.
- Warning notice boards indicating the time of blasting and NOT TO TRESPASS are displayed prominently.
- An approved explosive van is also available for transporting explosives to the blasting site.
- Provision of magazine at a safe place with fencing and necessary security arrangement.
- Regular maintenance and testing of all mining equipment were carried out as per manufacturer's guidelines.
- Suppression of dust on the haulage roads with frequent water sprinkling, etc.
- Increasing the awareness of safety and disaster through competitions, posters and annual safety weeks and environmental weeks, encouraged through suitable rewards and other similar drives.
- Making available all the emergency equipments like Ambulances, communication equipment, auxiliary lighting, fire extinguishers, fire tenders etc.
- An internal communication system is provided for the department head and to their line of command with mobile phone facility, Walky-talkie.Telephone nos. and addresses of adjoining mines, rescue station, police station, fire service station, local hospital, electricity supply agency and standing consultative committee members are maintained.

  The management is able to deal with the situations efficiently keeping in view of the likely sources of dangers in the mine.
- All these measures will be suitably augmented to meet the future needs.

Emergency Plan

On realizing anything serious that may happen anywhere in the mine immediate action to inform nearest mining official will be taken.

On being informed about the emergency it will be verified for the correctness of information and telephone in particular to the Manager and other mining officials of the mine and managers of adjoining mine.

On receiving information of emergency situation intimation will be sent to the consultative committee which is already formed. Shift in-charge will ensure that all the materials and transport system to deal with emergency situation is alerted.

First aid facilities will be readily available.

Responsibility has been given to following officers of the mines for Emergency preparedness plan. The detail contact no. of the officers is as follows:

Table No 1.2.1

Sl. No.	Designation	Address	Responsibility
1	Mines Manager	Badampahar iron Ore Mines At/ PO- Badampahar Dist- Mayurbhanj, Pin Code- 757043	Disaster control, sounding the alarm at danger / accident and information to the Lessee regarding the situation.
2	Assistant Manager		**do**
3	Foreman		Labour management & mob control. Information to the security personnel to evacuate all the persons from the area in case fire or any disaster except the fire brigade personnel.
4	**Mate**		do

1.2.2 Care and Maintenance during Temporary Discontinuance

An emergency plan for the situation of temporary discontinuance due to court order or due to Statutory requirements or any other unforeseen circumstances may indicate measures of care, Maintenance and monitoring of status of discontinued mining operations expected to re-open in near future.

However, during the course of mining, there may be temporary discontinuance due to unforeseen causes such as:

- Court order
- Natural Calamities
- Statutory Requirements
- Any other unforeseen circumstances
- Accidents in the Mine
- Local issues
- Therefore, an emergence plan is necessary to re-open the mine which will include:
- Intimation to authorities concerned (IBM, DGMS, Directorate of Mines, Circle Mining Office etc.) in the prescribed form for temporary discontinuance.
- Explanation to the local community regarding the cause of temporary discontinuance and possibility of re-opening of the mine in future.
- Listing and proper storing of machines / equipments / vehicles, assets and documents.
- Tightening of the security for proper watch and ward.
- Monitoring of status of discontinued mining operation in respect of bench height, width, individual bench slope angle, overall quarry slope angle, overhang, undercut, misfire, noise levels or any other parameters whose levels either in form of higher side or lower side is dangerous for further mine working.
- Preparation of plan & sections of discontinued mining operation.
- Projection of benches in plan & sections which is safe for further working.
- Formation of safe benches as per plan & sections.
- Management of misfire, fly rock movement, maintenance of machinery etc., which is risk free and not dangerous for further working.
- Intimation to the concerned authorities for re-opening once the mine is risk free.