CHAPTER – 7
ADDITIONAL STUDIES

7.1 INTRODUCTION

As per the ToRs prescribed by MoEFCC, New Delhi, following Additional Studies were required to be carried out for the proposed expansion project:

i. Public Consultation

ii. Risk Assessment and Disaster Management Plan

7.2 PUBLIC CONSULTATION

Public Hearing for proposed expansion proposal was conducted on 10\textsuperscript{th} April 2018 at Gram Panchayat Building, Village Siltara, District Raipur, Chhattisgarh.

Details of the Public Hearing include:

1. Proceedings of Public Hearing
3. Management response for the issues raised during Public Hearing & action plan

7.2.1 PROCEEDINGS OF PUBLIC HEARING

Public Hearing Proceedings have been enclosed as ANNEXURE – 8 along with this Final EIA/EMP Report.

7.2.2 MANAGEMENT RESPONSE FOR THE ISSUES RAISED DURING PUBLIC HEARING & ACTION PLAN

Issues raised during public hearing and their reply by management is showing in Table 7.1
### Table 7.1

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of Person</th>
<th>Issue raised</th>
<th>Management Response</th>
<th>Time schedule</th>
<th>Budgetary allocation</th>
<th>Recurring cost</th>
<th>Reference in EIA report</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sri Dhanesh Yadav, Janpad Vice President</td>
<td>• He opined that Industry management shall provide employment to educated unemployed and take-up CSR activities in the village</td>
<td>• In the existing plant, out of total 350 numbers of employees, 245 numbers (70%) of employees are from local area. It is here by confirmed that priority in employment will be given to the local youth based on their qualification &amp; experience and the requirement for a particular vacancy. • Socio economic activities will be carried out under CER and budget for same has been allocated under CER as per MOEF&amp;CC norms which will be carried out in consultation with the village panchayat.</td>
<td>Continuous Process</td>
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<td>1 to 7 years</td>
<td>Rs. 2.1 Crores</td>
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<td>Page no. 8.2; Chapter # 8 of EIA report</td>
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<td>2.</td>
<td>Sri M.R. Yadu, Sarpanch of Gram Panchayat Siltara</td>
<td>• He demanded that all industrialists personally come to meet with the villagers, so that they can be appraised of the problems faced by the villagers. • There are several sponge iron industries in the area.</td>
<td>• Socio economic activities will be carried out under CER and budget for same has been allocated under CER as per MOEF&amp;CC norms which will be carried out in consultation with the village panchayat.</td>
<td>1 to 7 years</td>
<td>Rs. 2.1 Crores</td>
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<td>Page no. 8.2; Chapter # 8 of EIA report</td>
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<td></td>
<td>Before commencement</td>
<td>Rs 18 Crores</td>
<td>Rs 2.6 Crores</td>
<td>Page no. 8.2; Chapter # 8 of EIA report</td>
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</table>
### Issue raised

Pollution can be controlled in sponge iron industries if industries operate the pollution control systems properly. Requested that all industries shall control pollution.

### Management Response

Bagfilters, dust suppression system, covered conveyors, pucca internal roads, Dust extraction system with bag filters have been installed and operated to comply with the CECB norms. CECB has issued CTO for the existing plant which is valid till 31st August 2020. CECB accords CTO after all necessary emission control systems have been installed and operated.

- ESPs are being operated continuously in the plant and the CEMS data connected to CPCB server is well within the norms. Similarly in the expansion also requisite emission control systems will be installed and operated to comply with the norms.
- No effluent is being discharged outside and ZLD is being followed in the existing plant. Similar practice will be followed after expansion also.
- Ash is stored in silo and no open

### Time schedule

of operation of expansion

### Budgetary allocation

No specific allocation mentioned in the EIA report.

### Recurring cost

No specific recurring cost mentioned in the EIA report.

### Reference in EIA report

EIA report
### Issue raised and Management Response

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<thead>
<tr>
<th>S.No.</th>
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<td>storage of ash. Ash disposal in the expansion project also will be in accordance with the MOEF&amp;CC Notification and its subsequent amendments. • Development of greenbelt in 1/3rd of the area helps in mitigating the emissions further. With all these measures there will not be any significant adverse impact on environment due to the proposed expansion project</td>
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<td>In the existing plant out of total 96.57 acres (39.1 Ha.), 32.0 acres (13 Ha.) of area has been developed with greenbelt. • Total 38,808 numbers of plants have been planted, out which 33,108 have survived. • Tree plantation will be taken up in Siltara area to increase the green cover of the area. 5,000 plants will be planted in Siltara area during the next monsoon. The same is considered under CER and budget also has been earmarked for the same.</td>
<td>1st year of operation</td>
<td>Rs 15 lakhs</td>
<td>Rs 2 lakhs</td>
<td>Page no. 10.18; Chapter # 10 of EIA report</td>
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<td></td>
<td></td>
<td>Plantation in siltara industrial area needs improvement and industries should contribute towards the same.</td>
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<td></td>
<td>• Drinking water problem in the area.</td>
<td>• Water required for the existing plant and for the expansion is supplied by CSIDC. Copy of the CSIDC confirmation on supplying the requisite quantity for expansion is enclosed in the Final EIA report</td>
<td>1st year of operation</td>
<td>Rs 10 Lakhs</td>
<td>Rs 1 lakh</td>
<td>Page no. 10.18; Chapter # 10 of EIA report</td>
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<td>• Rainwater harvesting measures are taken up in the existing plant and similar practices will be continued after the expansion.</td>
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<td>• Rainwater harvesting measures such as deepening of existing ponds will be taken up in the village under CER and budget is also allocated for the same.</td>
<td></td>
<td>1st, 2nd &amp; 3rd years</td>
<td>Rs 56 Lakhs</td>
<td>Rs 3 lakhs</td>
<td>Page no. 8.2; Chapter # 8 of EIA report</td>
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<td>• Employment to local people shall be provided</td>
<td>• It is confirmed that top priority will be given to the local youth in providing employment and will be based on their qualification &amp; experience and the requirement for a particular vacancy.</td>
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<td>• CSR activities shall be undertaken for development of nearby areas.</td>
<td>• Socio economic activities will be carried out under CER and budget for same has been allocated under CER as per MOEF&amp;CC norms which will be carried out in consultation with</td>
<td>1-7 years</td>
<td>Rs 2.1 Crores</td>
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<td>Page no. 8.2; Chapter # 8 of EIA report</td>
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</tbody>
</table>
### Issue 3: Mr. Sachin Mairisa of Siltara village

- **Issue raised:** The road made by PWD from Bazar Chowk in Siltara to Bilaspur Road is hardly two to two and half years old. Godavari power promised to lay the road but till now it is not laid.

- **Management Response:**
  - Company is using only the permitted capacity trucks for transport of raw materials and products. Company is willing to contribute expenditure jointly with other industries in the area in consultation with the State Government to lay the new road. Provision will be made in the CER budget. However the company will definitely contribute towards the maintenance of the road outside the plant premises.

- **Time schedule:**

- **Budgetary allocation:** Rs 18 Crores

- **Recurring cost:** Rs 2.6 Crores

- **Reference in EIA report:** Page no. 10.18; Chapter # 10 of EIA report

- **Additional Notes:**
  - Lot of pollution in siltara area due to more number of power plants. Pollution shall be controlled properly.
  - In the existing plant air emission control systems such as ESP, Bagfilters, dust suppression system, covered conveyers, pucca internal roads, Dust extraction system with bag filters have been installed and operated to comply with the CECB norms. CECB has issued CTO for the existing plant which is valid till 31st August 2020. CECB accords CTO after all necessary emission control
systems have been installed and operated.
- ESPs are being operated continuously in the plant and the CEMS data connected to CPCB server is well within the norms. Similarly in the expansion also requisite emission control systems will be installed and operated to comply with the norms.
- No effluent is being discharged outside and ZLD is being followed in the existing plant. Similar practice will be followed after expansion also.
- Ash is stored in silo and no open storage of ash. Ash disposal in the expansion project also will be in accordance with the MOEF&CC Notification and its subsequent amendments.
- Development of greenbelt in 1/3rd of the area helps in mitigating the emissions further. With all these measures there will not be any significant adverse impact on environment due to the
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<td>proposed expansion project</td>
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<td>1</td>
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<td>• More Plantation shall be taken up in Siltara area.</td>
<td>• In the existing plant out of total 96.57 acres (39.1 Ha.), 32.0 acres (13 Ha.) of area has been developed with greenbelt. • Total 38,808 numbers of plants have been planted, out which 33,108 have survived.</td>
<td>1st year of operation</td>
<td>Rs 15 lakhs</td>
<td>Rs 2 lakhs</td>
<td>Page no. 10.18; Chapter # 10 of EIA report</td>
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<td>• Tree plantation will be taken up in Siltara area to increase the green cover of the area. 5,000 plants will be planted in siltara area during the next monsoon. The same is considered under CER and budget also has been earmarked for the same.</td>
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<td>Rs 25 Lakhs</td>
<td>Rs 8 lakhs</td>
<td>Page no. 8.2; Chapter # 8 of EIA report</td>
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4. Sri. Keval Kumar Chakradhari from Village - Khulmurhi

• CSR amount shall be spent for development of village, such as construction of Wharf in village pond, plantation, concreting of village road. All the work of village development can’t be done by the government alone and industries in the area shall also contribute to the village development.

• Socio economic activities will be carried out under CER and budget for same has been allocated under CER as per MOEF&CC norms which will be carried out in consultation with the village Panchayat. These activities include development of plantation in Siltara area, pucca village road, strengthening of existing ponds, etc.

5. Sri. Prashant

• He said that the topic

• Once TOR is granted Public

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### S.No. | Name of Person | Issue raised | Management Response | Time schedule | Budgetary allocation | Recurring cost | Reference in EIA report
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1 | Thakur, C.G. Majdoor Congress | regarding capacity expansion of API Ispat is that the committee for environmental approval has been dissolved due to completion of the term, so is this public hearing proper? The main points are as follows: - | hearing can be conducted for the project has been obtained from MOEF&CC, Govt. of India New Delhi and not from the SEIAA, Chhattisgarh. More at the time of conducting of public hearing the Expert Appraisal Committee need not be functional - CECB has conducted the Public hearing as per the procedure prescribed by MOEF&CC | 1<sup>st</sup> year | Rs 10 Lakh | Rs 1 Lakh | Page no. 8.2; Chapter #8 of EIA report
2 | | • The company where it is expanding, that place was previously for Green Land. | • Existing plant is located in the 97.57 acres (39.1 Ha.) of land and proposed expansion will be carried out in the vacant land in existing plant and no plant cutting is envisaged. Greenbelt will be developed 1/3 rd of total area after expansion. | | | |
3 | | • Company has not done any work under CSR for the last 4 years neither given any details. | • During the financial year of 2015-16, 2016-17 and 2017-18, an amount of Rs.7.71 Lakh, Rs. 5.34 and Rs.24 Lakhs respectively has been spent on the CSR activities. The same can be confirmed from the certified compliance report issued by the | | | |
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<td>When this company had changed its ownership in the past, 60 numbers of employees did not get any new jobs nor got last salary.</td>
<td>Regional Office, MoEF&amp;CC, Nagpur.</td>
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<td>• Salaries to all employees at the time of acquisition by the new management has all been done by the earlier management.</td>
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<td>• Priority will be given to local people in employment.</td>
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<td>• There is no provision like PF nor the company follow the any rules of government.</td>
<td>• PF and all other statutory rules have been followed</td>
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<td>Where will the water come from for the capacity expansion, this is not clear. Water level of Siltara, Sankra and Sondra is already at low level.</td>
<td>Water for the expansion will be supplied by CSIDC. A copy of the confirmation letter given by CSIDC is enclosed in the Final EIA Report.</td>
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<td>• To augment the water table Rainwater harvesting has been implemented in the existing plant and further RWH measures will be implemented in the plant as part of expansion.</td>
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<td>• Company also proposes to deepen the existing ponds in the village to augment the ground water table.</td>
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<td>• Recharge pits also will be constructed to further augment</td>
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- 1st year of operation: Rs 10 Lakhs
- 1st, 2nd & 3rd years: Rs 56 Lakhs
- 4th & 5th year: Rs 3 lakhs

Page no. 10.18; Chapter # 10 of EIA report
Page no. 8.2; Chapter # 8 of EIA report
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<td>• All these measures will help in improvement of ground water table</td>
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<td>• It is not clear that the new unit will run by coal or anything else, so how will the environment be compensated.</td>
<td>• No sponge iron manufacturing and power generation is envisaged in the proposed expansion project.</td>
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<td>The siltara also comes in the urban residential area in the new master plan. Then how can it be allowed there.</td>
<td>• The present proposal is expansion and which will be taken up in the existing plant premises only. There is no additional land is involved.</td>
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<td>6.</td>
<td>Sri. Shiv Kumar Sarang of Siltara village</td>
<td>• There are several plants in Siltara area, except for one or two industries the wages given by other companies are very low. Wages paid are Rs 200-250 in Siltara area as against the minimum wage fixed by the govt at Rs 350. Necessary action can be done to meet this.</td>
<td>• Wages have been paid in accordance with the govt norms.</td>
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<td>7.</td>
<td>Sri Manjas Verma from Village</td>
<td>• He told that he is a farmer in the village and he should be given employment</td>
<td>• It is here by confirmed that priority for employment will be given to the locals based on their employment</td>
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<td>Chapora, Mandhar</td>
<td>according to his ability.</td>
<td>qualification &amp; experience and the requirement for a particular vacancy.</td>
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<td>8.</td>
<td>Sri. Mitharam Sahu, Village Nimora</td>
<td>• He told that he or his friends may get employment due to this project depending on our qualification. Unemployed youth shall get employed.</td>
<td>• It is here by confirmed that priority for employment will be given to the locals based on their qualification &amp; experience and the requirement for a particular vacancy.</td>
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<td>• Solution to water problem</td>
<td>• Water for the expansion will be supplied by CSIDC. A copy of the confirmation letter given by CSIDC is enclosed in the Final EIA Report.</td>
<td>1st year of operation</td>
<td>Rs 10 Lakhs</td>
<td>Rs 1 lakh</td>
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<td>1st, 2nd &amp; 3rd years</td>
<td>Rs 56 Lakhs</td>
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<td>• Recharge pits also will be constructed to further augment water table.</td>
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<td>• All these measures will help in</td>
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### S.No. | Name of Person | Issue raised | Management Response | Time schedule | Budgetary allocation | Recurring cost | Reference in EIA report
---|----------------|-------------|---------------------|---------------|----------------------|----------------|-------------------

9. | Sri. Tarun Nishad, Village Sondra | - He told that he has worked in 10 plants through contractors. Industries have developed well. Similarly we also should be developed by way of getting permanent employment. | - Improvement of ground water table. Apart from the above, the company also proposes to supply drinking water to the village. | | | | |

- It is here by confirmed that priority for employment will be given to the locals based on their qualification & experience and the requirement for a particular vacancy.
7.3 RISK ASSESSMENT [Gen. TOR # 3 (ix) & 7 (xiii)]

7.3.1 INTRODUCTION

Risk analysis deals with the identification and quantification of risks, the plant equipments and personnel are exposed to, due to accidents resulting from the hazards present in the factory. Hazard analysis involves the identification and quantification of the various hazards that are likely to occur in the industry.

Both hazard and risk analysis are very extensive studies, and require a very detailed design and engineering information.

The various hazard analysis techniques that may be applied are Hazard and Operability (HAZOP) studies, Fault - Tree Analysis (FTA), event –tree analysis and, failure and effects mode analysis. Risk analysis follows an extensive hazard analysis. It involves the identification and assessment of risks the neighboring populations are exposed to as a result of hazards present. This requires a through knowledge of failure probability, credible accident scenario, vulnerability of populations etc. Much of these information’s are difficult to get or generate. Consequently, the risk analysis is often confined to maximum creditable accident studies.

7.3.2 SCOPE OF THE STUDY

The scope of study includes the study of proposed operations, storage and handling of raw materials with respect to Hazard Identification. Risk Assessment and preparation of Disaster Management plan. Based on the Hazard Identification and analysis, the major disaster scenarios would be worked out to estimate the consequence of failure. A Disaster Management Plan (DMP) would also be evolved to meet the emergency situation including the occupational health and safety.
7.3.3 FIRE PROTECTION SYSTEM

The following Fire Protection system will be provided in the plant.

- Hydrant system covering the entire plant including all important auxiliaries and buildings. The system will be complete with piping, valves, instrumentation, hoses, nozzles and hydrants, etc.
- Sprinkler system for cable galleries / vaults / spreader room etc.
- High velocity water system for FO storage tanks.
- Portable fire extinguishers such as pressurized water type, carbon dioxide type and foam type will be located at strategic locations throughout the plant.
- Modular type carbon dioxide panel injection fire extinguishing system will be provided in control equipment room, cable space below control room and at other unmanned electrical and electronic equipment room.

The following pumps will be provided in the fire protection system.

**Fire water pumps:**

(Fire water reservoir is part of the main water reservoir)

a) AC motor driven fire water pumps for hydrant, medium velocity water spray system and foam system.

b) AC motor driven fire water pumps for high velocity water spray system.

c) Diesel engine driven pump as stand by for the above.

d) AC motor driven Jackey pump 1 No. for maintaining pressure.

Suitable number of electric motor driven and diesel engine operated hydrant and spray pumps with automatic starting will be provided for the above systems. The fire water pumps will take suction from the fire water reservoir to be created in the plant area.

7.3.4 METHODOLOGY OF MCA ANALYSIS

The MCA Analysis involved ordering and ranking of various sections in terms of potential vulnerability. The following steps were involved in MCA Analysis.

- Preparation of an inventory of major storages and rank them on the basis of their hazardous properties.
- Identification of potentially hazardous storage sections and representative failure cases from the vessels and the pipelines.
- Visualization of chemical release scenarios.
- Effect and damage calculation from the release cases through mathematical modeling.
- Inventory Analysis and Fire & Explosion and Toxicity Index (FETI) are the two techniques employed for hazard identification process.

7.3.5 **FIRE & EXPLOSION AND TOXICITY INDEX**

The role of Fire & Explosion Index (FEI) aids quantitative hazard identification. The FEI is calculated by evaluating the loss potential of all the units in the storage area and the hazardous areas are classified accordingly. The FEI plays an important role in:

- Identification of the equipment/areas that could likely contribute to the creation or escalation of incident and relative ranking of the incidents.
- Quantification of the expected damage of potential fire and explosion incidents.
- Preparation of guidelines for mitigating fire hazards.

The loss potential which could actually be experienced under the most adverse operating conditions is quantitatively evaluated. The FEI is used for any operation in which a flammable, combustible or reactive material is stored, handled or processed.

\[
FEI = MF \times GPH \times SPH
\]

Where:
- **MF**: Material factor
- **GPH**: General Process Hazard
- **SPH**: Special Process Hazard

**TOXICITY INDEX**

The Toxicity Index is calculated using the following formula.

\[
TI = \frac{(Nh + Ts) \times (1 + GPH + SPH)}{100}
\]

Where:
- **Nh**: General Process Hazard
- **Ts**: Special Process Hazard

**FEI**

**TOXICITY INDEX**
7.3.6 ASSESSMENT OF RISK AT API ISPAT & POWERTECH PVT. LTD.

Based on the storage inventory the following areas are identified as potential safety risk areas, shown in Table 7.1.

**TABLE 7.1**
POSSIBLE RISKS FROM THE PROPOSED EXPANSION PROJECT

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Process</th>
<th>Potential Hazard</th>
<th>Proposed Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Induction furnace</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IF</td>
<td>Converts charge into hot metal</td>
<td>Re-circulating water may come in contact with molten hot metal leading to spurting of metal or under extreme conditions explosion may also occur.</td>
<td>In built safety system is provided in the construction of furnace with suitable refractory walls.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Charging materials being rusty and moisturized which may lead to spurting of metal</td>
<td>This may occur if raw materials are stored in open. However, raw material in the proposed steel plant will be covered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Presence of oil and grease and other impurities, which may lead to unexpected fires.</td>
<td>Fuel supply into the furnace will be regulated and will be controlled by PLC systems.</td>
</tr>
<tr>
<td>Noise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>● Acoustic enclosure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>● Isolated panel rooms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>● Special foundation with vibration absorbers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Failure of APCS</strong></td>
<td>Dust / Smoke</td>
<td>Air emission</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Emergency alarm to be given to Villagers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Interlocking system will be provide to APCS.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Water sprinkling arrangements</td>
</tr>
<tr>
<td><strong>Pellet Plant</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Raw material storage</strong></td>
<td>Spillage of wet bentonite may lead to slip</td>
<td>Head injury / Broken bones</td>
<td>● Immediate barrier will be placed and warning signage around spillage area</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Training to the workers</td>
</tr>
</tbody>
</table>
**Balling & Mixing**

**Dust generation during running of loading circuit**

**Lung disorders**

- Personal respiratory equipments will be provided to the workers at work place.
- Exhaust ventilation system will be provided

---

**Coal Handling Plant - Dust Explosion**

Coal dust when dispersed in air can explode if it gets ignition source. Crusher houses and conveyor systems are most susceptible to this hazard. The minimum of explosive concentration of coal dust (33% volatiles) is 50 grams/m³. Failure of dust extraction & suppression systems may lead to abnormal conditions and may increase the concentration of coal dust upto the explosive limits. The sources of ignition are incandescent bulbs, electric equipment & cables, friction & spontaneous combustion in accumulated dust. Dust explosion may occur at any time without any warning with maximum explosion pressure of 6.4 bars. Another dangerous characteristic of dust explosions is that it sets off secondary explosions after the occurrence of initial dust explosion.

Stock pile area shall be provided with automatic garden type sprinklers for dust suppression as well as to reduce spontaneous ignition/combustion in coal stock piles. Necessary water distribution net work will be provided for distributing water at all transfer points, crusher house, control room, etc.

A centralized control room with microprocessor based control system has been envisaged for operation of the coal handling plant. Except locally controlled equipment like travelling tripper, dust extraction / dust suppression / ventilation equipment, sump pumps, water distribution system all other equipments will have provision for local control as well.

---

**Control Measures for Coal Storage Yard**

The entire quantity of coal will be stored in separate stack piles, with proper drains around to collect washouts during the monsoon. Water sprinkling system will be installed in and around the stocks of pile to prevent spontaneous combustion and consequent fire hazards. The stack geometry will be adopted to maintain minimum exposure of stock pile areas towards predominant wind direction. Temperature will be monitored regularly to detect any abnormal rise in temperature inside the stock pile to be enabled to control the same.
## From Ferro Alloys Unit

<table>
<thead>
<tr>
<th>S.No.</th>
<th>AREA OF</th>
<th>OCCUPATIONAL &amp; SAFETY HAZARDS AND CAUSES</th>
<th>THEIR IMPACT</th>
<th>ACTIONS TAKEN TO ELIMINATE THE IMPACT / HEALTH AND SAFETY HAZARDS</th>
</tr>
</thead>
</table>
| 1     | Raw Material Areas          | • Exposure To Dust
• Working In Open Areas                                                                 | • Dust allergy,                                                           | • Providing protective and safety appliances
• Fatigue due to physical activity                                                                                                           | • Rotation of workers                                                                                                                  |
| 2     | Raw Material Feeding Systems | • Exposure To Dust While Handling Raw Materials In Yards
• Exposure To Dust At Transfer Towers
• Noise Levels Due To Impact At Batching System, EMV Feeders                                                                                   | • Dust allergy, Lung disorders, respiratory problems and effect to skin
• Fatigue due to physical activity
• Scope of accidents / injuries due to improper maintenance practices.
• Hearing impairment, sleep disturbance, hypertension                                                                                       | • All conveyors covered
• Dust suppression systems at transfer towers to eliminate dust
• Providing proper protective and safety appliances
• Standing instructions and standard operating procedures
• Providing ear plugs                                                                                                                        |
| 3     | Furnace Area Ferro Alloys   | • Exposure To Heat At Furnace
• Exposure To Dust At Furnace
• Charging & Stroking System At Furnace
• Suffocation At Operating Floor Level 1<sup>st</sup> Floor                                                                                   | • Dehydration and cardio vascular disease.
• Dust allergy, Lung disorders, respiratory problems and effect to skin
• Metallic dust exposure
• Scope of burns and injuries and effect to eyes
• Scope of injury due to spillage of hot charge mix at furnace operating floor                                                               | • Low hood design of furnace smoke hood eliminates exposure to dust and fumes
• Providing safety and protective appliances
• Proper design of hood top for extraction of fumes to eliminate suffocation at operating floor due to fugitive emission
• Face marks, shoes, helmets at operating floor eliminates injuries                                                                          |
| 4     | Process Ferro Alloys        | • Fluctuations Due To Metallurgical Aspects
• Furnace Eruptions
• Variations In Process                                                                                                                     | • Burns and injuries due to furnace eruptions due to metallurgical disturbances in process
• Exessive heat / radiation and effect due                                                                                                | • Proper selection of raw materials and quality control of inputs eliminates process variations and related hazards.
• Provision of proper safety and |

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**EIA report – Chapter 7**

7.19
## S.No. | AREA OF | OCCUPATIONAL & SAFETY HAZARDS AND CAUSES | THEIR IMPACT | ACTIONS TAKEN TO ELIMINATE THE IMPACT / HEALTH AND SAFETY HAZARDS
--- | --- | --- | --- | ---
5 | Hot Metal Handling Areas | Parameters
- Tapping Area
- Hot Liquid Metal Handling And Spillages
- Exposure To Heat
- Continuous Casting Machine Process
| to hold up of slag / metal in the furnace due to process variations | protective equipment eliminates injuries / burns
- Scope of burns due to liquid metal spillages
- Accidents due to Break down / failure of tools and tackles used in hot metal handling equipment
- Burns due to liquid metal spillages during process of pouring
- Burns due to water ingress to hot metal areas | SOPs and proper maintenance of cranes / tools & tackles eliminate accidents
- Proper layout and free spaces for movement in hot metal handling areas eliminate scope of injuries in abnormal conditions.
- Providing proper safety and protective equipment eliminate scope of injuries.
6 | Product Handling Ferro Alloys | Hot Metal & Slag Cakes Handling
- Product Sizing Process
- Product Loading Process
| Scope of burns due to hot metal cakes handling
- Metallic dust exposure
- Scope of injuries during sizing process of metal and slag
- Failure of lifting tools & tackles and equipment | Providing proper safety and protective equipment to eliminate scope of injuries
- SOPs and proper maintenance and testing of lifting equipment to eliminate scope of injuries.
7 | Equipment Ferro Alloys | Break Down Of Cranes
- Break Down Of Water Cooling Pumps
- Break Down Of Blowers In Furnace Area
- Break Down Of Hydraulic Systems
| Crane break down cause scope of lining failures and there by scope of injuries / burns
- Scope of steam generation in the water cooling circuit and failure of water hoses due to steaming and scope of burns
- Break down of blowers scope of suffocation in 2\textsuperscript{nd} floor | Proper SOPs for O & M and proper maintenance schedules and equipment testing schedules eliminate scope of accidents related to these failures.
- Proper ventilation in the plant building eliminates scope of suffocation.
8 | Furnace | Possibilities Of Fire | Injuries / burns due to fire at transformer | Proper fire fighting equipment and
<table>
<thead>
<tr>
<th>S.No.</th>
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<th>THEIR IMPACT</th>
<th>ACTIONS TAKEN TO ELIMINATE THE IMPACT / HEALTH AND SAFETY HAZARDS</th>
</tr>
</thead>
</table>
|      | Transformers     | • Possibilities Of Electrical Failures                         | • Electrical short circuits causing transformer failure and scope of catching fire | nitrogen purging eliminates fire accidents in transformers  
|      |                  |                                                                |                                                                              | Proper protection scheme and isolation of furnace from source eliminate any scope of accidents due to failure of transformer          |
| 9    | Hydraullic Systems | • Failure Of Hydraulic Hoses  
|      |                  | • Possibilities Of Fire Of Hydraulic Oil                        | • Failure of hydraulic hoses due to electrical short circuits may cause accidents  
|      |                  |                                                                | • Possibility of fire accident due to oil catching fire                      | Proper SOPs for O & M eliminate failures  
|      |                  |                                                                |                                                                              | Using carbon free high pressure hoses eliminate hose failure accidents.  
|      |                  |                                                                |                                                                              | Separate enclosed room for hydraulic room reduces scope of high temperature and eliminate fire accidents                      |
| 10   | Pollution Control Systems  
|      |                  | • Sparks Causing Burning Of Bags In Bag Filters  
|      | Ferro Alloys      | • Possibilities Of Sudden Surges In Furnace                     | • Fire accidents at Bag house  
|      |                  |                                                                | • Excessive emissions due to failure of bags  
|      |                  |                                                                | • Structural failures due to this fire accident                              | To avoid scope of bags catching fire, baffles in the ducting to arrest sparks, water cooled hood top, duct length of about 40 metres between hood & bag filter, providing heat exchanger and dilution dampers for fresh air completely eliminate this scope of fire accident  
<p>|      |                  |                                                                |                                                                              | PLC based Interlocking system will be provided and acts in such a way that whenever bagfilters fail, then furnace will be shutdown  |
| 11   | Refining Process Areas | • Liquid Metal Handling Scope Of Burns                         | • Scope of burns due to liquid metal spillages                                 | SOPs and proper maintenance of cranes / tools &amp; tackles eliminate accidents                                                    |</p>
<table>
<thead>
<tr>
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</tr>
</thead>
</table>
|       |         | • Break Down Of Cranes                    | • Accidents due to Break down / failure of tools and tackles used in hot metal handling equipment  
|       |         |                                          | • Burns due to Liquid metal spillages during process of pouring | • Proper layout and free spaces for movement in hot metal handling areas eliminate scope of injuries in abnormal conditions.  
|       |         |                                          |                                | • Providing proper safety and protective equipment eliminate scope of injuries |
| 12    | Testing Areas | • Hazards Due To Chemicals  
|       |         | • Exposure To Reaction Fumes / Gasses | • Scope of burns and skin damages  
|       |         |                                          | • Scope of lung disorders | • Proper safety precautions and protective equipments to eliminate these hazards |
| 13    | Electrical Systems | • Exposure To Electrical Shocks  
|       |         | • Scope Of Fire Due To Electrical Short Circuits  
|       |         | • Exposure To Burns Due To Electrical Systems | • Burns due to electrical accidents  
|       |         |                                          | • Shocks due to electrical accidents  
|       |         |                                          | • Damages due to electrical fire accidents | • Proper SOPs for O & M teams will eliminate scope of these hazards  
|       |         |                                          | • Neurological problems due to electrical shocks | • Proper fire fighting scheme for electrical failures eliminate these Hazards  
|       |         |                                          |                                | • Proper design of electrical equipment and proper isolation eliminate these Hazards |
| 14    | Noise Related Hazards | • Exposure To Noise Of Various Equipment  
|       |         | • Working At Furnace Areas | • Damage to ears and neurological systems  
|       |         |                                          | • Lung disorders  
|       |         |                                          | • Skin diseases and effect to skin | • Proper ventilation eliminates heat  
|       |         |                                          |                                | • Proper measure to reduce noise levels and keep noise levels within permissible  
|       |         |                                          |                                | • Proper safety and protective equipment |
| 15    | Fire Hazards Areas | • All Hot Metal Areas  
|       |         | • Furnace Transformers  
|       |         | • Furnace Operating Floor | • Scope of fire accidents and burns  
|       |         |                                          | • Scope of damage to skin | • Proper SOPs for O & M and good fire fighting scheme eliminate these Hazards  
|       |         |                                          |                                | • Proper safety and protective equipments eliminate impact of these Hazards |
| 16    | Safety Related Areas | • Tools And Tackels Used In Handling Areas | • Scope of mechanical related accidents causing injuries | • Proper SOPs for testing of toold and tackles and lifting equipment and
<table>
<thead>
<tr>
<th>S.No.</th>
<th>AREA OF</th>
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</tr>
</thead>
</table>
|       |                                             | • Furnace Working Areas  
• Vehicular Movement At Rm Yards                                                                 | • Exposure to dust causing dust allergy                                      | proper maintenance schedules eliminate the scope of these accidents and hazards  
• Proper layout design eliminates accidents due to vehicular movement in project                                                                 |
| 17    | Continuous Process Industry                  | • Fatigue Due To Long Working Hours  
• Age Related Constraints                                                                                     | • Absentism causes long working hours and fatigue  
• Incapability in some working areas beyond certain age limit                     | • Keeping some additional manpower in summers eliminate fatigue  
• Relocation / rotation of working area will eliminate age related constraints                                                          |
| 18    | Seasonal Related Issues                      | • Exposure To Heat In Summers  
• Furnace Process Fluctuations During Monsoon Season  
• High Moisture Levels In Raw Materials                                                                         | • Dehydration during summers at furnace areas  
• Excess moistures cause improper porosity in the furnace causing eruptions and burning  
• Chocking of charging systems and spillages due to excess moisture during monsoon causing work load fatigue to maintenance teams | • Proper ventilation, providing additional manpower during summers eliminate the scope of impact due to these hazards  
• Proper selection of raw materials during monsoon, storage of raw material in covered sheds, maintaining proper preventive maintenance schedules and additional manpower during monsoon eliminates these Hazards |
| 19    | LDO / FO Storage Area                        | MS Tanks (1 X 25 KL)                                                                                     | • Fire & explosion                                                            | Precautions as per TAC and OISD will be implemented.                                                                                     |
| 20    | Failure Of Apcs                             | Dust / Smoke                                                                                             | • Air emission                                                                | • Emergency alarm to be given to Villagers.  
• Water sprinkling arrangements                                                                                                        |
7.3.7 RISK & CONSEQUENCE ANALYSIS OF FIRE

The principle objective of this study is to identify the potential hazards, estimate the effects of hazards to people both within and outside the plant premises.

- Identification of possible failure cases of the facilities which might affect the population and property within the plant boundary.
- Assessment of consequential effect on surrounding population, property etc., due to onset of such failures.
- Suggest recommendations based on consequence analysis relevant to the situations.

7.3.7.1 METHODOLOGY

The hazards expected from this plant include the pool fire situation due to the leakage of LDO & FO from the storage tanks. There will be two Nos. of FO storage tanks each of 50 m³ capacity & one No. of storage tank for LDO with a capacity of 25 m³. The tanks, made of Mild steel, will be provided with dyke. The most credible failure is due to the rupture of the pipe connecting the storage tank. The worst case can be assumed as when the entire contents leak out into the dyke forming a pool, which may catch fire after getting source of ignition.

HFO, LDO & FO STORAGE TANK - POOL FIRE SCENARIO

The maximum quantity of LDO & FO stored at site will be 1 x 25 m³ & 2 x 50 m³ capacity respectively. In the event of oil spillage through a small leakage or due to rupture of pipeline connecting the tank fire will follow after getting ignition source. As the tanks are provided with dyke, the fire will be confined within the dyke. Threshold limit for first degree burns is 4.5 kw/m². Based on these results it may be concluded that the vulnerable zone in which the thermal fluxes above the threshold limit for first degree burns (4.5 kw/m²) is restricted to 25 m.

The hazard distances for various radiation intensities are shown in table 7.2.

TABLE 7.2

HAZARD DISTANCES (Four Tanks on fire - scenario)

- LDO Quantity: 1 x 25 m³
- FO Quantity: 2 x 50 m³
The hazard distances for Thermal radiation are confined to the plant premises only. Hence there will not be any thermal radiation impact on outside the population due to the pool fire scenario. The thick green belt to be developed will help to further mitigate the radiation intensity level outside plant boundary.

7.4 DISASTER MANAGEMENT PLAN

7.4.1 DISASTERS

A disaster is a catastrophic situation in which suddenly, people are plunged into helplessness and suffering and as a result need protection, clothing, shelter, medical and social care and other necessities of life.

Disasters can be divided into two main groups. The first group includes those disasters which result from natural phenomena like earthquakes, volcanic eruptions, cyclones, tropical storms, floods, avalanches, landslides etc. The second group includes disastrous events occasioned by humans, or by their impact upon the environment. Examples are industrial accidents, radiation accidents, factory fires, explosions, escape of toxic gases or chemical substances from an industrial unit, river pollution, mining or other structural collapses; air, sea, rail and road transport accidents. These disastrous events can reach catastrophic dimensions in terms of human loss.

There can be no set criteria for assessing the gravity of a disaster because it depends, to a large extent, on the physical, economic and social environment in which it occurs. What would be considered a major disaster in developing country, equipped to cope with the problems involved, may not mean more than temporary emergency elsewhere. However, all disasters bring in their wake similar consequences that call for immediate action, whether at the local, national or international level, for the rescue and relief of the victims. This includes the search for the dead and injured, medical and social care, removal of the debris, the provision of...
temporary shelter for the homeless, food, clothing and medical supplies and the rapid re-establishment of essential services.

7.4.2 OBJECTIVES OF DISASTER MANAGEMENT OF 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. Effective implementation of Disaster Management Plan will be ensured by its wide circulation among the staff and workers and training of the personnel through rehearsals.

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

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

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

- Pool fire scenario due to HFO/LDO/FO storage
- Minimize damage to the property and the environment.
- Effect the rescue and medical treatment of victims.
- Fulfill the needs of relatives.
- Provide authoritative information to news media.
- Secure the safe rehabilitation of affected areas.
- Safeguard other people.
- Initially contain and then ultimately bring the situation under the control.
- Preserve subsequent records and equipment for subsequent enquiry of the cause and circumstances leading to emergency.
7.4.3 EMERGENCIES

7.4.3.1 GENERAL EMERGENCIES ANTICIPATED:

The emergencies that could be envisaged in the Plant are as follows:

- Pool fire scenario at LDO/FO storage tanks.
- Contamination of food / water.
- Sabotage / social disorder.
- Structural failures.
- Slow isolated fires.

7.4.3.2 SPECIFIC EMERGENCIES ANTICIPATED

During the study of risk assessment, the probabilities of occurrence of hazards are worked out along with the nature of damage. This is the reason why one should study risk assessment in conjunction with DMP.

7.4.3.3 EMERGENCY ORGANISATION

It is recommended to setup an Emergency Organization. A senior executive who has control over the affairs of the Plant would be heading the Emergency Organization. He would be designated as Site Controller. In the case of stores, utilities, open areas which are the not under the control of production heads, executive responsible for maintenance of utilities would be designated as Incident Controller. All the Incident Controllers would be reporting to the Site Controller.

Each Incident Controller organizes a team responsible for controlling the incident with the personnel under his control. Shift in-charge would be the Reporting Officer, who would report the incident to the Incident Controller.

Emergency Coordinators would be appointed who would undertake the responsibilities like fire fighting, rescue, rehabilitation, transport and support services. For this purposes, Security in-charge, staff of the Personnel Department/ Essential services would be engaged. All these personnel would be designated as key personnel.

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

7.4.3.4 EMERGENCY COMMUNICATION

Whosoever notices an emergency situation such as fire, growth of fire, leakage etc. would inform his immediate superior and Emergency Control Center. The person on duty in the Emergency Control Centre would appraise the site controller. Site controller verifies the situation from the Incident Controller of that area or the shift incharge and takes a decision about implementing on Site Emergency Plan. This would be communicated to all the Incident Controllers and Emergency Coordinators. Simultaneously, the emergency warning system would be activated on the instructions of the Site Controller.

7.4.3.5 EMERGENCY RESPONSIBILITIES

The responsibilities of the key personnel are appended below

7.4.3.5.1 SITE CONTROLLER

On receiving information about emergency, he would rush to Emergency Control Centre (ECC) and take the charge of ECC and the situation. He would assess the magnitude of the situation in consultation with the incident controller and decide:

- Whether affected area needs to be evacuated.
- Whether personnel who are at assembly points need to be evacuated.
- Declares Emergency and orders for operation of emergency siren.
- Organizes announcement by public address system about location of emergency.
- Assesses the areas which are likely to be affected, and need to be evacuated or alerted.
- Maintains a continuous review of possible development and assesses the overall situation to decide whether shutting down of any section or whole of the Plant is required.
- Directs personnel of rescue, rehabilitation, transport, fire brigade, medical and other designated mutual support systems, locally available, for meeting emergencies.
- Controls evacuation of affected areas. If the situation is likely to go out of control or effects are likely to go beyond the premises of the factory, informs to District Emergency Authority, Police, and Hospital and seeks their intervention and help.
- Informs Inspector of factories, Deputy Chief Inspector of factories, KSPCB and other statutory authorities.
- Gives public statement, if necessary.
- Keeps record of chronological events and prepares an investigation report and preserves the evidences.

After managing the emergent situation and binging the normalcy at the work place, he makes an statement accordingly

7.4.3.5.2 INCIDENT CONTROLLER

- Assembles the incident control team.
- Directs operations within the affected areas with the priorities for safety to personnel, minimizes damage to the plant, property and environment and minimizes the loss of materials.
- Directs the shutting down and evacuation of Plant and areas likely to be adversely affected by the emergency.
- Ensures that all-key personnel help is sought.
- Provides advice and information to the Fire and Security officer and the local Fire Services as and when they arrive.
- Ensures that all non-essential workers / staff of the effected areas evacuated to the appropriate assembly points and the areas are searched for victims, if any
- Understands the need for preservation of evidence so as to facilitate any enquiry into the cause and circumstances, which resulted or escalated the emergency.
- Coordinates with emergency services at the site.
- Provides tools and safety equipments to the team members.
- Keeps in touch with the team and advise them regarding the method of control to be used.
- Keeps the Site Controller informed continuously about the progress being made?

7.4.3.5.3 EMERGENCY COORDINATOR - RESCUE, FIRE FIGHTING

- Rushes to Emergency Control Centre after knowing about the emergency.
- Helps the Incident Controller in containment of the emergency.
- Ensures fire pumps in operating conditions and instructs pump house operator to be ready for any emergency.
- Guides the fire fighting crew i.e. Firemen, trained Plant personnel and security staff.
- Organizes shifting the fire fighting facilities to the emergency site, if required.
- Takes guidance of the Incident Controller for fire fighting as well as assesses the requirements of outside help.
- Arranges the traffic control at the gate and the incident area.
- Directs the security staff to the incident site to take part in the emergency operations under his guidance and supervision.
- Evacuates the people in the Plant or in the nearby areas as advised by site controller.
- Searches for any casualties and arranges proper aid for them.
- Assembles search and evacuation team.
- Decides paths for the workers evacuating the site
- Maintains law and order in the area, and if necessary seeks the help of police and local administration.
- Arranges safety tools/equipments for the members of his team.

7.4.3.5.4 EMERGENCY COORDINATOR - MEDICAL, MUTUAL AID, REHABILITATION, TRANSPORT AND COMMUNICATION

- The event of failure of electric supply and there by internal telephone, sets up communication point and establishes contact with the Emergency Control Center (ECC) in the event of failure of electric supply and communication network.
- Organizes medical treatment to the injured and if necessary, will shift them to nearby hospitals.
- Mobilizes extra medical help from outside, if necessary
- Keeps a list of qualified first aid providers of the factory and seek their assistance.
- Maintains first aid and medical emergency requirements.
- Makes sure that all safety equipments are made available to the emergency team.
- Assists Site Controller with necessary data and coordinates the emergency activities.
- Assists Site Controller in updating emergency plan.
- Maintains liaison with Civil Administration.
● Ensures availability of canteen facilities and maintenance of rehabilitation centre.
● Remains in liaison with Site Controller / Incident Controller.
● Ensures availability of necessary cash for rescue / rehabilitation and emergency expenditure.
● Controls rehabilitation of affected areas at the end of emergency.
● Makes available diesel/petrol for transport vehicles engaged in emergency operation.

7.4.3.5.5 EMERGENCY COORDINATOR – ESSENTIAL SERVICES

He would assist Site Controller and Incident Controller

● Plans alternate facilities in the event of Power failure, to maintain essential services such as lighting, etc.
● Organizes separate electrical connections for all utilities and during emergency ensures that the essential services and utilities are not affected.
● Gives necessary instructions regarding emergency electrical supply, isolation of certain sections etc to shift incharges and electricians.
● Ensures availability of adequate quantities of protective equipments and other emergency materials, spares etc.

7.4.3.5.6 GENERAL RESPONSIBILITIES OF EMPLOYEES DURING AN EMERGENCY

When an emergency warning is raised, the workers, if they are incharge of any process equipment, should adopt safe and emergency shut down and attend any prescribed duty as an essential employee. If no such responsibility has been assigned, he should adopt a safe course to assembly point and await instructions. He should not resort to spread panic. On the other hand, he must assist emergency personnel towards objectives of DMP.

7.4.3.6. EMERGENCY FACILITIES

7.4.3.6.1 EMERGENCY CONTROL CENTRE

During the emergency, the office block would function as Emergency Control Centre. It would have external Telephone & Fax facility. All the Incident Controllers, Officers, senior personnel would be available there.
The following information and equipments will be provided at the ECC.

- Intercom, telephone
- Fire suit / gas tight goggles / gloves / helmets
- Factory layout, emergency site plan
- Emergency lamp / torchlight
- Plan indicating locations of hazardous inventories, Plant control room, sources of safety equipment, work road plan, assembly points, rescue locations, vulnerable zones, escape routes.
- Hazard chart
- Self-contained breathing apparatus
- Hand tools, wind direction, wind velocity indications
- Public Address Megaphone, Hand bell, Telephone directories (Internal and P&T).
- Address with telephone numbers of key personnel, Emergency coordinator.
- Important addresses, telephone numbers of experts from outside, government agencies, neighboring industries etc.
- Emergency shut down procedures.
- Nominal roll of employees.

7.4.3.6.2 EMERGENCY POWER SUPPLY

Plant facilities would be connected to Diesel Generator and would be placed in auto mode.

7.4.3.6.3 FIRE FIGHTING FACILITIES

First Aid and Fire Fighting equipment suitable for emergency should be maintained as per statutory requirements/ TAC Regulations. Fire hydrant line covering major areas would be laid. It would be maintained at 6 kg / sq.cm. pressure.

7.4.3.6.4 LOCATION OF WIND SOCK

On the top of production block and on the top of administrative block wind socks would be installed to indicate direction of wind during emergency period.
7.4.3.6.5 EMERGENCY MEDICAL FACILITIES

Gas masks and general first aid materials for dealing with chemical burns, fire burns etc. would be maintained in the medical centre as well as in the emergency control room. Private medical practitioners help would be sought. Government hospital would be approached for emergency help.

Apart from Plant first aid facilities, external facilities would be augmented. Names of Medical Personnel, Medical facilities in Raipur city would be prepared and updated. Necessary specific medicines for emergency treatment of burnt patients and for those affected by toxicity would be maintained.

Breathing apparatus and other emergency medical equipment would be provided and maintained. The help of near by industrial managements in this regard would also be taken on mutual support basis.

7.4.3.7 EMERGENCY ACTIONS

7.4.3.7.1 EMERGENCY WARNING

Communication of emergency would be made familiar to the personnel inside the plant and people outside. An emergency warning system would be established.

7.4.3.7.2 EMERGENCY SHUTDOWN

There are number of facilities which can be provided to help in dealing with hazardous conditions. The suggested arrangements are

- Stop feed
- Deluge contents
- Remove heat
- Transfer contents

Methods of removing additional heat include removal by the normal cooling arrangements or by the use of an emergency cooling system. Cooling facilities which vaporizes liquid may be particularly effective, since a big increase in vaporization can be obtained by reducing pressure.
7.4.3.7.3 EVACUATION OF PERSONNEL

The area would have adequate number of exits and staircases. In the event of an emergency, unrelated personnel have to escape to assembly point. Operators have to take emergency shutdown procedure and escape. Time office maintains a copy of deployment of employees in each shift at Emergency Communication Centre. If necessary, persons can be evacuated by rescue teams.

7.4.3.7.4 ALL CLEAR SIGNAL

At the end of emergency, after discussing with Incident Controllers and Emergency Coordinators, the site controller orders an all clear signal.

7.5 OCCUPATIONAL HEALTH AND SURVEILLANCE

Large industries where multifarious activities are involved during construction, erection, testing, commissioning, operation and maintenance, the men, materials and machines are the basic inputs. Along with the booms, the industrialization generally brings several problems related with health and safety of the workmen.

7.5.1 OCCUPATIONAL HEALTH

Occupational health needs attention both during construction and operation phases. However, the problem varies both in magnitude and variety in the above phases.

7.5.2 CONSTRUCTION & ERECTION

The occupational health problems envisaged at this stage can mainly be due to constructional activities and noise.

To overcome these hazards, in addition to arrangements required to reduce it within TLV'S, personnel protective equipments should also be supplied to workers.

7.4.3 OPERATION & MAINTENANCE

The working personnel would be given the following appropriate personnel protective equipments.

- Industrial Safety helmets
- Crash helmets
- Face shield with replacement acrylic vision
- Zero power plain goggles with cut type filters on both ends
- Zero power goggles with cut type filters on both sides and blue colour glasses
- Welders equipment for eye and face protection
- Cylindrical type earplug
- Ear plugs
- Canister gas masks
- Self contained breathing apparatus
- Leather apron
- Safety belt / line man's safety belt
- Leather hand gloves
- Asbestos hand gloves
- Canvas cum leather hand gloves with leather palm
- Industrial safety shoes with steel toe
- Electrical safety shoes without steel toe and gum boots

### 7.5.4 OCCUPATIONAL HEALTH [Gen. TOR # 8 (i)]

The following are the Anticipated Occupational & Safety Hazards due to the proposed project.

**Anticipated Occupational & Safety Hazards**

- Heat Stress & Stroke
  - Physical activity
  - Extremes of age, poor physical condition, fatigue
  - Excessive clothing
  - Dehydration
  - Cardiovascular disease
  - Skin disorders
  - Dust Exposure

- Metallic dust exposure
- Noise
- Illumination
- Burns and shocks due electricity
Note: The air and water samples at the site revealed that Arsenic is Below Detectable Level. Hence Arsenicosis Management Plan is not envisaged.

The health of workers can be protected by adopting the following measures:

- Proper Designing of building, Work area.
- Relaxation facilities to workers in working in furnace are in separate rooms with good ventilation & air circulation. This will help in relieving of thermal stress.
- Good Housekeeping practices
- Well engineered ventilation & exhaust system
- Enclosure
- Isolation of specific areas
- Enforcement of usage of Personal Protective Devices.
- Regular Work Environment Monitoring
- Statistical Monitoring
- Working hours
- Rotation of employees in specific areas to avoid continuous exposure

**Frequency of Periodical Examination:**

For employees <30 Years once in five years
- Between 31-50 Years once in four years
- Between 41-50 Years once in two years
- Above >50 years once a year

**Personal Protective Devices and Measures**

- Industrial Safety helmets
- Crash helmets
- Face shield with replacement acrylic vision
- Zero power goggles with cut type filters on both sides and blue color glasses
- Welders equipment for eye and face protection
- Ear muffs
- Canister gas masks
Self contained breathing apparatus
Leather apron
Safety belt / line man’s safety belt
Leather hand gloves
Asbestos hand gloves
Canvas cum leather hand gloves with leather palm
Industrial safety shoes with steel toe
Electrical safety shoes without steel toe and gum boots
Protective clothing etc.

Plan of pre-placement and periodical health status of workers:

Pre-employment check up will be made mandatory and following test will be conducted:

Plan of evaluation of health of workers
Chest x rays
Audiometry
Spirometry
Vision testing (Far & Near vision, color vision and any other ocular defect)
ECG
Haemogram (examination of the blood)
Urine (Routine and Microscopic)
Complete physical examination
- Musculo-skeletal disorders (MSD)
- Backache
- Pain in minor and major joints
- Fatigue, etc.

Medical records of each employee will be maintained separately and will be updated as per finding during monitoring. Age, sex wise, department wise data on the above parameters will be maintained and submitted to the ministry.

Medical records of the employee at the end of his / her term will be updated.
List of equipment for Occupational Health Monitoring

- ECG
- Analytical Pan Balance
- Dust Sampling devices
- Heat stress monitoring device (Personal)
- Spectrophotometer
- Noise Monitoring device (dosimeter)
- Spirometer
- Audiometric device
- Vision screener

7.6 SAFETY PLAN

Safety of both men and materials during construction and operation phases is of great concern. The preparedness of an industry for the occurrence of possible disasters is known as emergency plan. The disaster in Project is possible due to collapse of structures and fire / explosion etc.

The details of fire fighting equipments to be installed are given below:

- Carbon dioxide type
- Foam type
- DCP type
- Soda acid type
- Fire buckets
- Fire hydrants

Keeping in view the safety requirement during construction, operation and maintenance phases, API Ispat & Powertech Pvt. Ltd. has formulated safety policy with the following regulations.

- To take steps to ensure that all known safety factors are taken into account in the design, construction, operation and maintenance of Plants, machinery and equipment.
- To allocate sufficient resources to maintain safe and healthy conditions of work.
- To ensure that adequate safety instructions are given to all employees.
- To provide where ever necessary protective equipment, safety appliances and clothing and to ensure their proper use.
• To inform employees about materials, equipments or processes used in their work which are known to be potentially hazardous to health and safety.

• To keep all operations and methods of work under regular review for making necessary changes from the safety point of view in the light of experience and up to date knowledge.

• To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work.

• To provide appropriate instructions, training and supervision to employee’s health and safety, first aid and to ensure that adequate publicity is given to these matters.

• To ensure proper implementation of fire preventive methods and an appropriate fire fighting service along with training facilities for personnel involved in this service.

• To publish / notify regulations, instructions and notices in the common language of employees.

• To prepare separate safety rules for each type of process involved.

• To ensure regular safety inspection by a competent person at suitable intervals of all buildings, equipments, work places and operations.

7.6.1 SAFETY ORGANISATION

7.6.1.1 CONSTRUCTION AND ERECTION PHASE

A highly qualified and experienced safety officer has already been appointed. The responsibilities of the safety officer include identification of the hazardous conditions and unsafe acts of workers and advice on corrective actions, conduct safety audit, organize training programmes and provide professional expert advice on various issues related to occupational safety and health. In addition to employment of safety officer, every contractor, whose employees will be more than 250, would also be asked to employ one safety officer to ensure safety of the workers in accordance with the conditions of the contract.

7.6.1.2 OPERATION & MAINTENANCE PHASE

After the completion of construction, the posting of safety officer would be in accordance with the requirements of Factories Act and he will be assigned the duties and responsibilities accordingly.
7.6.1.3 SAFETY CIRCLE

In order to fully develop the capabilities of the employees in identification of hazardous processes and improving safety and health, safety circles would be constituted in each area of work. The circle would consist of 5-6 employees from that area. The circle would normally meet for about an hour every week.

7.6.2 SAFETY TRAINING

A full fledged training centre will be established at API Ispat & Powertech Pvt. Ltd. Safety training will be provided by the safety officers with the assistance of faculty members called from professional safety institutions and universities. In addition to regular employees, limited contractor labours will also given safety training. To create safety awareness safety films will be shown to workers and leaflets etc. will be distributed.

7.6.3 HEALTH AND SAFETY MONITORING PLAN

All the potential occupational hazardous work places will be monitored regularly. The health of employees working in these areas will be monitored once in a year.

7.7 SOCIAL IMPACT ASSESSMENT

The local areas will be benefited by way of generation of employment opportunities, increased demand for local products and services. There will be an improvement in the income level of the local people.

The project will generate employment opportunities for about 250 persons during construction stage and for about 100 persons once the plant is commissioned. Priority will be given to locals for Semi-Skilled and Unskilled jobs.

Due to this the economic conditions, the educational and medical standards of the people living in the study area will certainly move upwards which will result in overall economic development, improvement in general aesthetic environment and increase in business opportunities.

The successful commissioning and running of the proposed plant will attract more industrial investments which in turn will benefit the society and the nation.
7.8 **R & R ACTION PLAN**

There is no habitation in the proposed site. Expansion will be taken up in the existing plant premises only. Hence no Rehabilitation & Resettlement Action Plan will be required.