RISK ASSESSMENT

1.0 RISK ANALYSIS AND CONTROL MEASURES:

Risk assessment is a process whereby risks are analyzed, assessed and risk management priorities are evaluated. It is defined as the characterization of the potential adverse effect to human health & environment due to environmental hazards.

Objectives of risk assessment are:-

- Identifying hazardous activities
- Assessment of risk level and severity in different operations
- Identification of control measures
- Setting monitoring process
- Reduce the impact of mishaps of all kinds
- Reduce the inherent potential for major accidents

Methodology of Risk assessment:

- Collection of information & identification of hazard
- Classify their severity and probability of occurrence
- Identification of exposed risks
- Assess the risk and risk rating based on
- Probability
- Exposure
- Consequence
- Prioritization of the risks
- Implementation of control measures
- Monitoring risk assessment
- Evaluation and correction

Factors of risks involved due to human induced activities in connection with mining operations are 1) Removal of O.B and side burden 2) Drilling 3) Blasting 4) Excavation of ore and 5) Transportation of ore.

Other risk factors due to natural activities are 1) Fire 2) Water inundation 3) Electricity and 4) Natural Calamities.

For the various risks, likely to arise, as above, detailed analysis of causes and control measures is given in below:

S.No	Factors	Causes of risks	Control measures
1.	Removal of O.B	a) Top soil & O.B bench may slide due to its unconsolidated nature. b) Vibration due to movement of vehicles in the O.B benches.	The following measures will be carried out to avoid slope failure of benches, in working places. - Individual bench slope will be maintained at 60° - Over all O.B bench slope angle will be maintained not more than 45° - Adequate Bench width will be provided.
2.	Drilling	a) Due to high pressure of compressed air hoses may burst b) Down the hole drill rod may break due to improper maintenance of the rod	-Periodical preventive maintenance and replacement of worn out accessories in the compressor and drill equipment -As per manufacturers recommendation rods to be replaced periodically
3.	Blasting	a) Fly rock, ground vibration and noise etc., b) Improper charging of explosives	- Burden and spacing will be kept optimum on trail basis. - Explosive charge per delay will be minimized. - NONEL / Milli Second Delay detonators will be used
4.	Excavation of Ore	a)Hauling and loading equipment are in such proximity while excavation b)Swinging of bucket over the body of tipper c) Driving of unauthorized person	- Operator shall not operate the machine when person & vehicles are in such proximity - Shall not swing the bucket over the cab and operator leaves the machine after ensuring the bucket is on ground -Shall not allow any unauthorized person to operate the machine by effective supervision
5.	Transportation of ore	a)Operating the vehicle " nose to tail"	It will be ensured that all these causes will be nullified by giving training to the

S.No	Factors	Causes of risks	Control measures
			operators
		b) Overloading of material	No over loading
		c) While reversal & overtaking of vehicle	Audio visual reverse horn will be provided
		d) Operator of truck leaving his cabin when it is loaded	Proper training will be given
6.	Fire due to electricity and Oil	a)Due to the short circuit of cables & other electrical parts	Electrical parts shall be cleaned frequently with the help of dry air blower
		b) Due to the leakage of inflammable liquid like diesel, oil etc.	All fastening parts and places will be tightening. Suitable fire suppression equipment shall be provided
7.	Natural calamities	Unexpected happenings	The mine management is capable to deal with the situation

2.0 DISASTER MANAGEMENT PLAN:

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. 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 will be sent to refresher courses from time to time to keep them alert. However, following natural/industrial hazards may occur during normal operation.

- **Inundation:** The Uppu Odai is situated in the middle of this area. The terrain is having a steady Easterly and westerly gradient to drain rainwater quickly. Hence the possibility of surface water posing unexpected flooding in this area is not there. However, in order to control the in rush of water from Uppu odai in to the mine pit during unprecedented heavy rains, a bund of dimension 25 m wide at base and 15 m wide at top with 8 to 9 m height will be formed all along the boundary on the both sides of adjoining the Uppu odai. Hence, the mine inundation from surface water is not anticipated.
- **Disaster due to failure of slope:** The favorable easterly dip adds to the stability of the sidewalls. The height of the benches is 5 m with a slope angle of each bench will have 70° slopes. Suitable Protective berm at the edge of the benches shall be

provided to arrest erosion. Hence by keeping proper bench dimensions at the end, failure is not anticipated.

- **Disaster due to failure of dump slopes:** Terraces and plantation will be carried out in the back filled dump slopes to prevent erosion and gully formation to avoid any slope failure. The inside dumps will be stabilized with plants having binding roots. Hence, there is no danger of slope failure due to above factors.
- **Fire, Seismic activities, tailing dam failure:** This area is comes under Seismic zone-II, Low Risk Zone. There is no tailing dam. Company has Emergency Preparedness Plan and Response Team. Roles and responsibilities of team have been established. In case of any emergency, company will get assistance from the local and district authority.
- Accident due to heavy mining equipment and
- Blasting and use of Explosives

In order to take care of above hazard / disasters the following control measures will be adopted.

- ✓ Checking and regular maintenance of garland drains and earthen bunds to avoid any inflow of surface water in the mine pit as mentioned in Chapter – IV,
- ✓ Provision of high capacity standby pumps with generator sets with sufficient quantity of diesel for emergency pumping especially during monsoon.
- ✓ All safety precautions and provisions of metalliferous mine regulation 1961 will strictly followed during all mining operations
- ✓ Prohibit entry of unauthorized persons.
- ✓ Providing Firefighting and first-aid provisions in the mines office and mining area.
- ✓ Provisions of all the safety appliances such as safety boot, helmets, goggles, dust masks, ear plugs and ear muffs etc. will made available to the employees for their use.
- ✓ Provide Training and refresher courses for all the employees work in hazardous premises
- ✓ Observance of all safety precautions for blasting and storage of explosives as per MMR 1961.
- ✓ Working of mine, as per approved plans and regularly updating the mine plans.
- ✓ Cleaning of mine faces will be regularly done.

- ✓ Regular maintenance and testing of all mining equipment as per manufacturers 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.

The management is able to deal with the situations efficiently keeping in view of the likely sources of dangers in the mine.

2.1 Structure of Disaster Management Plan:

The structure of the Disaster Management plan is described below.

2.2 Outline of Disaster Management Plan:

The purpose of disaster management plan is to restore the normalcy for early resumption of mining operation due to an unexpected, sudden occurrence resulting to abnormalities in the course of mining activity leading to a serious danger to workers or any machinery or the environment.

2.3 System of Communication:

An internal communication system is provided for the department head and to their line of command with telephone facility. 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 provided.

2.4 Consultative Committee:

A standing consultative committee will be formed under the Head of Mines. The members consists of Manager mines/ Safety Officer / Medical Officer / Public Relation Officer/ Foreman/ and Environmental Engineer.

2.5 Facilities and Accommodation:

Accommodation and facilities for medical centre, rescue room and for various working groups will be provided. Regular checking of these facilities shall be under taken by the Manager of mine.

2.6 First Aid and Medical Facilities:

The mine management will be having first aid / medical centre for use in emergency situation. All casualties would be registered and will be given first aid. The centre will have facilities for first aid and minor treatment resuscitation, ambulance and transport. It will have

proper telephone/wireless set for quick communication with hospitals where the complicated cases are to be referred. Regular checking of these facilities shall be under taken by the doctor and the in-charge of the first aid room.

2.7 Store and Equipment:

A detailed list of equipment available, its type and capacity and items reserved for emergency will be maintained by the Mine Manager.

2.8 Transport Services:

A well-defined transport control system will be provided to deal with the situation. Asst. Manager shall be made in-charge for these services.

2.9 Functions of Public Relations Group:

It is essential to keep cordial relation with government officials and other social service organization and working groups. Liaison with representatives of the mine workers is required to ameliorate the situation of panic, tension, sentiments, grievances and misgivings created by any disaster. Management is required to ameliorate the injured, survivors and family members of affected persons by providing material, finance, moral support and establishing contact with relatives of victims. The consultative committee formed, especially the nominated public relation officer shall look into these aspects.

2.10 Security:

Manning of security posts is very essential during the disaster management. This shall be undertaken by the mine manager /Manager Security

2.11 Catering and Refreshment:

Arrangements are to be made for the victims, rescue teams and others. The nominated public relation officer shall look into these aspects.

2.12 Care and Maintenance During Temporary Discontinuance:

If the mine is discontinued temporarily for more than 120 days, notice will be given 30 days before the date of such discontinuance to the concerned authorities. During discontinuance period safety arrangement and fencing will be provided to avoid the entry of unauthorized persons. The accessibility to the mine from the surface will be prevented by providing security guards and fencing arrangements. The mines manager shall take all the steps required for the care and maintenance during temporary discontinuance.

3.0 EMERGENCY PLAN:

The emergency plans to be adopted to deal with any emergency situation are described below:

Organization Plan:

Organization plan includes a clear statement on the line of command and the responsibilities of each person involved in case of emergency situation.

Equipment Plan:

Equipment plan includes clearly stipulating make and type of machinery, capacity of machinery, location of operations and field of operations. Emergency plan includes Emergency Preparedness Plan and the standing orders will be prepared and displayed at all conspicuous places.

Functions of the emergency consultative committee:

1. The team shall meet once in six months to discuss the possible or probable causes/ instances leading to any disaster that may occur in and around the mines.
2. The team shall assess the required resources to deal with the situation that may be identified as above.
3. The team leader shall lay down a detailed procedure or oral information to each member to follow in case of any impending or possible or actual disaster.
4. The team shall conduct mock drill once in a year to understand the practical problems that may arise while implementing the Emergency Preparedness Action Plan including the response time and take necessary steps to make the system effective.
5. The team shall make necessary recommendations/suggestions to the Management for identifying / monitoring/ dealing with any possible or probable disaster.
6. The minutes of the meeting of team shall be prepared including the probable cause of incident, response time and corrective and preventive actions required to be taken to avoid the reoccurrences of the same and kept as record.
7. The team may draw an Action Plan and modify the same from time to time based on changed circumstances.
8. The Emergency Preparedness team shall come into action immediately in case of any disaster by establishing the control room at an appropriate place nearer to the affected area.

9. The team shall record the actual performance/procedure followed/short comings while dealing with any actual disaster which will be discussed at various levels to strengthen the plan and approach.
10. Mines Manager shall inspect all the places where disaster occurred, along with Emergency Preparedness & Response Team to give further instructions.
11. Mines Manager shall ensure that all affected places are safe to resume the normal works and then only shall give permission to start the operations.

3.1 Executional procedures for emergency plan:

The following procedural methodologies will be adopted for proper execution of emergency plan.

- On realizing anything serious occurrence happened anywhere in the mine, immediate information has to be passed on to the nearest available mining official and the mine management to take prompt action.
- On being informed about the emergency it will be verified for its correctness by the mining official who will telephone in particular to the Manager and supervisors of other parts/operations of the mine and managers of adjoining mine so that persons may be withdrawn from the area of danger.
- On receiving information of emergency intimation, it will be sent to the consultative committee, already formed. The mines manager shall also inform about the disaster to the police, nearest office of mines safety, office of pollution control board, District Collector in charge of emergency plan of the district and other required statutory bodies of State and Central Government. Asst. Manager will ensure that all the materials and transport system to deal with emergency situation are made available at the site.
- First aid facilities and ambulance to be made ready for providing to the victims. The Doctor should be immediately called upon.

In case of likelihood of any possible risks or disasters, pertaining to the mine workings spreading to outside peripheral areas, an “Off-site Emergency Plan” has to be properly planned and documented in consultation with Collector, Ariyalur District and other concerned Government Officials. In case of any unfortunate happening of an emergency in off-site areas, prompt execution of various action plans as laid down in the offsite Emergency plan has to be carried out with the help of the concerned Government officials and local people.

3.2 Protocol in case of any accident and monitoring committee:

The objective of onsite disaster management plan for the captive mine is to be always in a state of perceptual readiness through training, development to immediately control and arrest any emergency situation so as to avert a full-fledged disaster and the consequence of human and property damage and in the event of a disaster still occurring, to manage the same so that the risk of the damage consequences to life and property is minimized. Periyathirukonam Limestone Mine has formulated a disaster management plan for Emergency Preparedness & Responses. The salient features are elaborated as below:

- Emergency response Organization
- Communication System
- Action on the site
- Facilities available at site.

Emergency Response organization:

Following officers of the mines will be responsible for co-ordination in case of emergency situated in any section of the mine.

Person	Responsibility
Mine Agent	Site Controller
Head of Mine / Mine manager	Incident Controller/ Communication officer
Employee who gives the first information about the incident	Primary Controller
P & A Dep't. (HOD)	Liaison officer

Key Personnel and their responsibility:

V. Manickam,
Director,
The India Cements Limited,
827, Anna Salai,
Dhun Building,
Chennai-600 090

Corporate office:
Coromental Towers
93, Santhome High Road,
Karpagam Avenue,
R.A.Puram
Chennai-600 028
Phone No: 044 – 28572100
Fax No: 044-28526311
E-mail : mines@indiacements.co.in

Site Controller:

- Mine agent shall have overall responsibility for controlling the incident/accident and directing the personnel.
- To prepare fool proof plan for control of accident like, landslides, subsidence flood and other natural calamities
- To inform statutory bodies of the state and central Government.
- To inform communication officer about the emergency, control centre and assembly point.
- To provide all assistance and call for Fire Squad, Security Officer and other services required for removing/control of danger.
- To ensure that all necessary personnel to assemble at assembly point.

Incident Controller/Head of the Mine/ Mine manager:

- Mock rehearsal of plan prepared for accident.
- To withdraw men/machines from the affected area with priority for safety of personnel, minimize damage to the machines, environment and loss of material.
- To act as accident controller to all.
- To make a report based on the facts and figure and submit to the Site Controller

Primary Controller:

- To inform the Accident Controller / shift in charge by the nearest mode of communication about the location and the nature of accident.
- To assist in clearing any obstruction in relief to accident affected person or site.
- To carry out all instructions of accident controller.

4.0 CAPABILITY OF LESSEE:

Following facilities are available at Periyathirukonam Limestone Mine

- Public addressing system
- Telephones/ Mobile handsets
- Runners/messenger
- Emergency alarm
- Fire–fighting equipments & accessories with trained manpower
- Training centre
- Fire tender, Ambulance

Other Facilities available:

Government Hospital at Ariyalur and Jayankondam will take care of immediate requirements. As per Risk Assessment studies, the possibility of "Offsite" emergency situation cannot be ruled out. Good hospitals and fire stations are available in Ariyalur, Jayankondam and Trichy at a distance of 19, 35 & 75 km respectively. Further the residential quarters and living area are far from the mine. However, considering extreme situation, district authorities, including police, would be informed about any offsite emergency if situation arises.

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