ON-SITE EMERGENCY PLAN

For

VEDANTA LIMITED,
PIG IRON DIVISION II, NAVELIM, GOA.

August - 2022

INDEX

CHAPTER - 1

LIST OF CEO, OCCUPIER, FACTORY MANAGER & SAFETY IN-CHARGE

Chief Executive Officer

Saptesh Sardesai

Factory Occupier

Sunil Duggal

Factory Manager

Roshan Naik

Safety In-charge

Sumeet Wagh

CHAPTER - 2

Verification

The information furnished in the documents on the subject, has been verified by me by signing each page and is being submitted for seeking modification/suggestion from the Office of Inspectorate Factories and Boilers, Panjim, Goa, to make the documents viable. I also assure that I will immediately review and amend the documents and seek your consent before any change in the Plant, machinery, building, structure, substance, storage and manufacturing process in intended or otherwise at least every period of 24 months from the date until the Factory (for any reasons), is not closed for ever. In later case, it will be our liability to inform closure of the factory to your office and dispose off, all hazardous substance/material of the Factory in a manner rendering them safe for the human life and environment.

Roshan Naik
Factory Manager
VEDANTA LIMITED
PIG IRON DIVISION -II

CHAPTER - 3

FOREWARD

The Onsite Emergency Plan of Vedanta Limited, Pig Iron Division - II, is hereby released here within of all employees concerned with handling of emergencies arising, if any, due to reasons whatsoever related to operation maintenance and functioning of plant.

The plan is a statutory requirement under the Goa Factories Rule:90-W and the Factories Act - 1948 [(Section:41. B (4)] with an intention to arrange and gear up the facilities to combat the emergency arising if any, in an effective and efficient way. This plan will definitely ensure minimum possible loss to the human being and to the properties involved. Further, it shall also help to make the situation in order within minimum possible time period.

Mere preparation of On-Site Emergency Plan to meet the statutory requirement is not our sole motto rather; we are to effectively implement it by way of accommodating it as a part of our routine and far most important activity. We are to be familiar with the responsibilities, norms, action plan and steps for effective implementation of the plan. This is possible only, when all employees who have been delegated with responsibilities to act-upon, make themselves actively involved through appraisal training programs to be conducted by the Safety Department of VAB from time to time and, through Mock Drills scheduled to conduct periodically as committed in the plan.

As such, I request all employees to actively participate in the action plan of On-Site Emergency Plan as per role given to them, to make ourselves operational at any stage of emergency.

Roshan Naik
Factory Manager
VEDANTA LIMITED
PIG IRON DIVISION -II

CHAPTER - 4

Onsite Emergency Plan 90W – Schedule

Name and address of the person furnishing the information	Roshan Naik Vedanta Limited, Pig Iron Division-II, Navelim, Goa.
Key personal of the organization and responsibilities assigned to them in case of an emergency	Main Controller, Incident Controller, Head HR, HOD of Electrical, Mech. and Prod, Security and Medical Officer Responsibility mentioned in section 4
Outside organization if involved in assisting during onsite emergency	Details of contacted furnished in General information, Chapter - 6
(a) Type of accident	Annexure I
(b) Responsibility assigned	Chapter – 7, Section - 5
Details of liaison arrangement between the organizations.	Enumerated in section 4 and section 7
Information on the preliminary hazard analysis -	Hazards and precautions detailed in Annexure II
Details about the site - (a) Location of dangerous substances: (b) Seat of key personnel: (c) Emergency control room	Mentioned in layout diagram.
Description of hazardous chemicals at plant site - (a) Chemicals (Quantities and toxicological data) : (b) Transformation if any, which could occur. : (c) Purity of hazardous chemicals. :	MSDS of dangerous chemicals and quantity mentioned in annexure 3 NA NA
Likely dangers to the plant	Annexure 1
Enumerate effects of - (a) Stress and strain caused during normal operation: : (b) Fire and explosion inside the plant and effect if any, of fire and explosion outside. :	NA Mentioned in Annexure 1, subsections 4 and 7

Details regarding - (a) Warning, alarm and safety and security systems. (b) alarm and hazard control plans in line withdisaster control and hazard control planning, ensuring the necessary technical and organizational precautions; (c) Reliable measuring instruments, control units and servicing of such equipment. (d) Precautions in designing of the foundation and load bearing parts of the building. (e) Continuous surveillance of operations.: (f) Maintenance and repair work according to the generally recognized rules of good engineering practices. :	Public addressable systems in place at process areas and control rooms, Sensors and manual call points connected to SCADA at control room Online CO monitors in hazardous areas, Access control system in place for gas prone areas with gate and l0ck In-house calibration of measuring instruments, sensors done once every 6 months Online CO monitors connected in PLC, Smoke detectors and total flooding system as per relevant standard Annual structurally tests and CAPA being done. All designs made by in house design department PM schedule in place for painting Camera installed in areas of concern like possible sites of lone working, gates, critical operational areas, high emission areas and monitored from control room and security room. Vedanta sustainability standards in place for hazard identification and control permit system with LOTO V in place for safe working. Tracking of incident CAPA and safety observation file in place.
Details of communication facilities available during emergency and those required for an offsite emergency.	Public addressable system in place for communication in between critical areas. Department personal is issued walkie talkie for communication in between personnels. Local landline facility also available with hotline
Details of firefighting and other facilities available and those required for an off-site emergency.	1 Fire hydrant pump of 2850 LPM maintaining & line pressure at 7 bar, 93 single hydrant, 6 double hydrant and 128 extinguishers kept at site as per relevant standards. No offsite emergencies exiting.
Details of first aid and hospital services available and its adequacy.	Furnished in General information. In-house dispensary existing, further medical facility available within an hour distance.

CHAPTER - 5

Abbreviations

VAB	Value Added Business
SS	Shift superintend
HSE	Health Safety and Environment
SP	System procedure
OHC	Occupational Health Centre
CO	Carbon monoxide
MSDS	Material safety data sheet
PA	Public addressable
MSDS	Material Safety Data Sheet
PA	Public addressable
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CHSE	Chief HSE Officer
LOTO	Lock Out Tag Out
BF	Blast Furnace
GMC	Goa Medical College
CPR	Cardio Pulmonary Resuscitation
DCP	Dry Chemical Powder

CHAPTER - 6

GENERAL INFORMATION

(A)

1.	**Name & address of the factory**	Vedanta Limited , Pig Iron Division – II, Survey No. 177 N 120 (Part), Navelim , P.O . Sanquelim, Bicholim , Goa. – 403529
2.	**Name and telephone no. of Factory Manager**	Roshan Naik 9011004472
3.	**Name and telephone no. of the Head (HSE IOB)**	Krishna Kulkarni Mobile No. 9765392259
4.	**Name and telephone no. of the Head (Chief HSE Officer VAB)**	Soham Mukherjee Mobile No.8013167549
5.	**Name & Telephone No. of In-charge of Safety**	Sumeet Wagh Mobile No. 9158342095
6.	**Name and telephone no. of the Chief Medical Officer**	Dr. Shashikant Shiolkar Mobile No. 9765308313

(B) Emergency Contact Number: External & Internal

UNIT	Contact No:
EXTERNAL:	
Factory Inspector	09422440008
Inspectorate of Factories & Boilers	+91-832- 2227670
State Pollution Control Board	(HO) 0832 243 8550
State Electricity Board	(Ponda O& M) 8380015005
Goa Industrial Development Corporation	+91-832-2437470
Nearest Police Station	(Bicholim) 0832-236-2233
Nearest Fire Brigade	(Bicholim fire station) 0832-236-2100
Nearest Hospital	(PHC Sanqulim) 0832-236 4258
Ambulance Services	(PHC Sanqulim) 0832-236 4258
Neighboring Factories	(Sesa Cements) 0832-2313238

INTERNAL:	
Emergency Control Room	0832-2385223
HSE Department	0832-2385284
Occupational Health Centre	0832-2385222
Security Services	0832-2385279
BF-1 Control Room	0832-2385223
BF-2 Control Room	0832-2385228
Mr. Roshan Naik: Main Controller	9011004472
Dr. Shashikant Shiolkar: Medical Officer	9765308313
Mr. Sumeet Wagh: Incident Controller	9158342095
Mr. Govind Narvekar: Admin In-Charge	8806317934
Safety Officer (Sumeet Wagh)	9823277060

CHAPTER - 7

CONTENTS OF OEP

1. Purpose

To identify and assess potential emergencies to business in terms of safety and environment at Vedanta Limited, Sesa Goa Iron ore, value addition business and to ensure that systems and procedures are in place along with resources to implement these so as to mitigate and minimize the extent of damage to life and property in the event of occurrence of any of these emergencies.

2. Applicability

QEHS Management System of VAB

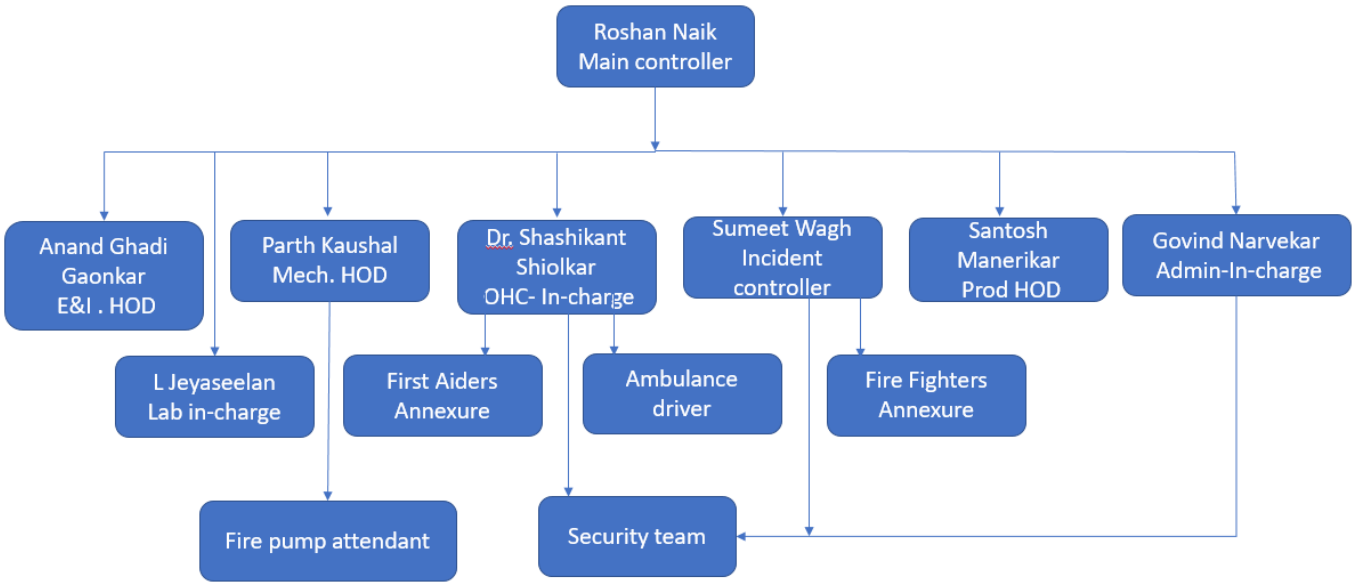
3. Scope

Applicable to emergency situations identified through environmental aspects & impacts and hazard identification & risk assessment for all locations and activities of PID 2

4. Role & Responsibilities of Key Persons in Case of Emergency

Organogram

PIEP



a) Main Controller : Factory manager

Alternate : Production Manager / Production In-Charge

- Main controller will proceed to the control room post getting information of Emergency.
- Assess the magnitude of the situation in consultation with Incident Controller, Process Owner, HR manager and Engg. manager (as required) and will decide if all staff needs to be evacuated from their work place to assembly point or only affected area needs to be evacuated.
- Maintain a continuous review of possible development and asses in consultation with incident controller & other key personnel (other HOD's) as to whether shutting down the plant or any section of the plant is required.
- Can exercise direct control over the area including affected area in consultation with process owner and incident controller.
- Ask HR Manager, if required to liaise with external agencies like fire brigade & medical assistance. Provide advice on possible effects on areas outside the factory premises. Additionally, ask Corporate Affairs to communicate to the Government Authorities in case of Major Incident.
- He/ She shall check from Administrative in charge abouthead count.
- Control rehabilitation of affected area on discontinuation ofemergency.

b) Incident Controller : Safety Manager

Alternate : Production Shift In-charge

- Incident controller will proceed to the Emergency control room immediately after sounding of siren or getting information of Emergency and from there to the incident location and report to the Main controller.
- He /She will assess the scale of emergency and decide in consultation with Main Controller, Process owner and other responders if major emergency exists or it's likely.
- He /She will direct all operation within the affected areas prioritizing safety of personnel, minimal damage to the plant, property, environment and minimum loss of materials.
- If required, direct the shutting down of affected facility and evacuation of area that is likely to be adversely affected.
- In case of evacuation, ensure those employees / staff of the areas affected is evacuated to the assembly points and the areas are searched for causalities.
- Ensure that all information to the outside help is givenby HR-Manager
- Report on all significant developments to the Main Controller.

c) Administration in Charge : Head HR

Alternate : HR Asst. Manager

- On receiving any information about emergency, He / She will coordinate with Main Site Controller and Incident Controller. He will, under the direction of Main controller, handle Police, Press & other inquiries.
- He/ She shall ensure that traffic movement in the factory is restricted and alternative transport is arranged when need arises.
- Shall call fire brigade/ ambulance if required.
- Reconciliation of attendance control and arrange headcounting.
- Shall take feedback from incident controller on emergency and discuss with Main Controller before making outside communication.
- To ensure that affected person receive adequate attention and to arrange additional help if required and to inform their relatives.
- When emergency is prolonged, he/ she shall arrange for the relief of personnel and organizes refreshment / catering facilities.
- Decide (if necessary) evacuation of staff from assembly points, after discussing with Main controller.
- Assign suitable staff to act as runners between the incident controller and himself, if the Telephone and other systems of communication fail due to whatsoever reasons.
- In consultation with Main controller communicate to Government Authorities.
- Attend interested party calls.

d) Health in-charge : Resident Doctor

Alternate : Dispensary staff on duty

- He/ She will be responsible for all administrative control of First Aid room.
- He/ She will ensure that ambulance is available and arrange to send at incident location if required, casualties receive adequate attention. Ask Main Controller whether additional help related to medical services is required.
- He/ She will inform security for allowing Ambulance to enter the factory.

e) Power Utility : Electrical HOD

Alternate : Engg. Assistant Manager, Electrical

- He / She will rush to the site of emergency on the first siren or getting information of Emergency.
- In case of fire He/ She will ensure power supply in the impacted area is cut off.
- He/ She will ensure the working of firefighting pumps & water storage tank is having sufficient level and will also coordinate with the pump operator.
- In case of steam related emergency, he will ensure the steam valve is cut off and if all employees need to be evacuated including the boiler operator he/she will ensure that boiler shutdown procedure is followed.
- He /She will estimate & prepare incident cost.

f) Duties of Production Manager/Officer

- In case Factory Manager not present in the plant, he/ She will act as a Main controller & take over all responsibilities of Main controller, and will delegate one of his subordinates to handle his other emergency responsibilities.
- He/ she will ensure that all lines are stopped properly (By applying Emergency Stops) if required.
- He/ she will ensure for proper evacuation of production area incase required.
- Assist HR manager for head counting.

g) Duties of Lab In-charge

Alternate : Lab Executive

- He / She will ensure for proper evacuation of Lab (Post assessment severity of incident), if required.
- In case of large chemical spillage, He / She will guide the emergency crew to adopt emergency spillage /leakage control procedure.

h) Fire Pump Attendant: Shift person, electrical and mech.

- On hearing the emergency alarm or getting information of emergency, he will rush to Fire Pump house along with Walky-Talky set & inform to Incident Controller/ Engineering Manager that he has reached to fire pump house.
- Ensure that fire pumps are in auto mode and shall monitor the operation.
- Monitor the level of water tank & input of water.
- If boiler operator has to evacuate the boiler house he/ she will follow the boiler stoppage procedure by applying the Emergency stops.

i) First Aiders : First Aid Trained Persons.

- After hearing emergency Siren or getting emergency information, they will reach at First aid center. And if necessary to the incident location.
- They will give necessary First aid to injured & shift him to First Aid Room if required to coordinate with site coordinator.
- Follow the instructions from Incident Controller and Team Leader.

j) Emergency vehicle / ambulance Driver:

- Once the siren is sounded, Driver (Security Guard) to bring the Ambulance / Emergency vehicle near the Occupational Health Centre keeping the vehicle engine in "ON" condition and he is in driver seat.
- If required he will move near to the incident location.

k) Fire Fighters : Trained fire fighters from factory.

- After hearing emergency Siren or getting emergency information, they must reach at Emergency control room and from there to incident location with necessary firefighting equipments like Fire extinguishers.
- Fire fighters from the incident location assess the situation and start fighting fire with thehelp of sources available like fire hydrant and fire extinguishers. (without putting themselves in danger situation)
- If fire requires further assistance or attention, wait for the assistant.
- Follow the instructions of Incident controller and Team Leader.

l) Safety Committee Members: -

- Will help in the evacuation of the personnel to emergency assembly point in case of evacuation.

m) Security Officers/Supervisor/Guard: -

- On receiving information about emergency, one Security person will rush to Emergency Control Room and then to Incident Location.
- Security Officer to Inform Safety Manager and Engineering Manager regarding the emergency if information is received on intercom
- Main gate security officer/guard will close the main gate immediately & ask other vehicles in the road to park at side safely.
- Only emergency vehicles like Ambulance/Fire brigade will be allowed for movement inside the factory in emergency situations.
- Will inform to key persons in case of silent hours/paid holiday about the emergency.
- Available security guards at main gate to be more alert and wait for further instructions.
- In case of evacuation information, security officer will assist HR manager at Assembly point and will help for correct headcount.
- If the external fire brigade arrives, He / She shall guide them to the incident location.

n) Other Employees: -

- After hearing emergency Siren or getting emergency information, continue working but be on alert for possible evacuation.
- If fire is in your area, consult with the shift in charge/ Shift officer /Line manager and evacuate the place without panic from nearest exits and reach emergency assemblypoint.
- In case of evacuation message from the concerned shift in charge/ officer or manager, close your work safely by applying the emergency stops and evacuate the place and proceed towards assembly point following the evacuation route.

o) Visitors: -

- After hearing emergency Siren/public addressable alarm, visitors will be guided by their contact person.
- In case not able to catch the contact person, visitors to go to reception & will be guided by receptionist.

a. Safety in-charge is Accountable for preparing the mock drill schedule and reviewing the on-site emergency plan for the adequacy.
b. Dept. HOD are accountable for carrying out the mock drills as per the plan.
c. Head HR VAB is responsible for liasoning with external emergency services if required.
d. Security In-charge VAB is responsible for arranging the security manpower and assisting in controlling the emergency.
e. Trained first aiders/fire fighters are responsible for immediate fixing of the problem at site
f. Resident doctor/OHC staff are responsible for treating the casualty
g. In the case of incidents having become emergencies and which, when using professional judgment, are deemed sufficiently serious in nature to require external support then the VAB Head or VAB EXCO will "call a crisis".
h. The Head VAB or EXCO will do this by activating their own Company Crisis Management team and by calling the Vedanta Resources CEO, CFO or CHSE, whose responsibility it will then be to take help from Other Vedanta Plants.

5. IDENTIFICATION OF EMERGENCY SITUATIONS:

Emergency situations are identified from the following sources by Dept. Head

a. Hazard identification risk assessment and risk control results as mentioned in procedure for 'Hazard Identification and Risk Assessment'
b. Identification of environmental aspects and its associated impacts as mentioned in procedure for 'Identification and Evaluation of Environmental Aspects and Impacts'
c. Legal and other requirements.
d. Experiences of previous accidents, incidents and emergency situations.
e. Similar organizational or group company experiences from previous accidents, incidents and emergency situations (lessons learnt, best practices).
f. Neighboring activities adjacent to the site shall also be considered, along with potential off-site emergency and crisis situations (such as transport of personnel or hazardous materials
g. List of common emergencies across PID II are given in annexure 1.

6. ACTIONS TO BE TAKEN IF AN EHS EMERGENCY OCCURS:

a. On occurrence of any emergency, respective emergency unit, emergency control stations (control rooms) should be contacted either by walkie-talkie, PA, telephone or by any other means
b. If fire is observed, minimum two persons should be there to extinguish the fire.
c. If there is a casualty arising out of emergency, only a trained first aider should attend the casualty, while others can help the first aider.
d. The employees who are likely to be affected by the emergency are to be evacuated and taken to safe open place.
e. If there is a major emergency arising in the plant, all the persons should be made to assemble at the Assembly Point.
f. Those who are affected should be rescued and given first aid and medical assistance.
g. Incase power is to be switched off Electrical Dept. should be contacted.
h. The following people should be immediately informed about the emergency
    i. Occupational Health Centre
    ii. Shift Superintend
    iii. Main Gate to inform Security In charge.
    iv. Safety In-charge
    v. Head HR VAB
    vi. Maintenance Head / Engineer
i. List of persons to be contacted in emergency along with Telephone Nos. is displayed at various sites.
j. Specific procedures to control all identified emergencies are given in annexure 2.

7. COMMUNICATION FACILITIES

- **Microphone and Speaker**

- **Walkie Talkies**

- **Telephone for each Department**

- Mobile Phone

8. FIRE FIGHTING EQUIPMENTS

- **Fire Hydrant**

A fire hydrant is a connection point by which firefighters can tap into a water supply. It is a component of active fire protection System. Single and Double headed Fire hydrant are used in our site

Details available in Annexure 4

- **Fire Sprinkler System**

- **Smoke Detector System**
- **Hose Reel**

Firefighting equipment used for extinguishing partially developed fire. Easy to handle is peculiarity of this type of Firefighting equipment
Details available Annexure 5

- **Fire Extinguisher**

Firefighting equipment used in initial stage of Fire.

9. MEDICAL FACILITIES / FIRST AID BOX / OHC

10. LILASONING WITH EMERGENCY SERVICES:

a. Head HR, VAB or Safety In-charge will contact the Fire Brigade if required and any other statutory authority as per the statutoryrequirements.
b. If the casualty(ies) is/are require further medical attention OHC In-charge should contact the nearest hospital either government or private as per his discretion and take further action.
c. If any external emergency services are required to enter the plant site to assist in the emergency, Security In charge should arrange to inform the security at the gate to allow them and one guard should accompany them to the site of emergency.
d. Plant personnel should assist the emergency service staff and inform them about any risk if any.

11. EMERGENCY CONTROL:

a. Cordoning off the area and controlling the Emergency: Security I/C on getting the intimation about the emergency should alert the Security guards in that area and inform the security officer to send additional security guards in the affected area who will assist the emergency service staff (Internal/External). If instructed by the Shift In-charge they should arrange to get the area cordoned off and restrict the entry of persons other than those required to bring the emergency under control in the affected area.
b. Emergency should be mitigated as per the procedures in annexure 1
c. After the emergency is brought under control, cause of the emergency shall be investigated and corrective action and preventive action shall be taken to prevent recurrence of such emergency situations.
d. Report shall be sent to Plant Head and Safety In-charge
e. The Safety In-charge will review the procedure for emergency preparedness and modify it if required.

EVACUATION PLAN:

In certain situations, like evolution of large quantities of smoke due to fires it may become necessary to evacuate the people to nearby location. In such a case following actions may be taken.

Incident controller, in consultation with the Main Controller, will decide the Evacuation Plan. While deciding the evacuation plan, they will keep the following points in mind.

- While handling the evacuation in case of a major fire or gas leak, direction of the wind is extremely important.
- Depending upon the quantity of smoke or gas & the wind direction, The Incident & Main Controller will draw an evacuation plan.

- It is the responsibilities of Admin head in consultation with Main Controller to inform local police-in-charge and Local authorities. Main Controller/admin head/ HR manager/ Incident controller will inform Collectors Office and organize additional help and emergency services.
- While contacting all the people mentioned above, the Incident Controller will give information regarding the wind direction so that help can reach the affected areas without getting affected by toxic gases.
- Finance & Control Manager in consultation with Main Controller will alert local Doctors / Hospitals regarding the emergency.

12. RESOURCE REQUIREMENT:

a. Dept. Head shall identify and document the resources required to ensure the effective implementation of the emergency and crisis management procedures. The following resources shall be considered and made available as necessary:
   i. Trained and competent personnel.
   ii. Equipment and other materials including Personal Protective Equipment (PPE), emergency lights, critical isolation valves, switches and cut-outs, firefighting equipment, LOTO.
   iii. Warning devices such as fire alarms, smoke alarms.
   iv. Medical services, including personnel trained in first aid and medical equipment that is appropriate to the type of operation. Dept. Head shall regularly check contents of the first aid box for any missing or expiry of any item.
   v. Emergency services support such as ambulance, fire tender, etc. and Emergency funding, along with an appropriate mechanism for delivering funds.

b. The Safety In-charge and Dept. Head shall ensure that the equipment and material required for handling emergency are readily available at all times and are maintained properly. Records of such maintenance activities shall be maintained.

c. The capacity of external resources, such as local fire-fighting capacity / fire-load, shall be assessed, and additional resources acquired and maintained at the operation where external resources are deemed insufficient.

13. TRAINING AND EMERGENCY RESPONSE MOCK-DRILLS:

a. Employees and contractors, shall all be trained to understand the Emergency Preparedness and Response Plans, their roles and responsibilities, and the use of emergency response resources.
b. The exact training needs shall be identified based on the requirements, roles and responsibilities, and capabilities of the individual(s) concerned as per procedure for 'Competency, Training and Awareness' .
c. Mock drills shall be conducted as per the plan given by Safety In-charge.
d. Where appropriate and practicable, the participation of contractors, security personnel and emergency service providers are considered.
e. The mock drills plan shall:
    i. Include, desk-based exercises, emergency response exercises that involve the testing of equipment and logistics, and full evacuations whenever required.
    ii. Be scheduled regularly, at least once a year for full drills and six monthly for onsite & desk-based exercises, although the exact frequency and type of drills shall depend on the nature and scale of the operations, and the associated risks.
f. A report of the same is made specifying the detail scenario of the mock drill conducted, mentioning the deviations observed, root cause, response time, and corrective actions taken for improvement and sent to Safety In-charge.
g. Mock drill records shall be maintained in 'Mock Drill Report' by concerned Dept. Head, Safety In-charge.
h. Mock drill results will be reviewed by Department Heads in consultation with dept. personnel and any recommended actions arising from the reviews will be implemented.
i. Emergency preparedness and response procedure shall also consider the 'Guidance Note – Hazardous Materials Management' (VED/CORP/SUST/GN 02) with respect to the pre and post event activities during emergency involving hazardous materials.
j. Actual emergency situation / incident shall be considered a non-conformance and procedure for 'Control of Non-conformity' (SP 10) and procedure for 'Corrective and Preventive Action' shall be followed by Dept. Head
k. Lessons learned following mock drills or actual emergency situations/incidents shall be documented, and any gaps in planning and implementation shall be addressed in revised versions of the Emergency Preparedness and Response Plans. Lessons learned shall be shared across Vedanta's operations where appropriate.

14. REFERENCE STANDERDS:

- The Factories Rules:99-W: On-Site Emergency Plan
- The Factories Act,1948: Section:41. B (4)
- Guidance Note – Hazardous Materials Management' -VED/CORP/SUST/GN 02
- ISO 14001: 2004 Clause No. 4.4.7
- OHSAS 18001: 2007 Clause No. 4.4.7
- VSGS Technical Standard VED/CORP/SUST/TS13, Emergency Preparedness and Response

15. RECORDS:

Mock Drill report
Incident Accident Report
Investigation report

16. PERFORMANCE INDICATORS:

Sr. No.	Measure	Unit	Frequency	Acceptance Criteria	Responsibility
1.	On-site Emergency Plan has been developed for each emergency situation identified	Nos.	Annually	Commensurate to the level of associated risk	Dept. Head, Safety In-charge
2.	Resources required to ensure the effective implementation of the emergency response plan	Nos.	Annually	Identified, documented and made available	Dept. Head
3.	Emergency Preparedness and Response Plans are reviewed and updated periodically	Nos.	Annually	100%	Dept. Head, Safety In-charge
4.	Preparation & Circulation of Mock Drill Schedule	-	Annually	Issued to Dept. Heads by 31st March of the preceding fiscal year	Safety In-charge
5.	Conducting Mock drills in compliance to Mock drills schedule	Nos.	Monthly	100% compliance	Dept. Head, Safety In-charge

Annexure 1

List of Identified Emergencies & Locations

1. **Fire**
2. **Major Accidents-**

i. **Fall from height / Crush injury / Entrapment / Engulfment / Road accident**

3. **Gas Poisoning**
4. **Runner Puncture**
5. **Tap hole breakout**
6. **Hearth break out.**
7. **Explosion in PCI burner**
8. **Bursting of Blow Pipe**
9. **Sudden failure of cooling water**
10. **Burn Injuries/ Ladle Failure**
11. **Acid Splash**
12. **CO Leakage**
13. **Structural failure**
14. **Power failure leading to blackout situation**
15. **Molten metal spillage and fire due to molten metal**

Annexure 2

Steps to be taken in case of potential emergency situations.

In case of specific emergencies mentioned under - 1.0, the following specific actions will be taken. Also it shall be the responsibility of production shift superintendent to assess whether the below mentioned scenarios are severe enough to be declared as an emergency

1. **Fire**

i) Isolated area

a. Whenever any fire is noticed anywhere in the plant, one of the persons working in the area will inform respective plants control rooms or any companyofficer.
b. Control room in charge will immediately inform Shift in charge, Safety officer, Security gate over phone/wireless sets.
c. If known, put off the power supply by making switch off in case of electric fire.
d. Only trained fire fighters will make attempt to extinguish the fire
e. Incase fire cannot be controlled through first aid firefighting, Shift in charge will inform Head HR, VAB to contact fire tenders
f. Once fire is completely extinguished, keep close watch for 1 hour to check possibility of re-ignition/deep seated fire and keep extinguishing means on standby.
g. Once site declared safe by SS, resume normal activity in area.

ii) Explosion in transformer:

a. Power supply to the transformer is to be switched off by electrical shift engineer.
b. In case of any injured victim, immediately check for breathing and give CPR if necessary
c. Victim to be immediately taken to OHC
d. If any fire is there, fire is to be extinguished by using suitable fire extinguisher (CO_2 / DCP, but not water) by trained fire fighter
e. Electrical inspector has to be intimated; respective unit head is to be informed
f. Check the condition of transformer oil and cooling system for signs of damage
g. Check for possible overloading, terminal faults, winding faults and incipient faults
h. Check the healthiness of relays, high voltage fuses etc.
i. After diagnosis and rectification, take transformer online.

iii) Fire / Explosion in Gas line:

a. Inform respective blast furnace control room or power plant control room to withdraw gas/isolate gas line from process,
b. Approach the area assuming there is gas leak and taking precautions, any victim involved to be taken immediately to OHC.
c. Steam purges the concerned gas line.
d. Isolate the concerned Blast Furnace from the gas holder, by water sealing the gasline.
e. If required, reduce wind volume and keep the bleeders opened. Open the cast immediately and dry the furnace.
f. Take shut down as per procedure.
g. Inspect and find out the reason for Fire / explosion.
h. Isolate the concerned gas line, by putting a blank if there is weldingwork.
i. Hand over the gas line to Mechanical for repairs
j. Once the necessary repairs/rectifications are done, and area declared free of Gas by HOD Prod, resume normal activity.

iv) Fire Power pack Room

a. Whenever any fire is noticed in the power pack room, the persons will inform respective plants control rooms or any companyofficer.
b. Control room in charge will immediately inform Shift in charge, Safety officer, Security gate over phone/wireless sets.
c. If known, put off the power supply by making switch off in case of electric fire.
d. Fire is to be put off by using mainly, foam type fire extinguisher or fire hydrant or DCP.
e. Only trained fire fighters will make attempt to extinguish the fire
f. Incase fire cannot be controlled through first aid firefighting Shift in charge will inform Head HR VAB to contact fire tenders
g. Once fire is completely extinguished, keep close watch for 1 hour to check possibility of re-ignition/deep seated fire and keep extinguishing means on standby.
h. Once site declared safe by SS, resume normal activity in area.

v) Fire in Electrical panel:

a. Power supply to the Electrical panel is to be switched off by electrical shift engineer.
b. In case of any injured victim, immediately check for breathing and give CPR if necessary, Victim to be immediately taken to OHC
c. If any fire is there, fire is to be extinguished by using suitable fire extinguisher (CO2 but not water) by trained fire fighter
d. Electrical inspector has to be intimated; respective unit head is to be informed
e. Check for possible overloading & bus bar faults.
f. Check the healthiness of relays, high voltage fuses etc.
g. After diagnosis and rectification, take Electrical panel online.

vi) Fire in LPG storage yard:

a. At sinter plant we have 2 LPG LOT manifolds of 20 cylinders each.
b. LPG leakage alarm is provided in SP control room.
c. Whenever LPG leakages observed at LPG shed one of the persons working in the area will inform respective plants control rooms or any company officer.
d. After that area in charge will take a charge of situation and will alert all about the LPG leakages and barricade the area.
e. Evacuate the area don't allow people to roam around in LPG affected area.
f. Ask electrical department to isolate power supply of all electric/instrumentation equipment available in LPG shed.
g. Check wind direction and stand in same direction and check LPG leakage by smell as well as LPG leakage monitor provided at LPG shed and SP control room.
h. Keep the fire extinguisher ready as a fire emergency.
i. Ensure that Fire buckets are filled with sand and water in case of emergency if not make it ready.
j. Check the source of LPG leakage and stop leakage accordingly.

i. If leakage is observed from hose pipe, close the knob of particular LOT cylinder and remove the hose pipe and inform mechanical team
ii. If leakage is observed from LOT cylinder valve, close the knob of particular LOT cylinder and keep in safe place inform vendor to replace it.

k. Once site declared safe by SS, resume normal activity in area.

vii) Fire in Head ESP

ESP Glow fire:

Note: HESP inlet temp should not be more than 180 ℃ at any point of time.

A. When plant is normal running

1 Main duct temp should be in range of 135 ℃ to 165 ℃.
2 When main duct temp is increasing above 165 ℃ then adjust wind box no 5, 6,7,8,9,10,11,12 accordingly and sinter machine speed to be adjusted.
3 Adjust main fan damper accordingly.
4 Adjust sinter machine speed accordingly.
5 In case secondary voltage of any field dropped below 15 KV ask electrical for spark rate and then discharge the particular field.
6 Run the rappers of emitting electrodes and collecting plates in manual mode at least for 10 to 20 minutes.
7 After rapping ask electrical to charge that particular field and check the field values.
8 If field values found to be normal, then take it into in operation.
9 If still improvement not observed, then inform HOD accordingly for further action plan.
10 Coke samples to be sent for VM every day in A shift only.
11 ESP dust to be sent for carbon % every alternate day in A shift.
12 Dust evacuation to be done regularly to avoid jamming of dust hoppers.
13 ESP inlet and outlet temperatures to be monitored, deviation to be brought into notice to all concerned.

B. When plant is stopped

1 Stop BFG flow.
2 Stop CA fan.
3 Stop Oxygen enrichment.
4 Close all wind box dampers fully.
5 Reduce the main fan damper to 20 % , interlock is also provided so that main fan damper should not get closed less than 20%
6 Main duct temperature still increasing after doing above activities then empty the sinter machine and take this un-sintered material in product bunker 1 subsequently.
7 If sinter machine could not able to empty then ask electrical to discharge all ESP fields, if ESP inlet temperature is above 180 and run the rappers of emitting electrodes and collecting plates in manual mode and the same time dust evacuation to be started parallel.

C. In case of glow fire observations

Outlet ESP temperature is more than ESP inlet temperature and smoke observed from chimney and any part of ESP.

1 Whenever glow fire observed in main fan chimney by one of the persons working in the area will inform respective plants control rooms or any company officer.
2 CRE to inform HOD and SS
3 Ask electrical to discharge all ESP fields.
4 Stop the main fan and all rapping system -decision to be taken only after analyzing site conditions.
5 Water spraying arrangement to be done on ESP top without any delay.
6 After electric clearance open the top hatches.
7 Spray water inside the ESP from top.
8 Ensure that RAV is removed subsequently to drain out the dust and water.
9 Open main fan damper 100% for natural draft.
10 Open dilution damper 100 % accordingly.
11 Once site declared safe by SS, resume normal activity in area.

2. Major Accidents:

a. In case of any accident in the plant the injured workmen will be taken to the plant dispensary for the treatment.
b. If needed, he is shifted by the ambulance which is stationed near the dispensary and can be called anywhere in the plant on inter com. (Telephone No. 0832-2385373)
c. Minor injuries can be attended by the nurse on duty.
d. Doctor if needed can be called by sending vehicle to his house.
e. If the doctor feels that the patient needs further treatment, then he will send the patient to GMC Hospital in Bambolim or private nursing home.
f. The first Information Report about the accident will be sent to the Dispensary by the Department concerned immediately after sendingthe injured person to the dispensary.
g. The resident doctor will send the accident report along with personal accident insurance claim form and medical certificate to the Personal Department for sending the accident report to Government Authorities concerned.
h. All work except rescue work shall be discontinued till the area is made safe by the Safety In-charge and / or HOD Prod. and/or S.S.
i. No person shall try to alter any conditions at the accident spot without informing Safety In-charge or S.S. (in non-general shift hours and holidays) unless such act is required for rescuing the persons trapped at the accident site.

3. Gas poisoning:

a. Whenever a person is found affected by BF gas, remove the person to a safe place free of gas.
b. Evacuate the place where the presence of gas is suspected. Do not start work until the area is declared free of CO gas by HOD (Prod).
c. Gas affected person should not be allowed to walk or run but should be carried by stretcher or ambulance.
d. Loosen the garments of the victim, but keep him warm with his garments.
e. Do not allow others to crowd, keep his head on one side and open his mouth.
f. Start artificial respiration with 15 - 18 movements / min till first aid arrives.
g. Information should be given to any of blast furnace control rooms or any company officer.
h. Preparation of a Gas affected person for artificial respiration:
i. If a person is affected by gas (poisonous) and has lost consciousness, it is necessary to:

i. Take him out immediately in open air and at the same time, call the doctor
ii. Unbutton clothes hindering breathing.
iii. Examine oral cavity if there are extraneous substances in it.
iv. Clean oral cavity if there are extraneous substances in it
v. Pull out the tongue with the help of a tongue holder or with fingers wrapped in a clean handkerchief.
vi. If the poisoned person does not breathe, begin making artificial respiration immediately. If respiration is normal don't give artificial respiration but put oxygen.

j. Method of Artificial Respiration:
   i. A person affected by gas must be laid on his back. His rolled-up clothes must be out under his shoulder blades so that his thorax should expand in a natural way.
   ii. All preliminary measures indicated in previous point must be done
   iii. Then one must kneel near the head of the affected person, take hold of his arms below elbows near to wrists and pull them with force from the sides of his chest behind his head so that the elbows should touch the ground or the floor. In this position the arms must be held for about 2 seconds. During this position the act of inhalation takes place.
   iv. After this one should pull the arms in the reverse direction, bending them at the elbows and pressing them to the thorax for about 2 seconds at the act of exhalation.
   v. In a minute 16 to 18 acts of inhalation and 16 to 18 acts of exhalation must be performed
   vi. Arms must be detained in extreme positions.
k. Checking for presence of Gas
   i. If any person complains of headache or giddiness at workplace it must be assumed that he was affected by gas unless it is proved otherwise with the help of proper gas checking procedure mentioned below that the area is free of gas.
   ii. No person should check for gas unless he wears a gas mask. Minimum 2 persons should go in the area for checking the presence of gas with 2 CO monitors and other persons should be ready in fresh air for helping in case of anyemergency.
   iii. No person shall enter in the gas area for rescue without wearing a gas mask.
   iv. The HOD (Prod) along with Shift superintendent and selected team members should investigate the reason for presence of gas and take steps to rectify the same.
   v. The team going for investigation should carry at least two gas detectors.
   vi. Any steam or smoke should be considered as gas unless it is proved otherwise.
   vii. Once the source detected, steps are to be taken to arrest the leakage under the supervision of production department. If required, take shutdown as per procedure.
   viii. HOD production will see the condition and declare the area SAFE after which work can be resumed in the area.

4. Runner Puncture

a. Inform area in-charge immediately to close the casting.
b. Evacuate all personal from below the cast-house and call ambulance.
c. Prod SS and Manager to be immediately informed.
d. Shutdown of furnace to be taken as per SOP.
e. Barricade the area below cast house.
f. If any fire arises from runner puncture, fire is to be extinguished by using suitable fire extinguisher by trained fire fighter

5. Tap-hole Breakout:

a. Evacuate all the people around the area to a safe distance through the emergency exits other than those leading to breakout area
b. Cordon off the unsafe area
c. Address on PA system and alert all concerned in the plant
d. Call ambulance and keep all medical facilities ready for any casualty
e. Reduce the wind volume to minimum and maintain the blast pressure at 0.10 kg /cm^2 (if required keep only two blowers running to drain the furnace of metal and slag.
f. Shut down the furnace as per procedure in production department manual.
g. Cool the hot metal and slag with water.
h. Once furnace is drained, ensure proper sealing of taphole for next casting
i. Inform unit head and head VAB.

6. Hearth break out:

a. Hearth break out of serious nature (i.e. all metal, slag and coke is out)
b. Reduce the wind volume, open the snort valve, open the bleeder valves if possible and stop the blowers.
c. Alert people on PA/ wireless to evacuate the area
d. Open the pressure relief valve on furnace top. (Equalization Valve - 1)
e. Back draft the furnace by opening the coffee pot valve.
f. Cool the hot metal and slag with water
g. Rescue any persons, if trapped and could not be removed earlier.
h. Do the necessary repair job.
i. Once mechanical has done necessary repair jobs/ furnace to be handed over to production

7. Explosion in PCI burner:

a. Inform respective blast furnace Shift Superintend and Area In charge.
b. PCI control room engineer to close the Waste gas line valve and open the chimney of HAG and isolate gas line from process.
c. Isolate the HAG by water sealing the PCI gas line.
d. Take shut down of Mill as per procedure.
e. Inspect and find out the reason for Fire / explosion.
f. Isolate the concerned gas line, by putting a blank if there if welding work.
g. Hand over the gas line to Mechanical for repairs.
h. Once the necessary repairs/rectifications are done, and area declared free of Gas by HOD Prod, resume normal activity

8. Blowpipe Bursting:

a. Alert everybody in the cast house to stay away from the tuyereplatform
b. Reduce the wind volume to safe minimum and open the cast if the furnace is due for tapping.
c. Take shutdown after draining the furnace.
d. Replace the blowpipe and analyze the reasons for the same.
e.

9. Sudden failure of cooling Tower water:

a. Immediately overhead tank auto valve will get open.
b. To further ensure, in addition to overhead tank auto valve, manual valve parallel in the same line will be opened by Control room/furnace in charge manually.
c. To ensure overhead tank level additional make up water from Bandara will be started.
d. Cast should be opened immediately and the furnace to be dried.
e. Simultaneously action will be taken for resumption of pumps/pipelines of cooling tower and return water.
f. Simultaneously, stop the water connection to tuyere if the tuyere bursts.
g. Change over the water connection to Overhead tank for tuyere and tuyere cooler
h. Shutdown to be taken as per procedure.
i. All copper members are to be inspected for burning and changed, if required.
j. Inspection to be done and the reason for water failure is to be found out.
    i. In case of pipeline rupture, change over to the standby line.
    ii. In case overhead tank level is low due to:
        1. Shortage of water: Start water makeup with Bandara / water tanker.
        2. Damage to the overhead tank or the incoming pipeline before valve: Drain the water completely and repair the tank / pipe line.
k. Water to the cooling member to be gradually given to prevent thermal shock

10. Burn Injuries/Ladle Failure

a. Inform area in-charge in shift immediately
b. Immediately call for help and evacuate injured person from area of ladle failure and call ambulance.
c. Prod SS and Manager to be immediately informed
d. Area to be barricaded and shift the injured person to dispensary for further treatment
e. If any fire arises from ladle failure, fire is to be extinguished by using suitable fire extinguisher by trained fire fighter
f. Area to be kept barricaded till ladle is shifted to an isolated place.
g. Resume normal operation post extinguishing all fires

11. Acid Splash:

a. Resources needed - i. Eye wash and shower system; ii. First aid box and first aiders & iii. Chemical spillage kit.
b. In case of Chemical Splash, the affected person (Chemist / Lab attendant) will raise a loud alarm.
c. Affected person will be lead to the eyewash Apparatus / Tap Water for splashing of plenty of water by his colleague / person present on duty (Chemist /Lab. Attendant).
d. Splash water for at least 20 minutes.
e. In case of spillage of chemical on the floor, plenty of water will be used for splashing on the floor and will be moped with absorbents.
f. For minor injuries if any, first aid shall be provided and casualty if any shifted to dispensary/hospital for seeking medical attention.
g. Ambulance shall be called for if necessary.

12. CO Leakage at Furnace top equipment - Hatch door, Whole BLT unit & bleeders, Furnace shell, Bustle ring, whole TSA, Furnace uptakes, off-take and Down-comer, GDC and GCP silo, BF gas mains, Septum valve, HBS, Drip-pots of BFG main, Flare stack, U--seal of BFG main and PCI HAG:

a. Whenever CO gas leakage is detected, said area needs to barricade/isolated immediately
b. Evacuate the place where the presence of gas is suspected. Do not start work until the area is declared free of CO gas by HOD (Prod).
c. Gas affected person, if any should be treated as per guidance given in gas poisoning from CO leakage
d. Information should be given to any of blast furnace control rooms or any company officer.
e. Gas burning to be done for leakages from furnace proper area (TSA and furnace shell) if leakage seems to be minor with the help of a make-shift torch and burning the gas coming out of the leakage point. For other areas, entry to be restricted till leakage arrested.
f. If leakage was found sever, particular equipment needs to be isolated or furnace shut down to be taken if isolation not possible
g. Purging to be done (for leakage from units related to BFG main) or top firing of furnace to be ensured (for leakages from furnace equipment) and nil presence of CO gas to be ensured for hot work before starting of leakage arresting jobs
h. After Furnace start-up, ensure leakage point has been arrested before resuming operation.

13. Structural Failure:

a. A command post under guidance of Mech. HOD of the plant should be established immediately as this can be a prolonged event.
b. Blocking of surrounding traffic should be considered to reduce vibrations and interference with incoming resources.
c. Command should do an immediate hazard assessment to assess the condition — and then confirm it by appointing a Safety Officer to perform another crosschecking.
d. Safety and utility groups should secure hazards as soon as possible, including shutting off gas, electricity and water.
e. Initial on-scene units should be directed in rescuing victims that can be seen on the surface
f. While the initial rescue of surface victims is going on, Command should establish a perimeter around the whole site and keep all incoming civilian personnel out of the immediate area.
g. After initial surface victim removal has been completed, Command should ensure that all personnel are removed from the collapse site.
h. During the initial stages of operation, Command should attempt to ensure that there will be roadways into and out of the collapse site.
i. Prior to beginning search and rescue operations, Command should create specific search teams.
j. If a victim is located, the rescue team should treat the area that they've been found in as a confined space and follow confined space rescue operations guidelines
k. If at all possible, rescue teams should attempt to gain access vertically; the horizontal breaching of walls should be done only if there is no other means to reach the void space that victims may be trapped in.
l. Once the rescue team has contacted the victim(s), an immediate assessment of the

victim(s) needs to be carried out.

m. Once the victim(s) have been removed to a safe location, they should be transferred tothe Occupational Health Center.

14. Power failure leading to blackout situation

a. After blackout Only required persons to be stationed at site and rest all (if any) to gather at common assembly point. This has to be ensured by the respective area supervisors and collectively by the SS.
b. SS to make sure emergency light at all critical locations where ever provided, has switched on in auto or else immediately inform electrical site in-charge to switch it ON manually
c. All Heads of the Dept. including safety & security to be informed by SS about the blackout situation
d. Dispensary to be immediately informed by SS to be on standby
e. Security personnel to be informed by SS for requirement (if any) of fire tenders,
f. SS to make sure all area representatives are well informed about the situation so no panic arises
g. Ensure the water supply from the safety water tank to coolingmembers,
h. Ensure the emergency blower is activated by contacting PIP Electrical department
i. Ensure the medium pressure diesel pump of cooling circuit is activated
j. Check the cooling member healthiness.
k. Check all tuyere for any incursion of metal and slag
l. Ensure nitrogen accumulator backup for ladle tilter, BLT, PCI is activated
m. If cast is due open cast by lancing / If cast is already in open, divert the metal and slag to emergency launder after ensuring the proper evacuation at EL area
n. Note:
    1. Safety water tank storage capacity is 500 m3 and duration is 15 min,
    2. Medium pressure diesel Pump diesel storage capacity is 800 liter and working duration is 8 hours,

    Total water storage tank capacity is 2500m3.

    Emergency blower power source is from PIP diesel generator

15. Molten metal spillage and fire due to molten metal

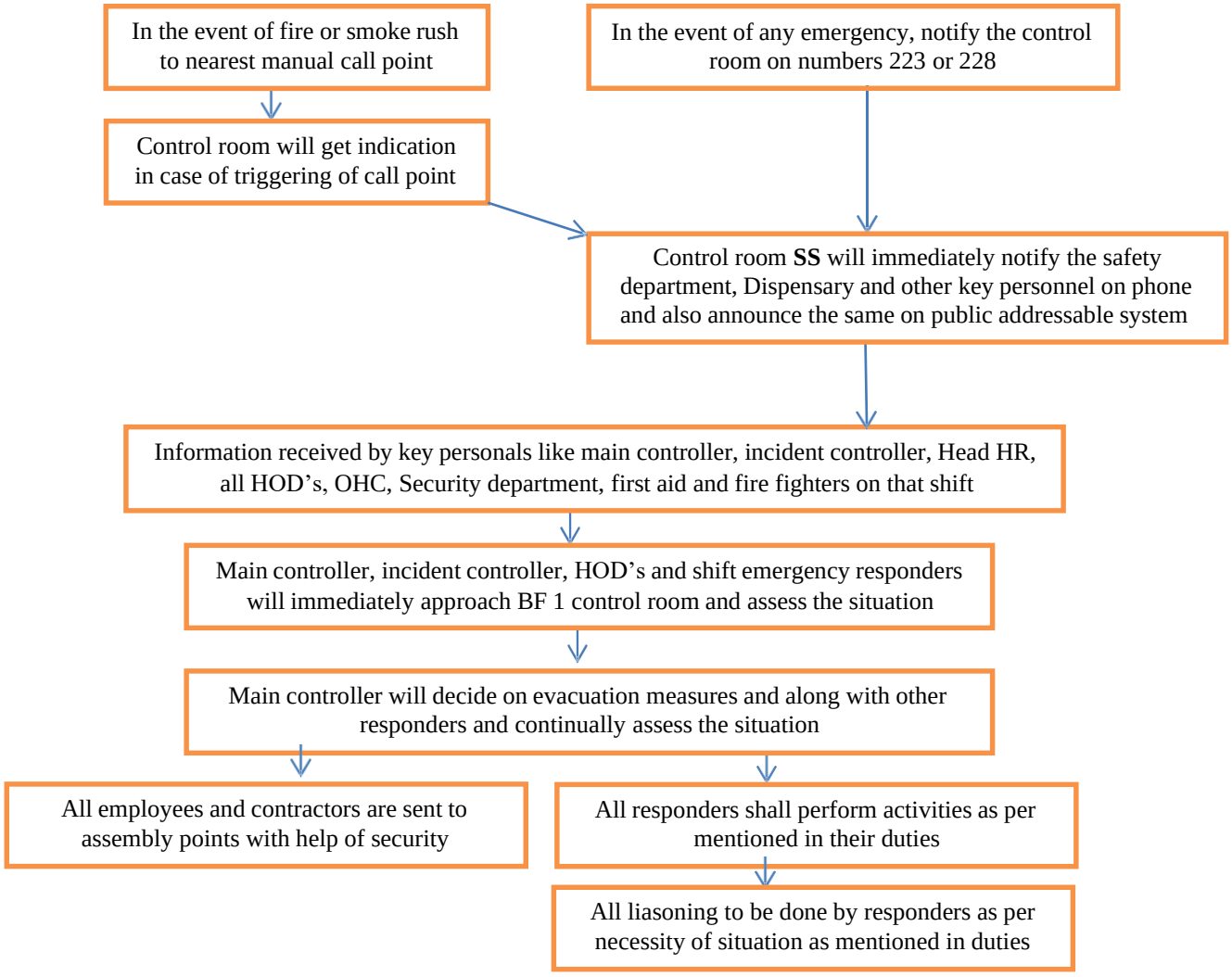
Cast house

a. Molten metal spillage can occur due to runner puncture, runner overflow and change in metal flow trajectory from taphole in this situation cast needs to be closed immediately
b. Ensure proper evacuation and barricade the area.
c. Inform Plant head, SS and safety head.
d. In case of fire use fire hydrant to extinguish the fire.
e. In case of injury Immediately call for help, evacuate injured person from area and call ambulance.

PCM & HMC

n. Molten metal spillage can occur due to ladle puncture, PCM runner overflow / puncture.
o. In case of PCM runner overflow stop the pouring immediately and evacuate the area
p. In case of ladle puncture is on ladle transfer its needs to be immediately move to the safer side along the ladle rail area
q. Evacuate the PCM area
a. Inform Plant head, shift SS and safety officer
b. In case of fire use fire hydrant to extinguish the fire.
c. In case of injury Immediately call for help, evacuate injured person from area and call ambulance.

Emergency Response Flow chart



ANNEXURE 3

MSDS of CO gas

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	CARBON MONOXIDE
Chemical Formula	CO
Trade Name	Carbon Monoxide (N3.7)
Colour coding	Signal Red (A.11) body with a Yellow (C.61) shoulder.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Carbon Monoxide
Chemical Family	Flammable, toxic, reactive gas
CAS No.	630-08-0
UN No.	1016
ERG No.	119
Hazchem Warning	Toxic gas

3. HAZARDS IDENTIFICATION

Main Hazards. All cylinders are portable gas containers, and must be regarded as pressure vessels at all times Carbon monoxide is a toxic, flammable gas. The flammability limits in the air are between 12.5% and 74.2% by volume. Inhaled carbon monoxide binds to the blood hemoglobin, greatly reducing the red blood cells ability to transport oxygen to body tissues. Effects may include headaches, dizziness, convulsions, loss of consciousness and death. Adverse Health effects. Carbon monoxide is a chemical asphyxiant, and the inhalation of concentrations as low as 400 ppm in air could result in headache and discomfort within 2 - 3 hours. Inhalation of concentrations of 4000 ppm in air could prove fatal in less than one hour.

Chemical Hazards. Carbon monoxide containing moisture and Sulphur containing impurities can cause corrosion of steel at any pressure. Dry, Sulphur free carbon monoxide is safe for use with steel and other common metals at pressures up to 13790 kPa.

Biological Hazards. Carbon monoxide in excess of 50 ppm will produce symptoms of poisoning if breathed in for a sufficiently long time. As little as 200 ppm will produce slight symptoms (slight headache, discomfort) in several hours. A concentration of 400 ppm will produce headache and discomfort within two to three hours. With moderate exercise, 1000 - 2000 ppm will produce slight palpitation of the heart in 30 minutes, a tendency to stagger in 1,5 hours, and confusion of the mind, headache, and nausea in 2 hours. A concentration of 2000 - 2500 ppm will usually produce unconsciousness in about 30 minutes. Its effects at higher concentrations may be so sudden that a man has little or no warning before he collapses. These effects are summarized in the followingtable.

Effect	Concentration (ppm)
Permissible for an exposure of 8 hours	50
Concentration which can be inhaled for 1 hour without appreciable effect	400 - 500
Concentration causing a just appreciable effect after 1 hour of exposure	600 - 700
Concentration causing unpleasant but not dangerous symptoms after 1 hour of exposure	1000 - 2000
Dangerous for exposure of 1 hour	1500 - 2000
Fatal in exposures of less than 1 hour	4000 & above

Vapor Inhalation. The concentration, exposure time and physical activity of the individual will determine the percentage conversion of hemoglobin to carboxyhemoglobin. The effects produced depend on the degree and duration of saturation of blood with carbon monoxide.

4. FIRST AID MEASURES

Conscious persons should be assisted to an uncontaminated area and be treated with supplemental oxygen. Quick removal from the contaminated area is most important. Unconscious persons should be removed to an uncontaminated area and given artificial respiration and oxygen at the same time. The administering of the oxygen at an elevated pressure (up to 2 to 2.5 atmospheres) has shown to be beneficial as has treatment in a hyperbaric chamber. The physician should be informed that the patient has inhaled toxic quantities of carbon monoxide. Prompt medical attention is mandatory in all cases of overexposure to carbon monoxide. Rescue personnel should be equipped with self-contained breathing apparatus and be cognizant of extreme fire and explosion hazard.

5. FIRE FIGHTING MEASURES

Extinguishing media. Dry powder, Carbon dioxide, Fog-water spray (In the absence of fog equipment a fine spray of water may be used.) Specific hazards, highly flammable, may form explosive gas mixtures with air is a chemical asphyxiant.

Emergency actions. Evacuate area. Post warnings to prevent persons from approaching with lit cigarettes or open flames. Using water, keep all cylinders in the vicinity of the fire cool. Remove cylinders from the vicinity of the fire if possible. Remove all cylinders with signs of overheating to a safe area. Keep cool.

Protective Clothing. Exposed fire fighters should wear approved self-contained breathing apparatus with full-face mask. Safety gloves and shoes, or boots, should be worn when handling cylinders.

Environmental precautions. As carbon monoxide is only slightly lighter than air it will not diffuse rapidly. Caution should be taken when entering confined spaces as pockets of high concentrations may occur. Ventilate all confined spaces using forced draught if necessary. Ensure that all electrically powered equipment is flameproof.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions. As carbon monoxide is a chemical asphyxiant, self-contained breathing apparatus should be used when entering confined spaces where leaks have occurred. Do not enter any potentially hazardous area with any source of ignition such as a lit cigarette or match.

Environmental precautions. Carbon monoxide does not pose a hazard to the environment. An explosive gas-air mixture could be formed when leaks occur, so eliminate all forms of ignition.

Small spills. Small leaks should be extinguished by shutting off the source of supply, e.g. closing the valve on the cylinder, or tightening the gland nut. If unable to stop small leaks the cylinder should be moved into the open, well away from any source of ignition. Should a small leak have ignited, use a multi-purpose dry powder or carbon dioxide extinguisher. Should there be no extinguisher available, a welder's glove or heavy cloth, soaked in water may be used to extinguish the flame.

Large spills. Stop the source if it can be done without risk. Eliminate all sources of ignition and static discharges. Restrict access to the area until completion of the clean-up procedure. Post-relevant warning signs. Wear adequate protective clothing when working near the source of the leak. Ventilate the area using forced-draught if necessary. Ensure that all equipment is flameproof.

7. HANDLING AND STORAGE

Do not allow cylinders to slide or come into contact with sharp edges. Carbon monoxide cylinders may be stacked horizontally provided that they are firmly secured at each end to prevent rolling. Ensure that equipment is adequately earthed. Conspicuous signs should be posted in the storage area forbidding smoking or the use of naked lights. Do not store reserve stocks of carbon monoxide with cylinders containing oxygen, or other highly oxidising or flammable materials. Use the "first-in first-out" inventory system to prevent full cylinders from being stored for excessive periods of time. Compliance with all relevant legislation is essential. Keep out of reach of children.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational exposure hazards. Lacking odour and colour, carbon monoxide gives no warning of its presence, and inhalation of high concentrations can cause sudden, unexpected collapse. The eight-hour time-weighted average threshold limit value (TLV) adopted by the American Conference of Governmental Industrial Hygienists is 50 ppm (55 mg/m3) for exposure to carbon monoxide. Occupational Safety & Health Administration has adopted an eight-hour time-weighted average exposure limit of 35 ppm (40 mg/m3) and a ceiling limit of 200 ppm (229 mg/m3) for carbon monoxide. Engineering control measures.

Engineering control measures are preferred to reduce exposures. General methods include mechanical ventilation, process or personal enclosure, and control of process conditions. Administrative controls and personal protective equipment may also be required. Use a suitable flameproof ventilation system separate from other exhaust ventilation systems. Exhaust direct to outside. Supply sufficient replacement air to make up for air removed by exhaust system.

Personal protection. Use self-contained breathing apparatus when fighting large fires. Eyes Use safety glasses when working with cylinders Hands Use suitable protective gloves when working with cylinders Skin No known effect.

9. PHYSICAL AND CHEMICAL PROPERTIES

Chemical Symbol	CO
Molecular Weight	28,01
Specific volume @ 20°C & 101,325 kPa	850 ml/g
Density gas @ 20°C & 101,325 kPa	1,165 kg/m
Auto-ignition temperature	652°C
Relative density (Air=1) @ 101,325 kPa	0,967
Flammability limits in air	12,5 - 74,2% (by vol)
Colour	None
Taste	None
Odour	None

10. STABILITY AND REACTIVITY

Conditions to avoid. Overheating of cylinders. Never test for leaks with a flame. Use soapy water when testing for leaks. Never use cylinders as rollers or supports, or for any other purposes other than the storing of carbon monoxide. Do not use carbon monoxide cylinders for the storage of any other gas.

Incompatible materials. Steel and other common metals are satisfactory for use with dry, sulphur-free carbon monoxide at pressures up to 13790 kPa. The presence of moisture and sulphur-compounds appreciably increases the corrosive action on steel at any pressures.

Hazardous decomposition products. Only carbon dioxide is formed when carbon monoxide burns in air.

Annexure IV

MSDS HSD

1. Chemical-
Identification

Chemical Name : Diesel Oil
Synonyms : Automotive Diesel Oil
Formula : Mixture of hydrocarbons

Chemical classification : Flammable Liquid
Trade name : HSD
C.A.S No. : 8052-41-3 U.N.No.: 1202.

Shipping name:HSD

Regulated identification : HSD

Hazardous west ID No. : NA

Hazchem No. : Class 3

Hazardous Ingredients	C.A.S.No. :
Benzene Trace	71-43-2
Naphthalene Trace	91-20-3
Sulphur Trace	7704-34-9

2. Physical & Chemical data

Boiling Range / points : 215^{O}C to 376^{O}c
Melting / freezing points: 18^{O}C to 46^{O}c
Vapour Density (Air-1) : 3-5
Specific Gravity water : 0.81-0.91

Physical state : Liquid Appearance : Light brown
Vapour Pressure : 2.12 to 26mm Hg @38^{O}C
Solubility in water : 30 PPm
PH : NA

3. Fire and Explosion Hazards Data

Flammability : Yes LEL : 0.6%
TDG Flammability : Class 3 UEL : 6%

Flash Point : 32^{O}C Auto ignition : 225^{O}C
Flash Point :

Explosion Sensitivity to impact: Non-sensitive to Mechanical Impact
Explosion Sensitivity to Static Electricity: For vapors sensitivity exist
Hazardous Combustion Products: Carbon monoxide, Nitrogen Oxide and other aromatic hydrocarbons

Hazardous Polymerization : N.A
Combustible Liquid : Yes
Flammable Material : Yes
Pyrophoric material : NA

Explosive material: Yes
Oxidizer : NA
Organic peroxide : NA

Corrosive material: No
Other : NA

4. Reactivity Data

Chemical stability : Stable
Incompatibility with other material : Oxidizers such peroxides, Nitric acid and Perchlorates
Hazardous Reaction Products : On fire it will be liberate some carbon monoxide, Sulphur dioxide, Nitrogen Oxide and other aromatics

5. Health Hazards Data

Routes of Entry : Inhalation, Skin absorption, ingestion

Effects of Exposure Symptoms: Excessive inhalation vapors cause rapid breathing, excitability, staggering, headache, fatigue, nausea and vomiting, dizziness, drowsiness, narcosis convulsions, coma

Emergency Treatment :in case of eye or Skin contract fresh with plenty of fresh water, remove containment clothing, in case of excessive inhalation move the victim to fresh air, obtain medical assistance.

TLV (ACGIH) : 800 PPm STEL: 500 PPm

Permissible Exposure Limit : $L.D_{50}$ (Oral –Rat) : 5 g/Kg $L.C_{50}$(Rat for 4 hrs) 5g/M^3

NFPA Hazards	Health	Flammability	Stability	Special
Signals	1	2	0	-

6. Preventive measures

Personal Protective equipment

Handling and storage Precautions : Canister type gas mask, PVC or Rubber. Goggles giving complete protection to eyes. Eye wash fountain with safety.
: Do not expose to heat and naked lights, keep containers and Valves closed when not in use.

7. Emergency and First aid measures

Fire media — Fire Extinguishing : Foam. CO_2, Dry Chemical Powder. Water may be used to cool fire exposed containers

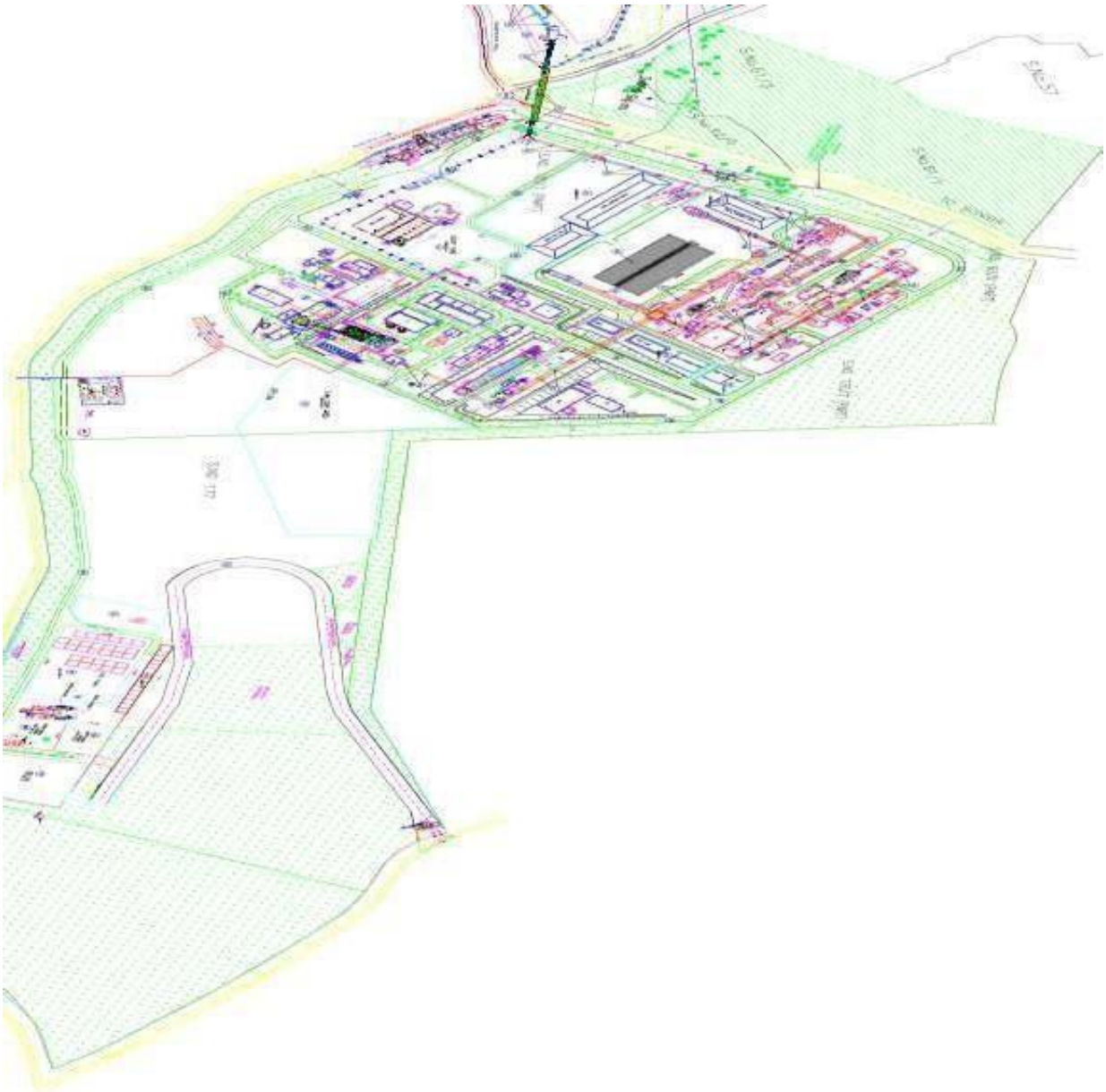
Fire — Special procedures : Shut off leak, if safe to do so, keep non – involved People away from spill site. Eliminate all sources all sources of ignition.

Unusual Hazards : It will spread along the ground and collect in sewers

Exposure First Aid measures : **Skin contact**; in case of contact with Skin flush with fresh water, remove containment clothing
Inhalation: in case of excessive inhalation move the victim to fresh air, If problem in breathing give artificial respiration; give oxygen obtain medical assistance
Ingestion: Give water to conscious victim to drink; do not induce vomiting.

Antidotes/Dosages : NA

PLANT LAYOUT



LIST OF TRAINED FIRST - AIDERS

Sr. No.	Name	Staff/Workman	Unit	Dept.
1	Zubair Mulla	W	PID 2	Electrical
2	Kishor Gaonkar	W	PID 2	Electrical
3	Ramachandra Mahale	W	PID 2	Electrical
4	Imran Patel	W	PID 2	Electrical
5	Vishal Sawant Bhosale	W	PID 2	Electrical
6	Shubhakanta Bhoi	W	PID 2	Electrical
7	Santosh Sinari	W	PID 2	Electrical
8	Amit Kasar	W	PID 2	Electrical
9	Ganpat Jadhav	W	PID 2	Electrical
10	Kabbeer Nagappa	W	PID 2	Electrical
11	Arun Kumar Rout	W	PID 2	Electrical
12	Basappa Awari	W	PID 2	Electrical
13	Rohidas Kulam	W	PID 2	Electrical
14	Sakharam Sawant	W	PID 2	Electrical
15	Sudir Naik	W	PID 2	Electrical
16	Shyam Naik	W	PID 2	Electrical
17	Sonu Kumar Singh	W	PID 2	Electrical
18	Ravindra Kalogi	W	PID 2	Electrical
19	Soma Gauns	W	PID 2	Electrical
20	Devendra Naik	S	PID 2	HR
21	Nandakumar Rawool	S	PID 2	HSE
22	Tejas Pednekar	W	PID 2	Mech.
23	Santosh Sah	W	PID 2	Mech.
24	Muktar Ali Saha	W	PID 2	Mech.
25	Ritesh Pattnaik	S	PID 2	Mech.
26	Sunil Vijayan	W	PID 2	Mech.
27	Sumit Patel	W	PID 2	Mech.

28	Dilip Shah	w	PID 2	Mech.
29	Shyam Kumar	w	PID 2	Mech.
30	Sanjit Yadav	w	PID 2	Mech.
31	Vikash Kumar	w	PID 2	Mech.
32	Sanjay Kumar	w	PID 2	Mech.
33	Dipu Singh	w	PID 2	Production
34	Jitender Ram	w	PID 2	Production
35	Dulgo Sawant	w	PID 2	Production
36	Omprakash Satardekar	s	PID 2	Production
37	Prabir Haldar	w	PID 2	Production
38	Balakrishna Samal	w	PID 2	Production
39	Durga Prasad	w	PID 2	Production
40	Arjun Volvoikar	w	PID 2	Production
41	Vijay Gaurav	w	PID 2	Production
42	Amresh Das	s	PID 2	Production
43	Raju Chadichal	s	PID 2	Production
44	Baburao Gadekar	w	PID 2	Dispensary
45	Mahesh Navelkar	w	PID 2	Dispensary
46	Akhil Gawas	w	PID 2	Dispensary
47	Raju Gauns	w	PID 2	Dispensary

LIST OF TRAINED FIRE – FIGHTERS

S.No.	NAME	Department	CONTACT NO.
1	Zuber Mulla	Electrical	9673360262
2	Basappa Awari	Electrical	9823615079
3	Nagappa Kabber	Electrical	8485086094
4	Anup Parab	Inst	7776062776
5	Rethiesh kumar	Inst	7608067218
6	Dhiraj Kumar	Inst	8322385385

7	Shiva prakash	Inst	7719998044
8	Anup Naik	Electrical	9834938545
9	Sumit Kumar	Electrical	9556601294
10	Rupesh OJha	Electrical	7008018231
11	Rajendra Ulgekar	Electrical	9168630417
12	Hanif Ghanachi	Electrical	8322385385
13	Gopi Satelkar	Inst	8322385385
14	Shekhar Dessai	Inst	8322385385
15	Sudhir Naik	Electrical	8322385385
16	Vasudev Naik	Security	8322385367
17	Ashok Kumar	Security	8322385367
18	Gaulsidhar	Security	8322385367
19	Arun Dsouse	Security	8322385367

Revisions:

1. **Name of factory manager changed as per appointment**
2. **Name of occupier changed**
3. **Contact details of mentioned personnel updated**
4. **Names of HODs changed**
5. **List of first aiders updated**
6. **List of fire fighters updated**