7.0 ADDITIONAL STUDIES

7.1 Risk Assessment and Disaster Management Plan

Hazard analysis involves the identification and quantification of the various hazards (unsafe conditions) that exist in the plant. On the other hand, risk analysis deals with the identification and quantification of risks, the plant equipment and personnel are exposed to, due to accidents resulting from the hazards present in the plant.

Risk analysis follows an extensive hazard analysis. It involves the identification and assessment of risks the neighbouring populations are exposed to as a result of hazards present. This requires a thorough knowledge of failure probability, credible accident scenario, vulnerability of population etc.

In the sections below, the identification of various hazards, probable risks in the proposed expansion of Steel Melting Plant and Rolling Mill, maximum credible accident analysis, consequence analysis are addressed which gives a broad identification of risks involved in the plant. Based on the risk estimation for fuel and chemical storage, Disaster Management Plan (DMP) has been prepared.

7.1.1 Approach to the Study

Risk involves the occurrence or potential occurrence of some accidents consisting of an event or sequence of events. The risk assessment study covers the following:

- Identification of potential hazard areas;
- Identification of representative failure cases;
- Visualization of the resulting scenarios in terms of fire (thermal radiation) and explosion;
- Assessment of the overall damage potential of the identified hazardous events and the impact zones from the accidental scenarios;
- Assessment of the overall suitability of the site from hazard minimization and disaster mitigation points of view;
- Furnishing specific recommendations on the minimization of the worst accident possibilities; and
- Preparation of broad Disaster Management Plan (DMP), On-site and Off-site Emergency Plan, which includes Occupational and Health Safety Plan.

7.1.2 Hazard Identification

Identification of hazards in the proposed steel industry expansion is of primary significance in the analysis, quantification and cost effective control of accidents. A classical definition of hazard states that hazard is in fact the characteristic of system/plant/process that presents potential for an accident.

Hence, all the components of a system/plant/process need to be thoroughly examined to assess their potential for initiating or propagating an unplanned event/sequence of events, which can be termed as an accident. The following two methods for hazard identification have been employed in the study:

- Identification of major hazardous units based on Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 of Government of India (GOI Rules, 1989); and
7.1.3 Identification of Major Hazardous Units

Hazardous substances may be classified into three main classes such as flammable substances, unstable substances and toxic substances. The ratings for a large number of chemicals/substances based on flammability, reactivity and toxicity have been given in NFPA Codes 49 and 345 M.

The details of Fuel oil (Furnace oil) storage and its classification as per GOI rules are given in Table - 7.1. Hazardous characteristics of Fuel oil (Furnace oil) are listed in Table - 7.2.

**TABLE - 7.1**

**CATEGORY WISE SCHEDULE OF STORAGE FACILITIES AFTER THE PLANT OPERATION**

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Chemical/ Fuel</th>
<th>No. of Tanks</th>
<th>Storage Capacity</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fuel oil (Furnace oil)</td>
<td>2</td>
<td>1 x 25000 = 25,000 L</td>
<td>Flammable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 x 19000 = 19,000 L</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Fuel Oil (Furnace Oil) will be used as fuel for Reheating Furnace*

**TABLE - 7.2**

**PROPERTIES OF FUELS USED AT THE PLANT**

<table>
<thead>
<tr>
<th>Chemical/ Fuel</th>
<th>Codes/Label</th>
<th>TLV</th>
<th>FBP °C</th>
<th>MP °C</th>
<th>FP °C</th>
<th>UEL %</th>
<th>LEL %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furnace oil</td>
<td>Flammable</td>
<td>5 mg/m³</td>
<td>400</td>
<td>338</td>
<td>32.96</td>
<td>7.5</td>
<td>0.6</td>
</tr>
</tbody>
</table>

**7.1.4 Identification of Major Hazard Installations Based on GOI Rules, 1989**

Following accidents in the chemical industry in India over a few decades, a specific legislation covering major hazard activities has been enforced by Govt. of India in 1989 in conjunction with Environmental Protection Act, 1986. This is referred here as GOI rules 1989. For the purpose of identifying major hazard installations, the rules employ certain criteria based on toxic, flammable and explosive properties of chemicals.

A systematic analysis of the fuels/chemicals and their quantities of storage has been carried out, to determine threshold quantities as notified by GOI Rules, 1989 and the applicable rules are identified. Applicability of storage rules is summarized in Table - 7.3.

**TABLE - 7.3**

**APPLICABILITY OF GOI RULES TO FUEL STORAGE**

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Chemical/ Fuel</th>
<th>Listed in Schedule</th>
<th>Total Quantity</th>
<th>Threshold Quantity (T) for Application of rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Furnace Oil</td>
<td>3(1)</td>
<td>44000 Litres</td>
<td>5,7-9,13-15 10-12 25 MT 200 MT</td>
</tr>
</tbody>
</table>
7.1.5 Common Causes of Accidents

Based on the analysis of past accident information, common causes of accidents are identified as:

- Poor housekeeping;
- Improper use of tools, equipment, facilities;
- Unsafe or defective equipment facilities;
- Lack of proper procedures;
- Failure to follow prescribed procedures;
- Failure to understand the jobs;
- Lack of awareness of involved hazards;
- Lack of guides and safety devices; and
- Lack of protective equipment and clothing.

7.1.6 Failures of Human Systems

Major causes of human failures reported are due to:

- Stress induced by poor equipment design, unfavourable environmental conditions, fatigue, etc.;
- Lack of training in safety and loss prevention;
- Indecision in critical situations; and
- Inexperienced staff being employed in hazardous situations.

Often, human errors are not analysed while reporting accidents and the accident reports only provide information about equipment and/or component failures. Hence, a great deal of uncertainty surrounds analysis of failure of human systems and consequent damages.

7.2 Hazard Assessment and Evaluation

7.2.1 Methodology

An assessment of the conceptual design is conducted for the purpose of identifying and examining hazards related to utility and support systems, environmental factors, facilities, and safeguards.

7.2.2 Preliminary Hazard Analysis (PHA)

A preliminary hazard analysis is carried out initially to identify the major hazards associated with storage in the proposed expansion activity. This is followed by consequence analysis to quantify these hazards. Finally, the vulnerable zones are plotted for which risk reducing measures are deducted and implemented. Preliminary hazard analysis for fuel storage area and whole plant is given in Table - 7.4 and Table - 7.5.

### TABLE - 7.4

<table>
<thead>
<tr>
<th>Unit</th>
<th>Capacity</th>
<th>Hazard Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furnace oil</td>
<td>44000 Litres</td>
<td>Fire/Explosion</td>
</tr>
</tbody>
</table>
TABLE - 7.5
PRELIMINARY HAZARD ANALYSIS IN GENERAL

<table>
<thead>
<tr>
<th>PHA Category</th>
<th>Description of Plausible Hazard</th>
<th>Recommendation</th>
<th>Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental factors</td>
<td>If there is any leakage and eventuality of source of ignition.</td>
<td>---</td>
<td>All electrical fittings and cables will be provided as per the specified standards. All motor starters are flame proof.</td>
</tr>
<tr>
<td></td>
<td>Highly inflammable nature of fuels may cause fire hazard in the storage facility.</td>
<td>A well designed fire protection including protein foam, dry powder, CO₂ extinguisher should be provided.</td>
<td>Fire extinguisher of small size and big size are provided at all potential fire hazard places. In addition to the above, fire hydrant network is also provided.</td>
</tr>
</tbody>
</table>

- **Safety Measures in Storage Facilities**

Risk for storage units depends not on the extent of the consequences, but also on the probability of the failure of the safety measures and provisions provided. The safety measures to be provided in storage facilities in the proposed expansion project are given below:

<table>
<thead>
<tr>
<th>Substance Stored</th>
<th>Safe Guard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furnace oil</td>
<td>Following Fire Fighting measures will be provided:</td>
</tr>
<tr>
<td></td>
<td>a) DCP extinguisher;</td>
</tr>
<tr>
<td></td>
<td>b) AFFF Extinguisher;</td>
</tr>
<tr>
<td>High Speed Diesel (HSD)</td>
<td>c) Water cum Foam Monitor; and</td>
</tr>
<tr>
<td></td>
<td>d) Sand Bucket.</td>
</tr>
</tbody>
</table>

7.2.3 **Maximum Credible Accident Analysis (MCAA)**

Hazardous substances may be released as a result of failures or catastrophes, causing possible damage to the surrounding area. This section deals with the question of how the consequences of the release of such substances and the damage to the surrounding area can be determined by means of models. Major hazards posed by flammable storage can be identified taking recourse to MCA analysis. MCA analysis encompasses certain techniques to identify the hazards and calculate the consequent effects in terms of damage distances of heat radiation, toxic releases, vapour cloud explosion, etc. A host of probable or potential accidents of the major units in the complex arising due to use, storage and handling of the hazardous materials are examined to establish their credibility. Depending upon the effective hazardous attributes and their impact on the event, the maximum effect on the surrounding environment and the respective damage caused can be assessed. The reason and purpose of consequence analysis are many folds like:

- Part of risk assessment;
- Plant layout/code requirements;
- Protection of other plants;
- Protection of the public;
- Emergency planning; and
- Design criteria.
The results of consequence analysis are useful for getting information about all known and unknown effects that are of importance when some failure scenario occurs in the plant and also to get information as how to deal with the possible catastrophic events. It also gives the workers in the plant and people living in the vicinity of the area, an understanding of their personal situation.

- **Selected Failure Cases**

The purpose of this listing is to examine consequences of such failure individually or in combination. It will be seen from the list that failure cases related to storage of Furnace Oil have been identified. A disastrous situation may arise due to outcome of fire, explosion or toxic hazards in addition to other natural causes, which eventually lead to loss of life, property and ecological imbalance.

Major hazards posed by flammable storage can be identified taking recourse to MCA analysis. Depending upon the effective hazardous attributes and their impact on the event, the maximum effect on the surrounding environment and the respective damage caused can be assessed.

**7.2.3.1 Damage Criteria**

The fuel storage and unloading facility may lead to fire and explosion hazards. The damage criteria due to accidental release of any hydrocarbon arise from fire and explosion. The vapours of these fuels are not toxic and hence no effects of toxicity are expected. Tank fire will occur if the radiation intensity is high on the peripheral surface of the tank leading to increase in internal tank pressure. Pool fire will occur when fuel collected in the dyke due to leakage gets ignited.

- **Fire Damage**

A flammable liquid in a pool will burn with a large turbulent diffusion flame. This releases heat based on the heat of combustion and the burning rate of the liquid. A part of the heat is radiated while the rest is convected away by rising hot air and combustion products. The radiations can heat the contents of a nearby storage or process unit to above its ignition temperature and thus result in a spread of fire. The radiations can also cause severe burns or fatalities of workers or fire fighters located within a certain distance. Hence, it will be important to know beforehand, the damage potential of a flammable liquid pool likely to be created due to leakage or catastrophic failure of a storage or process vessel.

This will help to decide the location of other storage vessels and decide the type of protective clothing the workers/fire fighters need, the duration of time for which they can be in the zone, the fire extinguishing measures needed and the protection methods needed for the nearby storage/process vessels. The damage effects on people and equipment due to thermal radiation intensity are presented in **Tables - 7.6**.
TABLE - 7.6
DAMAGE DUE TO INCIDENT RADIATION INTENSITIES

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Incident Radiation (kW/m²)</th>
<th>Type of Damage Intensity</th>
<th>Damage to Equipment</th>
<th>Damage to People</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>37.5</td>
<td>Damage to process equipment</td>
<td></td>
<td>100% lethality in 1 min. 1% lethality in 10 sec.</td>
</tr>
<tr>
<td>2.</td>
<td>25.0</td>
<td>Minimum energy required to ignite wood at indefinitely long exposure without a flame</td>
<td>50% Lethality in 1 min. Significant injury in 10 sec.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>19.0</td>
<td>Maximum thermal radiation intensity allowed on thermally unprotected adjoining equipment</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>12.5</td>
<td>Minimum energy to ignite with a flame; melts plastic tubing</td>
<td>1% lethality in 1 min.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>4.5</td>
<td>-</td>
<td>Causes pain if duration is longer than 20 sec, however blistering is un-likely (First degree burns)</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>1.6</td>
<td>-</td>
<td>Causes no discomfort on long exposures</td>
<td></td>
</tr>
</tbody>
</table>

Source: Techniques for Assessing Industrial Hazards by World Bank

The effect of incident radiation intensity and exposure time on lethality is given in Table - 7.7.

TABLE - 7.7
RADIATION EXPOSURE AND LETHALITY

<table>
<thead>
<tr>
<th>Radiation Intensity (kW/m²)</th>
<th>Exposure Time (seconds)</th>
<th>Lethality (%)</th>
<th>Degree of Burns</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.6</td>
<td>--</td>
<td>0</td>
<td>No Discomfort even after long exposure</td>
</tr>
<tr>
<td>4.5</td>
<td>20</td>
<td>0</td>
<td>1st</td>
</tr>
<tr>
<td>4.5</td>
<td>50</td>
<td>0</td>
<td>1st</td>
</tr>
<tr>
<td>8.0</td>
<td>20</td>
<td>0</td>
<td>1st</td>
</tr>
<tr>
<td>8.0</td>
<td>50</td>
<td>&lt;1</td>
<td>3rd</td>
</tr>
<tr>
<td>8.0</td>
<td>60</td>
<td>&lt;1</td>
<td>3rd</td>
</tr>
<tr>
<td>12.0</td>
<td>20</td>
<td>&lt;1</td>
<td>2nd</td>
</tr>
<tr>
<td>12.0</td>
<td>50</td>
<td>8</td>
<td>3rd</td>
</tr>
<tr>
<td>12.5</td>
<td>--</td>
<td>1</td>
<td>--</td>
</tr>
<tr>
<td>25.0</td>
<td>--</td>
<td>50</td>
<td>--</td>
</tr>
<tr>
<td>37.5</td>
<td>--</td>
<td>100</td>
<td>--</td>
</tr>
</tbody>
</table>
7.3 Visualization of MCA Scenarios

7.3.1 Scenarios considered for MCA Analysis

7.3.1.1 Fuel Storage (Furnace oil)

The details of storages are given in Table - 7.1. In case of fuel released in the area catching fire, a steady state fire will ensue. Failures in pipeline may occur due to corrosion and mechanical defect. Failure of pipeline due to external interference is not considered as this area is licensed area and all the work within this area is closely supervised with trained personnel.

7.3.1.2 Modeling Scenarios

Based on the storage and consumption of fuels the following failure scenarios for the proposed expansion of steel melting plant and rolling mill have been identified for MCA analysis and the scenarios are discussed in Tables - 7.8.

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Fuel</th>
<th>Total Quantity</th>
<th>Scenarios Considered</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Failure of FO tank</td>
<td>44,000 Litres</td>
<td>Pool fire</td>
</tr>
</tbody>
</table>

The fuel properties considered for modeling are given in Table - 7.9.

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Fuel</th>
<th>Molecular Weight (kg/kg.mol)</th>
<th>Boiling point °F</th>
<th>Density Kg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Furnace oil</td>
<td>135</td>
<td>350</td>
<td>900</td>
</tr>
</tbody>
</table>

7.3.2 Model Computations

- Results and Discussion - Pool fire

The results of MCA analysis are tabulated indicating the distances for various damages identified by the damage criteria. Calculations are done for radiation intensity levels of 37.5, 25, 12.5, 4.5 and 1.6 kW/m² which are presented in Table - 7.10. The distances computed for various scenarios are given in meters and are from the centre of the pool fire.

<table>
<thead>
<tr>
<th>Radiation and Effect</th>
<th>Radiation Intensities (kW/m²)/Distances (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure of Furnace Oil Tank</td>
<td></td>
</tr>
<tr>
<td></td>
<td>61.9 78.0 91.2 115.8 207.3 373.8</td>
</tr>
</tbody>
</table>
Pool fire due to the Failure of Furnace oil storage Tank

The maximum quantity of storage of Furnace oil tanks 1 and 2 is 25,000 litres and 19000 litres respectively. The most credible failure is the rupture of the largest pipe connecting the storage tank. As the worst case, it is assumed that the entire contents leak out into the dyke forming a pool, which may catch fire on finding a source of ignition.

A perusal of the above table clearly indicates that 37.5 kW/m² (100% lethality) occurs within the radius of the pool which is computed at 61.9 m in case of furnace oil tank on pool fire. This vulnerable zone will damage fuel storage of all equipment falling within the pool radius.

The threshold limit for 50% and 1% lethality is 25.0 and 12.5 kW/m². From the result it is concluded that the vulnerable zone in which the thermal fluxes above the threshold limit for 50% and 1% lethality is restricted to 78.0 m and 115.8 m.

Similarly, the threshold limit for first degree burns is 4.5 kW/m², and this vulnerable zone in which the thermal fluxes above the threshold limit for first degree is restricted to 207.3 m in case of furnace oil tank on pool fire. The contour map showing the pool fire due to failure of Furnace oil storage tanks of (1 x 25000 litres) and (1 x 19000 litres) capacity is given in Figure - 7.1.
FIGURE - 7.1
RADIATION CONTOUR LAYOUT FOR FURNACE OIL STORAGE TANKS
7.3.3 Risk Assessment Summary

The preliminary risk assessment has been completed for the proposed expansion of steel melting plant and associated facilities:

- There will be no significant community impacts or environmental damage consequences; and
- The hazardous event scenarios and risks in general at this facility can be adequately managed to acceptable levels by performing the recommended safety as part of detailed design, applying recommended control strategies and implementing a Safety Management System.

7.3.4 Recommended Approach to Combat with the Possible Accidents

Considering all possible accident scenarios as analysed in the risk analysis, it is established that there will not be any major potential hazards in the project causing major damages inside and outside the boundary.

In spite of this, the project authorities should be well prepared to handle any such eventuality as described below;

**In case of Explosion:**

The following measures and actions are to be taken:

- Evacuate the area in vicinity;
- Take all necessary actions to avoid escalation of the accident;
- If problem appears to be out of control, call fire brigade and police. Report to the District collector, and;
- Provide first aid to the victims as suggested in the Material Safety Data Sheets.

**Spillage due to Storage Tank Rupture**

This accident scenario has considerable damage potential. In such scenario the following steps should be taken:

- Contain fuel supply to the tankers;
- Determine the extent of damage;
- Undertake all the emergency actions mentioned above.

**Spillage from storage tank, storage tank/tanker overfilling, pipe-hose rupture**

In addition to the measures stated above, the following actions are to be taken:

- Stop further process of filling immediately;
- Note the amount of fuel spilled in the area;
- If the tanker is on the road, communicate about the accident to the traffic police;
- Take help of the traffic police for preliminary emergency actions.
Major Spillage due to Storage tank rupture

This accident scenario has considerable damage potential. In such case the following steps have to be taken up:

- Determine the extent of damage;
- Contain fuel supply of FO tanks;
- Undertake all the emergency actions mentioned above.

7.4 Disaster Management Plan

The disaster management plan has been prepared inline with Tiruvallur District Disaster Management Plan, 2016. A disaster is a catastrophic situation in which suddenly, people are plunged into helplessness and suffering, as a result, need protection, clothing, shelter, medical and social care and other necessities of life.

Disasters can be divided into two main groups. In the first, disasters resulting from natural phenomena like earthquakes, volcanic eruptions, storm surges, cyclones, tropical storms, floods, avalanches, landslides, forest fires etc. The second group includes disastrous events occasioned by man, or man’s impact upon the environment. Examples are armed conflict, radiation accidents, campus fires, river pollution, air, sea, rail and road transport accidents and can reach catastrophic dimensions in terms of human loss.

There can be no set criteria for assessing the gravity of a disaster in the abstract since this depends to a large extent on the physical, economic and social environment in which it occurs. What would be considered a major disaster in a developing country, ill-equipped to cope with the problems involved may not mean more than a temporary emergency elsewhere.

However, all disaster brings 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 and removal of debris and social care, the provision of temporary shelter to the homeless food, clothing and medical supplies, and the rapid re-establishment of essential services.

7.4.1 Objectives of Disaster Management Plan (DMP)

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

The Disaster Management Plan would reflect the probable, consequential severity of the undesired event due to deteriorating conditions or through ‘Knock on’ effects. Further the management should be able to demonstrate that their assessment of the consequences uses good supporting evidence and is based on currently available and reliable information, incident data from internal and external sources and if necessary the reports of outside agencies. To tackle the consequences of a major emergency inside the factory or immediate vicinity of the factory, a planned emergency document is prepared, called the “Disaster Management Plan”
The objective of the Disaster Management Plan is to make use of the combined resources of the plant and the outside services to achieve the following:

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

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

7.4.2 Specific Emergencies Anticipated

Fire consequences can be disastrous, since they involve huge quantities of fuel either stored or in dynamic inventory in pipelines or in nearby areas. Toxic releases can affect persons working around. Preliminary hazard Analysis has provided a basis for consequence estimation.

7.4.3 Emergency Organization

It is recommended to set up 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 at Site Controller. Works Manager would be designated as the Incident Controller. In the case of stores, utilities, open areas, which are not under the control of the Production Heads, Senior 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, for him self, organizes a team responsible for controlling the incidence with the personnel under his control. Shift In-charge would be the reporting officer, who would bring the incidence to the notice of the Incidence Controller and Site Controller. Emergency co-ordinators would be appointed who would undertake the responsibilities like fire fighting, rescue, rehabilitation, transport and provide essential and support services. For this purposes, Security In-charge, Personnel Department, Essential services personnel would be engaged. All these personnel would be designated as Key personnel.

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

7.4.3.1 Emergency Communication

Whoever notices an emergency situation such as fire, escalation of fire, leakage etc will inform his immediate superior and Emergency Control Center. A place nearer to the security office shall be identified as Emergency Control Center. The person on duty in the Emergency Control
7.4.4 Onsite Emergency Preparedness and Response for Accidents

7.4.4.1 Emergency Responsibilities

The responsibilities of the key personnel are appended below:

**Site Controller:**

On receiving information about emergency he would rush to Emergency Control Center (ECC) and take charge of ECC and the situation and;

- Assesses the magnitude of the situation on the advice of incident Controller and decides, Whether the affected area needs to be evacuated,
- Whether personnel who are at assembly points need to be evacuated,
- Declare Emergency and order for operation of emergency siren,
- Organizes announcement by public address system about location of emergency,
- Assesses which areas are likely to be affected, or need to be evacuated or need to be alerted,
- Maintains a continuous review of possible development and assesses the situation in consultation with Incident Controller and other Key Personnel as to whether shutting down the plant or any section of the plant is required and if evacuation of persons is required,
- Directs personnel for 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 the District Emergency Authority, Police, Hospital and seeks their intervention and help,
- Informs the Inspector of Factories, Deputy Chief Inspector of Factories, TNPCB and other statutory authorities,
- Gives a public statement if necessary,
- Keeps record of chronological events and prepares an investigation report and preserve evidence,
- On completion of On Site Emergency and restoration of normalcy, declares all clear and orders for all clear warning.

**Incident Controller:**

- Assembles the incident control team.
- Directs operations within the affected areas with the priorities for safety to personnel minimize damage to the plant, property and environment and minimize the loss of materials.
- Directs the shutting down and evacuation of plant and areas likely to be adversely affected by the emergency.
- Ensure that 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.
Chapter-7
Additional Studies

Environmental Impact Assessment for the Proposed Expansion of Steel Melting Plant and Rolling Mill from 27,000 TPA to 90,000 TPA of MS Billets and 60,000 TPA to 89,700 TPA of Re-Rolled Steel Products by M/s. GBR Metals Private Limited at Peravallur Village, Ponneri Taluk, Tiruvallur District, Tamil Nadu

- Ensures that all non-essential workers/staff of the affected areas evacuated to the appropriate assembly points, and the areas are searched for casualties.
- Has regard to the need for preservation of evidence so as to facilitate any inquiry into the causes and circumstances, which caused or escalated the emergency.
- Co-ordinates with emergency services at the site.
- Provides tools and safety equipment to the team members.
- Keeps in touch with the team and advice them regarding the method of control to be used.
- Keeps the Site Controller of Emergency informed of the progress being made

Emergency Coordinator - Rescue, Fire Fighting:

- Helps the incident Controller in containment of the emergency;
- Ensures fire pumps are in operating conditions and instructs pump house operator to be ready for any emergency with standby arrangement;
- Guides the fire fighting crew i.e. firemen, trained plant personnel and security staff;
- Organizes shifting of 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 to control the traffic 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 casualties and arranges proper aid for them;
- Assembles search and evacuation team;
- Arranges for safety equipment for the members of this team;
- Decides which paths the evacuated workers should follow;
- Maintains law and order in the area, and if necessary seeks the help of police.

Emergency Coordinator-Medical, Mutual Aid, Rehabilitation, Transport and Communication:

- In the event of failure of electric supply and thereby internal telephone, sets up communication point and establishes contact with the ECC;
- Organizes medical treatment to the injured and if necessary will shift the injured 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 equipment is made available to the emergency team;
- Assists Site Controller with necessary data and to coordinate the emergency activities;
- Assists Site Controller in updating emergency plan, organizing mock drills verification of inventory of emergency facilities and furnishing report to Site Controller;
- Maintains liaison with Civil Administration;
- Ensures availability of canteen facilities and maintenance of rehabilitation center;
- He will be in liaison with Site Controller/Incident Controller;
- Ensures transportation facility;
- Ensures availability of necessary cash for rescue/rehabilitation and emergency expenditure;
- Controls rehabilitation of affected areas on discontinuation of emergency;
- Ensures availability of diesel/petrol for transport vehicles engaged in emergency operation.
Emergency Coordinator - Essential Services:

- He would assist Site Controller and Incident Controller.
- Maintains essential services like Diesel Generator, Water, Fire Water, Compressed Air/Instrument Air, power supply for lighting.
- He would plan alternate facilities in the event of power failure, to maintain essential services such as lighting, refrigeration plant etc.
- He would organize separate electrical connections for all utilities and emergency services so that in the event of emergency or fires, essential services and utilities are not affected.
- Gives necessary instructions regarding emergency electrical supply, isolation of certain sections etc. to shift in-charge and electricians.
- Ensures availability of adequate quantities of protective equipment and other emergency materials, spares etc.

General Responsibilities of Employees during an Emergency:

During an emergency, it becomes more enhanced and pronounced when an emergency warning is raised, the workers if they are in-charge of process equipment should adopt safe and emergency shut down and attend any prescribed duty as essential employee. If no such responsibility is 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.

7.4.4.2 Emergency Facilities

Emergency Control Center (ECC):

For the time being, Office Block or a place nearer to the security office is identified as Emergency Control Center. It would have external Telephone, Fax, and Telex facility. All the Site Controller/ Incident Controller Officers, Senior Personnel would be located here. Also, it would be an elevated place. The following information and equipment are to be provided at the Emergency Control Center (ECC).

- Intercom, telephone
- P and T telephone
- Safe contained breathing apparatus
- Fire suit/gas tight goggles/gloves/helmets
- Hand tools, wind direction/velocities indications
- Public address megaphone, hand bell, telephone directories
- (Internal P and T) factory layout, site plan
- Emergency lamp/torch light/batteries
- Plan indicating locations of hazard inventories, plant control room, sources of safety equipment, work road plan, assembly points, rescue location vulnerable zones, escape routes.
- Hazard chart
- Emergency shut-down procedures
- Nominal roll of employees
- List of key personnel, list of essential employees, list of Emergency Co-ordinators
- Duties of key personnel
- Address with telephone numbers and key personnel, emergency coordinator, essential employees.
• Important address and telephone numbers including Government agencies, neighboring industries and sources of help, outside experts, chemical fact sheets population details around the factory.

Assembly Point:

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

In view of the size of plant, different locations are earmarked as assembly points. Depending upon the location of hazard, the assembly points are to be used.

Fire Fighting Facilities:

First Aid Fire fighting equipment suitable for emergency should be maintained in each section in the plant. This would be as per statutory requirements. However, fire hydrant line covering major areas would be laid. It would be maintained at 6 - kg/cm² pressure. Fire alarms would be located in the bulk storage areas. Fire officer will be the commanding officer of fire fighting services.

Location of Wind Sock:

On the top of the Administration block and the top of each production blocks, windsocks shall be installed to indicate direction of wind for emergency escape.

Emergency Medical Facilities:

Stretchers, gas masks and general first aid materials for dealing with fire burns would be maintained in the medical center as well as in the emergency control room. Medical superintendent of the township will be the head of the casualty services ward. Private medical practitioners help would be also are 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 the area would be prepared and updated. Necessary specific medicines for emergency treatment of Burns for 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 management in this regard would be taken on mutual support basis.

Ambulance:

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

**Emergency Warning**

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

**Emergency Shutdown**

There are number of facilities which can be provided to help deal with hazardous conditions, when a tank is on fire. The suggested arrangements are:

1. Stop the production;
2. Dilute contents;
3. Remove heat;
4. Deluge with water; and
5. Transfer contents.

Whether a given method is appropriate depends on the particular case. Cessation of agitation may be the best action in some instances but not in others. Stopping of the feed may require the provision of bypass arrangements.

Methods of removing additional heat include removal through the normal cooling arrangements or use of an emergency cooling system. Cooling facilities, which use vapourising liquid, may be particularly effective, since a large increase in vaporization can be obtained by dropping pressure.

**Evacuation of Personnel:**

There could be more number of persons in the storage area and other areas in the vicinity. The area would have adequate number of exits and staircases. In the event of an emergency, unconnected 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 ECC. If necessary, persons can be evacuated by rescue teams.

**All Clear Signal:**

Also, at the end of an emergency, after discussing with Incident Controllers and Emergency Co-ordinators, the Site Controller orders an all clear signal. When it becomes essential, the Site Controller communicates to the District Emergency Authority, Police, Fire service personnel regarding help required or development of the situation into an Off-Site Emergency.

7.4.4.4 General

**Employee Information:**

During an emergency, employees would be warned by raising siren in specific pattern. Employees would be given training of escape routes, taking shelter, protecting from toxic effects. Employees would be provided with information related to fire hazards, antidotes and first aid measures. Those who would be designated as key personnel and essential employees should be given training to emergency response.
Public Information and Warning:

The industrial disaster effects related to this plant may mostly be confined to the plant area. The detailed risk analysis has indicated that the pool fire effects would not be felt outside. However, as an abundant precaution, the information related to chemicals in use would be furnished to District Emergency Authority for necessary dissemination to general public and for any use during an off site emergency. Factories of this size and nature are in existence in our state since long time.

Co-ordination with Local Authorities:

Keeping in view of the nature of emergency, two levels of coordination are proposed. In the case of an On Site Emergency, resources within the organization would be mobilized and in the event of extreme emergency, local authorities help should be sought.

In the event of an emergency developing into an off site emergency, local authority and District emergency Authority (normally the Collector) would be appraised and under his supervision, the Off Site Disaster Management Plan would be exercised. For this purpose, the facilities that are available locally, i.e. medical, transport, personnel, rescue accommodation, voluntary organizations etc. would be mustered. Necessary rehearsals and training in the form of mock drills should be organized.

Mutual Aid:

Mutual aid in the form of technical personnel, runners, helpers, special protective equipment, transport vehicles, communication facility etc should be sought from the neighboring industrial management.

Mock Drills:

Emergency preparedness is an important step in planning of Industrial Disaster Management. Personnel would be trained suitably and prepared mentally and physically in emergency response through carefully planned, simulated procedures. Similarly, the key personnel and essential personnel should be trained in the operations. Co-ordination meeting with the line Department officials for preparedness and implementation, viability and conduct of Mock Drill/ training should be conducted along with Divisional or Taluk level of Tiruvallur District.

Important Information:

Once the Plant goes into stream, important information such as names and addresses of key personnel, essential employees, medical personnel, out side the plant, transporters address, address of those connected with Off Site Emergency such as Police, Local Authorities, Fire Services, District Emergency Authority should be prepared and maintained.

7.4.5 Off-Site Emergency Preparedness Plan

7.4.5.1 Introduction

Off-site emergency plan follows the on-site emergency plan. When the consequences of an emergency situation go beyond the plant boundaries, it becomes an off-site emergency. Off-site emergency is essentially the responsibility of the public administration. However, the
factory management will provide the public administration with the technical information relating to the nature, quantum and probable consequences on the neighboring population. The off-site plan in detail will be based on those events, which are most likely to occur, but other less likely events, which have severe consequence, will also be considered. Incidents which have very severe consequences yet have a small probability of occurrence should also be considered during the preparation of the plan. However, the key feature of a good off-site emergency plan is flexibility in its application to emergencies other than those specifically included in the formation of the plan.

The roles of the various parties who will be involved in the implementation of an off-site plan are described below. Depending on local arrangements, the responsibility for the off-site plan should be either rest with the works management or, with the local authority. Either way, the plan should identify an emergency co-ordinating officer, who would take the overall command of the off-site activities. As with the on-site plan, an emergency control center should be setup within which the emergency co-ordinating officer can operate.

An early decision will be required in many cases on the advice to be given to people living "within range" of the accident - in particular whether they should be evacuated or told to go indoors. In the latter case, the decision can regularly be reviewed in the event of an escalation of the incident. Consideration of evacuation may include the following factors:

a. In the case of a major fire but without explosion risk (e.g. an oil storage tank), only houses close to the fire likely need to be evacuated, although a severe smoke hazard may require this to be reviewed periodically;

b. If a fire is escalating and in turn threatening a store of hazardous material, it might be necessary to evacuate people nearby, but only if there is time; if insufficient time exists, people should be advised to stay indoors and shield them from the fire. This latter case particularly applies if the installation at risk could produce a fireball with very severe thermal radiation effects;

c. For release or potential release of toxic materials, limited evacuation may be appropriate down wind, if there is time. The decision would depend partly on the type of housing "at risk". Conventional housing of solid construction with windows closed offers substantial protection from the effects of a toxic cloud, while shanty house, which exist close to factories, offer little or no protection.

The major difference between releases of toxic and flammable materials is that toxic clouds are generally hazardous down to much lower concentrations and therefore hazardous over greater distances. Also, a toxic cloud drifting at, say 300 m per minute covers a large area of land very quickly. Any consideration of evacuation should take this into account. Although the plan will have sufficient flexibility built in to cover the consequences of the range of accidents identified for the on-site plan, it will cover in some detail the handling of the emergency to a particular distance from each major hazard works.

7.4.5.2 Aspects Proposed to be considered in the Off-Site Emergency Plan

The main aspects, which should be included in the emergency plan are:

- Organization
  Details of command structure, warning systems, implementation procedures, emergency control centers.
Names and appointments of incident controller, site main controller, their deputies and other key personnel.

- **Communications**
  
  Identification of personnel involved, communication center, call signs, network, list of telephone numbers.

- **Specialized knowledge**
  
  Details of specialist bodies, firms and people upon whom it may be necessary to call e.g. those with specialized chemical knowledge and laboratories.

- **Voluntary organizations**
  
  Details of organizers, telephone numbers, resources etc.

- **Chemical information**
  
  Details of the hazardous substances stored or procedure on each site and a summary of the risks associated with them.

- **Meteorological information**
  
  Arrangements for obtaining details of weather conditions prevailing at the time and weather forecasts.

- **Humanitarian arrangements**
  
  Transport, evacuation centers, emergency feeding treatment of injured, first aid, ambulances and temporary mortuaries.

- **Public information**
  
  Arrangements for dealing with the media press office and informing relatives, etc.

- **Assessment of emergency plan**
  
  Arrangements for: (a) Collecting information on the causes of the emergency; (b) Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

### 7.4.5.3 Role of the Emergency Co-ordinating Officer

The various emergency services should be co-ordinated by an Emergency Co-ordinating Officer (ECO), who will be designated by the district collector. The ECO should liaison closely with the site main controller. The Emergency Operation Centre (EOC) functioning at each Taluk office Collectorate, round the clock with Toll free Phone No. 1077 and 044-2766746. Again depending on local arrangements, for very severe incidents with major or prolonged off-site consequences, the external control should be passed to a senior local authority administrator or even an administrator appointed by the central or state government.
7.4.5.4 Role of the Local Authority

The duty to prepare the off-site plan lies with the local authorities. The Emergency Planning Officer (EPO) appointed should carry out his duty in preparing for a whole range of different emergencies within the local authority area. The EPO should liaison with the works, to obtain the information to provide the basis for the plan. This liaison should ensure that the plan is continually kept up to date.

It will be the responsibility of the EPO to ensure that all those organizations, which will be involved in off-site handling of the emergency situation, know of their role and are able to accept it by having for example, sufficient staff and appropriate equipment to cover their particular responsibilities. Rehearsals for off-site plans should be organized by the EPO.

7.4.5.5 Role of Police

Formal duties of the police during an emergency include protecting life and property and controlling traffic movements.

Their functions should include controlling bystanders, evacuating the public, identifying the dead and dealing with casualties, and informing relatives of death or injury.

7.4.5.6 Role of Fire Authorities

The control of a fire should be normally the responsibility of the senior fire brigade officer who would take over the handling of the fire from the site incident controller on arrival at the site. The senior fire brigade officer should also have a similar responsibility for other events, such as explosions and toxic release.

Fire authorities in the region should be appraised about the location of all stores of flammable materials, water and foam supply points, and fire-fighting equipment. They should be involved in on-site emergency rehearsals both as participants, and on occasion, as observers of exercises involving only site personnel.

7.4.5.7 Role of Health Authorities

Health authorities, including doctors, surgeons, hospitals, ambulances, and so on, should have a vital part to play following a major accident, and they should form an integral part of the emergency plan. For major fires, injuries should be the result of the effects of thermal radiation to a varying degree, and the knowledge and experience to handle this in all but extreme cases may be generally available in most hospitals. For major toxic releases, the effects vary according to the chemical in question, and the health authorities should be apprised about the likely toxic releases from the plant, which will enable them in dealing with the aftermath of a toxic release with treatment appropriate to such casualties.

Major off-site incidents are likely to require medical equipment and facilities additional to those available locally, and a medical “mutual aid” scheme should exist to enable the assistance of neighboring authorities to be obtained in the event of an emergency.
7.4.5.8 Role of Government Safety Authority

This will be the factory inspectorate available in the region. Inspectors are likely to satisfy themselves that the organization responsible for producing the off-site plan has made adequate arrangements for handling emergencies of all types including major emergencies. They may wish to see well-documented procedures and evidence of exercise undertaken to test the plan.

In the event of an accident, local arrangements regarding the role of the factory inspector will apply. These may vary from keeping a watching brief to a close involvement in advising on operations in case involvement in advising on operations. In cases where toxic gases may have been released, the factory inspectorate may be the only external agency with equipment and resources to carry out tests.

7.5 Social Impact Assessment

The impact of the proposed expansion activity will begin with the starting up of the construction activities at the site. The proposed expansion activity will provide employment to considerable number of skilled, semi-skilled and unskilled construction labourers. In normal circumstances, the local people will be given preference for the unskilled activities, as there are many construction labourers in the vicinity of the project and are expected to be available with normal wages.

Presently, a large number of skilled and semi-skilled technicians and labourers who emigrated from various parts of India have been engaged in many companies on wages/contract basis. Similar technicians and skilled workers will either be brought or sourced from the local area for erection of the proposed expansion activity.

The peak labour force required during the construction period will be sourced from the local area. Provision of wage employment to the local populace during construction period of the project will benefit the local area to some extent. This will enhance the income levels of the construction labourers and lead to their socio-economic wellbeing during the construction phase of the proposed expansion activity, which will be positive impact due to the project.

In addition, the real estate in the region will get a boon and the land prices are likely to shoot-up as part of speculation. Normally, the construction activity will benefit the local populace in a number of ways, which include the requirement of skilled, semi-skilled and unskilled construction labourers, tertiary sector employment and provision of goods and services for daily needs including transport.

In line with the above, some more recommendations are given below:

- Local people will be given preference;
- All the guidelines under the Labour Act and Safety Rules as specified under Factories Act, 1948 will be implemented during the construction work to avoid any accidents;
- The contractor will be instructed to provide cooking fuel to the workers to prevent damage to trees. This will be part of the contractual agreement between the project proponent and the contractor engaged for construction.
7.6 Rehabilitation & Resettlement Action Plans

The proposed expansion activity does not involve any Rehabilitation & Resettlement issues, as the entire erection activities will be carried out within the existing premises itself.

7.7 Occupational Health and Safety

Large industries, in general where numerous activities are involved during construction, erection, testing, commissioning, operation and maintenance, materials and machines are the basic inputs. Along with the boons, the industrialization generally brings several problems like occupational health and safety.

The industrial planner, therefore has to properly plan and take the steps to minimize the impacts of industrialization and to ensure appropriate occupational health, safety including fire plans. All these activities again may be classified under construction and erection & operation and maintenance. The proposed safety plan is given below:

7.7.1 Occupational Health

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

- **Construction and Erection**

The occupational health problems envisaged at this stage can mainly be due to the constructional accident and noise. To overcome these hazards, in addition to arrangements to reduce it within TLV’s (Threshold Limit Values), personal protective equipment shall be supplied to workers.

- **Operation and Maintenances**

The problem of occupational health in the operation and maintenance phase is due to noise hearing losses. Suitable personnel protective equipment shall be given to the employees. The working personnel shall be given the following appropriate personnel protective equipment.

1. Industrial Safety Helmet
2. Crash Helmet
3. Face shield with replacement of acrylic vision
4. Welder’s equipment for eyes and face protection
5. Ear muffs
6. Safety belt
7. Leather Hand Gloves
8. Industrial Safety Shoes with steel toe

Full Fledged hospital facilities shall be made available round the clock for attending emergencies arising out of accidents, if any. All working personnel shall be medically examined once in a month and at the end of his term of employment. The fund allocation for occupational health and safety are presented in Table - 7.11.
7.7.2 Safety Plan

Safety of both men and material during the erection and operation phases is of concern. The preparedness of an industry for the occurrence of possible disasters is known as emergency plan. The disaster in the proposed expansion plant is possible due to the blast furnace, material handling, leakage of fuel/oil, collapse of structures and fire/explosion etc.

Keeping in view the safety requirement during, operation and maintenances phases, the proposed expansion plant shall formulate safety policy with the following regulations;

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

7.7.3 Safety Organisation

Construction and Erection Phase

A Qualified and experienced safety officer shall be appointed. The responsibilities of the safety officers include identification of the hazardous conditions and unsafe acts of workers and advice on corrective actions, conduct safety audit, organize training programs and provide professional expert advice on various issues related to occupational safety and health.
Operation and Maintenance Phase

When the construction is completed the posting of safety officers shall be in accordance with the requirement of Factories Act and their duties and responsibilities shall be as defined thereof.

7.7.4 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 the work. The circle would consist of 2-3 employees from that area. The circle normally shall meet for about an hour every week.

7.7.5 Safety Training

A full-fledged training center shall be set up. Safety training shall be provided by the safety officers with the assistance of faculty members called from Corporate Center, Professional Safety Institutions and Universities.

To create safety awareness, safety films shall be shown to workers and leaflets etc., can be distributed. Some precautions and remedial measures proposed to be adopted to prevent fires are:

- Spread of fire in horizontal direction would be checked by providing fire stops for cable shafts;
- Reliable and dependable type of fire detection system with proper zoning and interlocks for alarm are effective protection methods for conveyor galleries;
- Housekeeping of high standard helps in eliminating the cause of fire and regular fire watching system strengthens fire prevention and fire fighting; and
- Proper fire watching by all concerned would be ensured.

7.8 Health and Safety Monitoring Plan

All the potential occupational hazardous work places such as fuel storage, material handling area shall be monitored regularly. The health of employees working in these area shall be monitored once in a month for early detection of any ailment.

Though effective measures are taken to combat pollution in ambient conditions, occupational health hazards are not overlooked. Project will provide well organized occupational health services to all its employees by taking responsibility for establishment and maintenance of safe and healthy working environment and assessment of the physical and mental capabilities to turn out specific workloads.

7.8.1 Medical Surveillance

The industry will have the medical center for all the employees. All the employees will be examined periodically by the standard qualified doctors once in a month to determine the health status of the workers in respect of occupational health hazard to which they are exposed.
Environmental Impact Assessment for the Proposed Expansion of Steel Melting Plant and Rolling Mill from 27,000 TPA to 90,000 TPA of MS Billets and 60,000 TPA to 89,700 TPA of Re-Rolled Steel Products by M/s. GBR Metals Private Limited at Peravallur Village, Ponneri Taluk, Tiruvallur District, Tamil Nadu

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- Hazardous area wise list will be prepared by the medical officers to perform the specific test for the working employees.
- No person will be signed up to operate the crane, locomotive or work-lift or give signals unless his eye sight and color vision is properly examined by the concern ophthalmologist.

7.8.2 Industrial Medical Center Responsibilities

- Surveillance of workers health in relation to work;
- Surveillance of working environments;
- Identification and evaluation of environmental factors which may affect the worker’s health;
- Assessment of conditions of occupational health of employees; and
- Observance of safety norms and reduce/eliminate exposure to hazardous environments.

7.8.3 Employees training Programme

The industry will provide training program to the working employees. The training programme will includes the hazardous operation, usage of the nose mask and earplugs, Engineering Act and working process in connection with their jobs roles.

7.8.4 List of Test for Working Employees

List of tests that are being conducted for every month to the workers are as:

- X-ray Chest view
- Electro Cardiogram (ECG)
- Eye fitness
- Spirometry Test
- Audiogram Test

7.8.5 Medical Examination

The GBRMPL will take up monitoring activities periodically to assess hazards due to gases, dusts, vibrations, radiations etc. The medical testing report result is attached in Annexure-XXVIII. The health check-up photographs are shown in Figure - 7.2 (A), 7.2 (B), 7.2 (C), 7.2 (D), 7.2 (E) & 7.2 (F).

The following medical check-up/examination will be done:

- Pre-employment medical check-up for the employees;
- X-ray Chest test including bone scan, CT ratio;
- ECG to find the activity of the heart related problems;
- Eye Fitness (near and far as well as colour vision);
- Spirometry to measure the lung function;
- Audiogram Test to find the deafness.
Environmental Impact Assessment for the Proposed Expansion of Steel Melting Plant and Rolling Mill from 27,000 TPA to 90,000 TPA of MS Billets and 60,000 TPA to 89,700 TPA of Re-Rolled Steel Products by M/s. GBR Metals Private Limited at Peravallur Village, Ponneri Taluk, Tiruvallur District, Tamil Nadu

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FIGURE - 7.2 (A)
EYE EXAMINATION
Environmental Impact Assessment for the Proposed Expansion of Steel Melting Plant and Rolling Mill from 27,000 TPA to 90,000 TPA of MS Billets and 60,000 TPA to 89,700 TPA of Re-Rolled Steel Products by M/s. GBR Metals Private Limited at Peravallur Village, Ponneri Taluk, Tiruvallur District, Tamil Nadu

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FIGURE 7.2 (B)
AUDIOGRAM ENHANCEMENT EXAMINATION

FIGURE 7.2 (C)
CHEST X-RAY EXAMINATION
FIGURE - 7.2 (D)
ECG EXAMINATION

FIGURE - 7.2 (E)
LUNG EXAMINATION

FIGURE - 7.2 (F)
BLOOD PRESSURE EXAMINATION
7.9 Public Hearing

The public hearing for the proposed Expansion of Steel Melting Plant and Rolling Mill was conducted through Tamil Nadu Pollution Control Board (TNPCB) on 06\(^{th}\) June, 2017 in the premises of M/s. GBRMPL, Peravallur Village, Ponneri Taluk, Tiruvallur District, Tamil Nadu.

The press notification indicating date and venue of the public hearing was issued by Member Secretary, Tamil Nadu Pollution Control Board (TNPCB), on 19\(^{th}\) April, 2017 in prominent newspapers i.e. The New Indian Express and Dinamani with project details inviting suggestions, views, comments and objections from the public regarding the proposed Expansion of Steel Melting Plant and Rolling Mill at Peravallur Village, Ponneri Taluk, Tiruvallur District, Tamil Nadu.

During the public hearing Tmt. E. Sundaravalli, I.A.S., (District Collector - Tiruvallur), Thiru D. Vasudevan - (District Environmental Engineer, Ambattur), GBRMPL staffs and public were present and attended the public hearing. Total public hearing statements were recorded in the minutes of meeting. The comments/suggestions raised during the public hearing were summarized by Tamil Nadu Pollution Control Board and is given in Annexure – XXXIV.

A total number of 11 persons came forward and registered their comments/views on the project and the responses given by the project proponent are as follows.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Comments/Suggestions</th>
<th>Response of the Project Proponent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>Mr. Sunanda Reddy, Environmentalist</strong></td>
<td>The Project Proponent acknowledged the support towards the proposed expansion. Proper Pollution Control measures will be implemented in the plant.</td>
</tr>
</tbody>
</table>

He began his speech by welcoming the proposed project. He said that environmentalist generally will oppose the setting up of an industry but he is the first environmentalist in India to show support towards the development of an industry. He stated that he supports industries as unemployment is the first pollution in society, which cannot be solved by central and state governments alone. Only when private industries are developed, unemployment can be eradicated. He suggested that proper pollution control measures should be implemented for air, water and land environments, as it is very essential to maintain the ecological balance. He requested to collect the health status of the employees and the villagers, crop productivity and ground water availability in the 10 km radius. He also requested to make proper arrangements for collection of rain water and reuse during non-rainy days by the industry. He suggested that green belt occupying 40 - 50 % of the total plant

The domestic waste water (11 KLD) from the plant after the proposed expansion will be treated in the existing Sewage Treatment Plant of capacity 60 KLD. The treated water will be reused for cooling purposes and for greenbelt development. The effluent of 0.7 KLD will be treated in the existing Solar Evaporation Pan. The waste water from the cooling processes will be treated in the cooling pond followed by cooling tank and the treated water will be recirculated to the process. Bag filters will be installed to control the emissions from the induction furnaces. The reheating furnace is already provided with wet scrubber arrangement for pollution control. No sewage/trade effluent will be let out from the industry.
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#### Sr. No. | Comments/Suggestions | Response of the Project Proponent
---|---|---
1. | area. He further asked to take up tree and avenue plantation in nearby villages using local plants and fruit bearing and medicinal value plants instead of normal plant varieties. Also, he pointed out that top priority should be given to local educated unemployed youth for employment and to promote skill development training programs to the unemployed youth to acquire better skills and enable them to gain opportunities in India and abroad. Finally, he concluded that a Co-ordination Committee incorporating members from the local villages and government authorities should be formed to spend the CSR budget on demand related works in the region and requested the Public Hearing Panel to recommend the project to MoEF and to give unconditional permission to GBR Metals Pvt. Ltd. | Data on the health status of the employees and villagers, crop productivity and ground water availability will be collected. Adequate Rain water harvesting structures in the form of underground collection tanks and percolation pits will be constructed to harvest the rain water from roofs and run-off water from landscapes areas/roads respectively. Greenbelt will be developed in an area of 1.08 ha (33.1% of the total land). Also, fruit bearing trees and medicinal value plants will be planted in the nearby villages, as part of Enterprise Social Commitment (ESC). Further priority will be given to the unemployed youth from the nearby villages. Skill development programmes will be organized for the benefit of the unemployed youth, so that they gain better job opportunities. The CSR fund will be spent on welfare activities and a co-ordinating committee will be formed with members from the villages and government officials to monitor the proper spending of the fund. |

2. | **Mr. Ravikumar, Environment Volunteer and Senior Journalist** He also expressed his support towards the proposed expansion project of M/s. GBR Metals Pvt. Ltd and said that Government of Tamil Nadu is providing numerous incentives to developing industries. He stated that this expansion project will provide employment opportunities to 120 Nos. of unemployed youth. He asked the project proponent to develop green belt in 33% of land, as per the norms and also community works should be taken up. He also said that he sent a suggestion letter to the Pollution Control Board in this regard. Finally, he expressed his hope that the project proponent will take necessary steps to save environment and | The project proponent acknowledged the support for the proposed project. Upon expansion the plant will result in direct employment of 120 persons, for which local unemployed youth will be given preference. Green belt will be developed in a land area of 1.08 ha, covering 33.1% of the total land area of the plant. It is assured that necessary steps will be taken to reduce the impacts and conserve the environment. |
### Additional Studies

<table>
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</table>
| 3.      | **Mr. Madhubabu, Environment Volunteer**  
He stated that the Environment Consultant has undertaken satisfactory baseline study as per the norms of CPCB, with respect to ambient air, water and noise. In this regard, he requested that the consultant may take up health status and crop productivity monitoring in the villages in the 10 km radius. He said that rain water harvesting should be properly implemented, as the industry uses of ground water for meeting its water requirement. He also suggested to use waste water for developing green belt and sprinkling on roads to control dust pollution. He said that greenbelt shall be developed from 33% to more than 50% of the total area of the plant and fruit bearing plants and medicinal value plants can be planted in the nearby villages. He requested to provide preference in employment to local people and also to arrange medical camps, drinking water, educational services and development of main roads and state roads in the surrounding villages. He said that the project will generate revenue for State and Central government. He concluded by requesting the PCB panel to recommend the project to MoEF to grant permission to GBR Metals Pvt Ltd.  |
|         | Health status and crop productivity monitoring will be carried out in the villages in the 10 km radius around the plant site. Rain water harvesting structures in the form of underground collection tanks and percolation pits will be constructed to harvest the rain water from roofs and run-off water from landscapes areas/roads respectively.  
Treated water from STP will be used for greenbelt development, which will be developed in an area of 1.08 ha comprising 33.1 % of the total plant area.  
Separate fund has been allotted for activities such as planting of fruit trees and medicinal plants, medical camps, safe drinking water, educational services and development of main roads and state roads as part of ESC.  |
| 4.      | **Mr. Y. Chena Kesava Reddy, NGO**  
He said that tree plantation should be increased and that safe drinking water should be assured to the surrounding villages. He further requested to arrange medical camps and skill development programmes in the villages. He asked the project proponent to follow the norms laid out by CPCB and concluded by recommending the project to MoEF&CC.  |
|         | Activities such as tree planting and safe drinking water and skill development programmes will be covered as part of the Enterprise Social Commitment.  
Medical camps will be conducted as a portion of the Corporate Social Responsibility (CSR).  
The Project Proponent assures to always follow the norms laid out by CPCB.  |
## Environmental Impact Assessment for the Proposed Expansion of Steel Melting Plant and Rolling Mill from 27,000 TPA to 90,000 TPA of MS Billets and 60,000 TPA to 89,700 TPA of Re-Rolled Steel Products by M/s. GBR Metals Private Limited at Peravallur Village, Ponneri Taluk, Tiruvallur District, Tamil Nadu

## Chapter 7
### Additional Studies

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<th>Comments/Suggestions</th>
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<tbody>
<tr>
<td>5.</td>
<td><strong>Mr. Ramesh, Peravallur</strong>&lt;br&gt;He said that he supports the proposed expansion project.</td>
<td>The Project Proponent acknowledges the support extended by the Public.</td>
</tr>
<tr>
<td>6.</td>
<td><strong>Mr. A. Ravi, Peravallur</strong>&lt;br&gt;He said that he has no objection towards the proposed expansion project. Though there may be some shortcomings in the implementation of the project, he requested the project proponent to rectify the same through direct supervision, such that no environmental impacts are experienced in the nearby villages.</td>
<td>Any impacts during the implementation and operation of the expansion project will be mitigated to minimize the environmental impacts of the nearby villages, through direct supervision of the project proponent.</td>
</tr>
<tr>
<td>7.</td>
<td><strong>Mr. N. Arun, Panchetti</strong>&lt;br&gt;He said that GBR Metals Pvt. Ltd has undertaken various welfare measures to its employees. He also said that the company has a Sewage Treatment Plant and is reusing the treated water for greenbelt development. He noted that among the various steel melting plants operating in the Panchetti region, GBR Metals Pvt. Ltd is the only company to own and operate a Sewage Treatment Plant. He said that the company is following proper scientific Solid Waste Management measures for disposal of Solid Waste and has ensured good housekeeping in the industry premises. He said that the Occupational Health and Safety of the workers is given paramount importance and the industry has proper canteen, first-aid and other facilities for the labourers. He said that employees from Panchetti region are working in the plant.</td>
<td>GBRMPL has undertaken welfare measures to its employees. The Sewage Treatment Plant is used for the treatment of domestic wastewater from the plant. The treated water is used for nurturing the greenbelt. Solid waste from the industry is disposed in adequate manner and good housekeeping has been ensured in the premises. Occupational Health and Safety of the employees is given due importance with the provision of personal protective equipment, periodic health checkups, monitoring of employees health etc.</td>
</tr>
<tr>
<td>8.</td>
<td><strong>Mrs. Ellamma, Thatchoor</strong>&lt;br&gt;She said that she is an employee of GBR Metals Pvt. Ltd and she has no difficulties in carrying out her day-to-day work in the company.</td>
<td>The Project Proponent thanked the public for her opinions.</td>
</tr>
<tr>
<td>9.</td>
<td><strong>Mr. Anandraj, Cholavaram</strong>&lt;br&gt;He said that as an employee of GBR Metals Pvt. Ltd, the proposed expansion will create ample job opportunities to the employees from Cholavaram region.</td>
<td>The Proposed expansion project will create both direct and indirect employment opportunities to the young generation.</td>
</tr>
</tbody>
</table>
Environmental Impact Assessment for the Proposed Expansion of Steel Melting Plant and Rolling Mill from 27,000 TPA to 90,000 TPA of MS Billets and 60,000 TPA to 89,700 TPA of Re-Rolled Steel Products by M/s. GBR Metals Private Limited at Peravallur Village, Ponneri Taluk, Tiruvallur District, Tamil Nadu

Chapter - 7
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<tbody>
<tr>
<td>10.</td>
<td>Mrs. Usha, Siruvapuri</td>
<td>She said that GBR Metals Pvt Ltd looks after the employees and ensures that they receive their salary and other benefits properly. The Project Proponent thanked the public for her opinions.</td>
</tr>
<tr>
<td>11.</td>
<td>Mrs. Nalini, Peravallur</td>
<td>She expressed her gratitude towards her employer and said that they are providing support to the employees and the villagers. The Project Proponent thanked the public for her opinions.</td>
</tr>
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</table>

7.9.1 Enterprise Social Commitment

Based on the public hearing issues, comments/views and suggestion received from the public, 2.5% of the project cost has been allotted for Enterprise Social Commitment (ESC). The item-wise details along with the time bound action plan are shown in the Table - 7.12.

<table>
<thead>
<tr>
<th>Activity based on Public Hearing Issues/Suggestions</th>
<th>Time of Action Plan*</th>
<th>Capital Investment (Rs. In Lakhs)</th>
</tr>
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<tbody>
<tr>
<td>1. Skill development Programme for unemployed youths</td>
<td>First Year</td>
<td>3.12</td>
</tr>
<tr>
<td>2. Educational Services to the surrounding villages</td>
<td>Second Year</td>
<td>3.12</td>
</tr>
<tr>
<td>3. Planting of fruit bearing trees and medicinal value plants in the nearby villages</td>
<td>Third Year</td>
<td>3.12</td>
</tr>
<tr>
<td>4. Preference of employment for educated unemployed youth from the nearby villages</td>
<td>Fourth Year</td>
<td>3.14</td>
</tr>
<tr>
<td>5. Maintenance of State roads and other village roads</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Safe drinking water for the surrounding villages</td>
<td></td>
<td></td>
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</tbody>
</table>

**TOTAL** | **12.50**

*Source: GBRMPL*
7.9.2 Socio Economic Development through ESC by GBRMPL

GBRMPL is committed towards the socio-economic development of the villages surrounding the plant. The people in the villages lack certain basic facilities including drinking water and better road infrastructure facilities. The enterprise social commitment will address the issues/requests voiced by the public during the public hearing.

1. Skill development programme for unemployed youths

The skill development programme will help in nurturing and bringing out the hidden skills of the unemployed youth and help them to gain better employment opportunities. It is also proposed to give employment in GBRMPL to those individual who show remarkable proficiency in areas related to metallurgy and others.

2. Educational services to the surrounding villages

The educational services include the supply of stationery items such as notebooks, writing materials to the students of nearby government schools, arrangement of coaching classes and tuitions, scholarship for meritorious students etc., Since the students in the government schools are from marginally low economic background, these educational measures will help them in boosting the confidence level of the children and propel them towards excellence. This in turn will increase the literacy rate of the society.

3. Planting of fruit bearing and medicinal value plants in the nearby villages

Planting of fruit bearing tree saplings and plants with medicinal value will be highly beneficial to the villagers. It not only improves the aesthetics of the villages but will also provide the healthy environment to the people. In the long run, the people can harvest the fruits and the medicinal herbs which can be sold by the people to generate income for their livelihood. The additional income will help to improve the economic status of the people.

4. Preference of employment for educated unemployed youth from the nearby villages

Preference will be given to local unemployed youth for employment opportunities. This will help to reduce the problem of unemployment in the surrounding villages.

5. Maintenance of State roads and other village roads

Road infrastructure and its maintenance will help in the speedier movement of men and materials from one place to another. A well connected and well maintained road network will increase the public and private vehicle transport such as two wheelers etc. The improved roads will result in more number of school going children to adopt Bicycle transport.

6. Safe drinking water for the surrounding villages

Safe drinking water is the basic human right and its importance is well understood by GBRMPL. By ensuring safe drinking water to the people of the nearby villages, water bone diseases can be controlled leading to a healthier community.