EMERGENCY PREPAREDNESS PLAN FOR MARKETING LOCATIONS OF OIL INDUSTRY

OISD-GDN-168
FIRST EDITION, JULY, 1997

OIL INDUSTRY SAFETY DIRECTORATE

Government of India
Ministry of Petroleum & Natural Gas
8th Floor, OIDB Bhavan, Plot No. 2, Sector – 73, Noida – 201301 (U.P.)
Website: www.oisd.gov.in
Tele: 0120-2593800, Fax: 0120-2593802
EMERGENCY PREPAREDNESS PLAN FOR MARKETING LOCATIONS OF OIL INDUSTRY

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FIRST EDITION, JULY, 1997

PREPARED BY

COMMITTEE ON EMERGENCY PREPAREDNESS PLAN

OIL INDUSTRY SAFETY DIRECTORATE
8th Floor, OIDB Bhavan,
Plot No. 2, Sector - 73
Noida – 201301 (U.P.)
Preamble

Indian petroleum industry is the energy lifeline of the nation and its continuous performance is essential for sovereignty and prosperity of the country. As the industry essentially deals with inherently inflammable substances throughout its value chain – upstream, midstream and downstream – Safety is of paramount importance to this industry as only safe performance at all times can ensure optimum ROI of these national assets and resources including sustainability.

While statutory organisations were in place all along to oversee safety aspects of Indian petroleum industry, Oil Industry Safety Directorate (OISD) was set up in 1986 Ministry of Petroleum and Natural Gas, Government of India as a knowledge centre for formulation of constantly updated world-scale standards for design, layout and operation of various equipment, facility and activities involved in this industry. Moreover, OISD was also given responsibility of monitoring implementation status of these standards through safety audits.

In more than 25 years of its existence, OISD has developed a rigorous, multi-layer, iterative and participative process of development of standards – starting with research by in-house experts and iterating through seeking & validating inputs from all stake-holders – operators, designers, national level knowledge authorities and public at large – with a feedback loop of constant updation based on ground level experience obtained through audits, incident analysis and environment scanning.

The participative process followed in standard formulation has resulted in excellent level of compliance by the industry culminating in a safer environment in the industry. OISD – except in the Upstream Petroleum Sector – is still a regulatory (and not a statutory) body but that has not affected implementation of the OISD standards. It also goes to prove the old adage that self-regulation is the best regulation. The quality and relevance of OISD standards had been further endorsed by their adoption in various statutory rules of the land.

Petroleum industry in India is significantly globalized at present in terms of technology content requiring its operation to keep pace with the relevant world scale standards & practices. This matches the OISD philosophy of continuous improvement keeping pace with the global developments in its target environment. To this end, OISD keeps track of changes through participation as member in large number of International and national level Knowledge Organizations – both in the field of standard development and implementation & monitoring in addition to updation of internal knowledge base through continuous research and application surveillance, thereby ensuring that this OISD Standard, along with all other extant ones, remains relevant, updated and effective on a real time basis in the applicable areas.

Together we strive to achieve NIL incidents in the entire Hydrocarbon Value Chain. This, besides other issues, calls for total engagement from all levels of the stake holder organizations, which we, at OISD, fervently look forward to.

Jai Hind!!!

Executive Director

Oil Industry Safety Directorate
FOREWORD

The Oil Industry in India is more than 100 years old. Because of various collaboration agreements, a variety of international codes, standards and practices have been in vogue. Standardisation in design philosophies, operating and maintenance practices at a national level was hardly in existence. This coupled with feed back from some serious accidents that occurred in the recent past in India and abroad emphasized the need for the Industry to review the existing state of art in designing, operating and maintaining Oil and Gas Installations.

With this in view, the Ministry of Petroleum and Natural Gas in 1986 constituted a Safety Council assisted by an Oil Industry Safety Directorate (OISD) staffed from within the Industry in formulating and implementing a series of self regulatory measures and aimed at removing obsolescence, standardizing and updating the existing standards to ensure safer operations. Accordingly, OISD constituted a number of Functional Committees of Experts nominated from the Industry to draw up standards and guidelines on various subjects.

The present document, "Guidelines on Emergency Preparedness Plan" (EPP) for Terminals, LPG bottling plants, Gas Processing Plants, Installations, Depots and Aviation Stations within the Marketing Outfits of the Oil Industry was prepared by the Functional Committee to deal with Emergency Control Measures and Preparedness under Section 41 b(4) of the Factories Act, 1948(amended in 1987) and Rule 13 of Manufacture, Storage and Import of Hazardous Chemicals Rules 1989 (Amended in 1994). This document is based on the accumulated knowledge and experience of Industry members and the various National and International practices.

When it comes to the Marketing Outfits, comparisons are odious and each location is a class by itself and each location will have to endeavour to put this document into practice duly taking into consideration the environment in which they are placed and perfect the Emergency Preparedness Plan by regular mock exercises.

It is hoped that the provisions of this document when adopted will go a long way to improve the acumen of every location to handle unforeseen accidents in the Oil Industry. Users of these guidelines are cautioned that no standard can be a substitute for the people to go through and live through a Emergency Preparedness Plan in order to perfect the same for all situations. This standard in no way supersedes the statutory regulations of Controller of Explosives, Factories Act, 1948 (as amended in 1987) or Hazardous Chemicals Rules, 1989 (as amended in 1994) or any other statutory regulations by Central Government or State Government. Only one Emergency Preparedness Plan shall be prepared and if any other format is made available by State/Central Government authorities, the EPP shall be prepared in such format.

This document will be reviewed periodically for improvements based on the new experiences and better understanding. Suggestions from industry members may be addressed to:

The Member Coordinator
Emergency Preparedness Plan
OIL INDUSTRY SAFETY DIRECTORATE
8th Floor, OIDB Bhavan,
Plot No. 2, Sector - 73
Noida – 201301 (U.P.)
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This standard is intended to supplement rather than replace the prevailing statutory requirements.
# LIST OF FUNCTIONAL COMMITTEE MEMBERS

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## EMERGENCY PREPAREDNESS PLAN FOR MARKETING LOCATIONS OF OIL INDUSTRY

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1.0 INTRODUCTION

Petroleum Industry occupies an important segment of our economy and is a source of large benefit to the society. In recent years, there has been a rapid increase in volumes handled to meet the increasing demand. Petroleum products are highly flammable and Safety, which forms an integral part of the industry, has always been given paramount importance.

Several Government Authorities, both at the Centre and State levels, such as Inspectorate of Factories, Department of Explosives etc. are entrusted with the responsibility of ensuring Safe handling and accident prevention measures. Inspite of the measures, possibility of accidents either due to human errors and / or due to equipment/systems failures cannot be ruled out. On some occasions, the accidents have led to grave disasters e.g. Bhopal gas tragedy (Toxic release, 1984), Mexico Disaster (BLEVE, 1984), accident in LPG bottling Plant, Shakurbasti, Delhi (1983). The lessons learnt from the disasters all over the world made it essential to draw an Emergency Preparedness Plan (EPP) to negotiate such eventuality. The imperatives of Emergency preparedness to minimise the adverse effects due to any unfortunate accident occurring in Manufacture, Storage, Import and Transport of any hazardous substance is thus well recognised by all concerned. An Emergency Preparedness Plan is essential to obviate such an eventuality by providing the measures to contain the incident and minimise the after affects. To assist the Marketing Locations of the oil Industry, it is considered essential to provide the guidelines for preparing such plans based on the interactions within the oil Industry.

2.0 SCOPE

The purpose of the guidelines in brief is to assist the owners/ occupiers of oil Industry marketing units (POL/LPG & other Locations) in preparation of the On-Site emergency plan as required under relevant Acts and Rules.

The Emergency Preparedness Plan for Petroleum Locations shall provide the measures to contain and minimise the effects due to

(a) spillage of petroleum products during storage and handling within the premises.
(b) release or escape of flammable/toxic gases;
(c) fire or explosion.

The necessary preventive and protective steps that are required to be taken before, during and after the accident need to be worked out as detailed in this document.

The guidelines detail:

a) Statutory Requirements.
b) Nature, causes, consequences of hazards
c) Hazard analysis.
d) Basic elements of the on-site Emergency Preparedness Plan
e) Key personnel and their duties during an emergency.
f) Steps to be taken before, during and after emergency.
g) Response Evaluation and updation of the plan.

The Guidelines are aimed to be a supportive document for the Marketing Locations in the oil Industry and concerned authorities/agencies in preventing as well as dealing with an
emergency or accident while handling petroleum products. The guidelines should thus be treated as supplementary and advisory in nature only.

It shall be noted that no two locations are identical with respect to layout, surroundings, products, storage quantities, meteorological data etc. Therefore Emergency Preparedness Plan will be location specific and no effort be made to replicate the Emergency Preparedness Plan of another location.

3.0 STATUTORY REQUIREMENTS

3.1 Factories Act - 1948 (as amended in 1987).

Handling highly flammable liquids and gases fall under the category of hazardous processes under First Schedule of the Factories Act, Section 41-B (4) of the Factories Act - 1948 (amended in 1987), requires that an "On-site Emergency Plan" with detailed disaster control measures shall be drawn by every occupier of an Installation involving hazardous process.

3.2 Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 (amended in 1994) [MSIHC]:

Under the MSHIC Rules hazardous chemical/substance means -

(i) any chemical which satisfies any of the criteria laid down in Part I of Schedule I and is listed in Column 2 of Part II of the Schedule.
(ii) any chemical listed in Column 2 of Schedule 2;
(iii) any chemical listed in Column 2 of Schedule 3.

3.2.1 All Marketing locations fall under the category of isolated storage which comes under Schedule 2 of MSIHC Rules and threshold storage quantities for applicability of various rules is as under:

<table>
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<th>Petroleum Product</th>
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<tr>
<td></td>
<td>Rules 4, 5, 7, 8, 9</td>
</tr>
<tr>
<td>Flammable Gases:*</td>
<td>50 MT</td>
</tr>
<tr>
<td>Highly Flammable Liquids:**</td>
<td>10,000 MT</td>
</tr>
</tbody>
</table>

*Chemicals which in the gaseous state at normal pressure and mixed with air become flammable and the boiling point of which at normal pressure is 20 deg.C (like Propane, Butane, LPG etc.)

**Chemicals which have a flash point lower than 23 deg.C and the boiling point of which at normal pressure is above 20 deg.C (like MS, Naptha, Hexane, Toluene, Solvent, Butadiene, etc.)

3.2.2. Under MSIHC Rules various chemicals, compounds have been identified which are subject to general or low level, medium level and high level controls and accordingly, it is obligatory for an occupier to comply with the requirements under the appropriate rules.

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depending on the threshold storage quantities as stipulated in 3.2.1. Generally Rule Nos. 4, 5, 7, 8, 9 & 10 to 15 are applicable depending upon threshold quantities.

3.2.3 The gist of the above referred rules are given below for the reference. However, for details, refer Annexure I.

a) Rule 4 - General responsibility of the occupier.
b) Rule 5 - Notification of major accident.
c) Rule 7, 8, 9 - Notification of site and updation of same (following changes).
d) Rule 10 - Preparation of safety reports.
e) Rule 11 - Updating of Safety Reports
f) Rule 12 - Providing additional information (as required by concerned authority).
g) Rule 13 - Preparation of On-site Emergency Plan (By occupier).
h) Rule 14 - Preparation of Off-site Emergency Plan (By concerned authority).
i) Rule 15 - Information to public likely to be affected.

3.3 Rules on Chemical Accidents (Emergency Planning, Preparedness and Response):

The proposed rules on “Chemical Accidents (Emergency Planning, Preparedness and Response) compliments the set of rules on accident prevention and preparedness notified under the Environment (Protection) Act, 1986 in 1989 entitled "Manufacture, Storage and Import of Hazardous Chemicals Rules" and envisages a 4-tier crisis management system in the country. The 4-tier crisis management system consists of following crisis group:

1. Central Crisis Group
2. State Crisis Group
3. District Crisis Group
4. Local Crisis Group

For the details about the formation of the crisis groups and their roles, the original gazette document on “Rules on Chemical Accidents (Emergency Planning, Preparedness and Response)” shall be referred. However, the gist of the concerned rule is given below:

The rules provide a statutory back-up for setting up of a Crisis Group in districts and states which have Major Accident Hazard Installations (MAH) and providing information to the public. The rules define the major accident hazard installations which include industrial activity, transport and isolated storages at a site handling hazardous chemicals in quantities specified. As per the rules, the Government of India is to constitute a Central Crisis Group for the management of chemical accidents and set up an alert system within 30 days of the notification. The Chief Secretaries of all the States are to constitute Standing State Crisis Groups to plan and response to chemical accidents in the state and notify the same in gazette within 45 days. The District Collector shall not only constitute a District Crisis Group (DCG) but also constitute Local Crisis Groups (LCGs) for every industrial pocket in the district within 60 days.

The SSCG will review all the District Off-site Emergency Plans for its adequacy. The guidance for which is available in the amendments of October 1994 to the Manufacture, Storage and Import of Hazardous Chemical Rules in Schedule-12. The District Collector shall be the Chairman of the DCG and the DCG will serve as the apex body at the district level and shall meet every 45 days. This group shall review all on-site Emergency Plans prepared by the occupiers of the Major Accident Hazard installations for preparation of a District Off-site Emergency Plan, which shall also include hazard due to the transportation.

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of hazardous chemicals both by road and by pipeline. The rules will enable preparation of an Off-site Emergency Plan, updation and conduct of mock-drill.

4.0 NATURE, CAUSES AND CONSEQUENCES OF HAZARDS.

4.1 NATURE

In handling the petroleum products, the accidents leading to an emergency may be one or the combination of following events:

a) Release of flammable liquids or gases resulting in vapour clouds/ fire/ explosion and consequent thermal radiation and smoke.
b) Spillages on ground or into water resulting in pollution / contamination of air, water etc.
c) Emergency arising from neighbourhood.

4.2 CAUSES

The common causes for the above events are :

Man-made

a) Equipment failure
b) Design deficiency
c) Unsafe Acts/operations
d) Inadequate maintenance
e) Emergency in neighbourhood

Natural

a) Storm
b) Earthquake
c) Floods

Extraneous

a) War
b) Terrorism
c) Sabotage

4.3 CONSEQUENCES:

The consequences of an accident may be confined within the premises or may spill off-site triggering cascading effects. The occurrence is considered On-site when the accident occurs within and effects are confined to the premises involving only the people working in the unit. The consequences of an accident are fire explosion, deflagration, blast waves, fast spreading flames resulting in direct effects like damage to buildings/property, burns, fatalities. However, an accident in the neighbourhood may sometimes cascade into an on-site emergency.

5.0 RISK ASSESSMENT

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5.1 HAZARD ANALYSIS

Assessing the hazard potential of an installation is the first step in planning for emergencies. To analyse and to assess the potential hazards and safety of an installation, hazard analysis should be carried out covering the following areas:

a) Which substance in the installation constitutes major hazard?
b) Which design deficiency can contribute to a hazard?
c) What failures or errors could cause abnormalities leading to an accident?
d) Measures for preventing the accident.
e) Consequences of a major accident on the workers, people in neighbourhood and the environment.
f) Mitigation of the consequences of an accident.

The three basic steps of hazard analysis are:

a) Hazard Identification
b) Vulnerability analysis
c) Risk analysis.

These steps should be followed sequentially though the level of detail vary from location to location.

5.1.1 HAZARD IDENTIFICATION:

Hazard identification is the first step in the hazard analysis and entails the process of collecting information on –

a) The types and quantities of hazardous substances stored, handled and disposed in the location;
b) The location of storage tanks & other facilities.
c) Potential hazards associated with the spillage and release.

Various components of hazard identification are -

a) CHEMICAL IDENTITY & NATURE OF HAZARD - The substance can be identified by the UN No. and the substance shall be classified as toxic, flammable or explosive.
b) QUANTITY - The estimation of quantity of each hazardous substance at a location should include the maximum quantity likely to be stored on site. This should also include following:
   (i) Any vehicle (TW/TT) used as a storage vessel either on the site or within 500 Metres of site.
   (ii) Any pipeline used for transfer of product within the premises or within 500 Metres from the site.
   (iii) Quantity stored in any neighbouring site within 500 Metres of the boundary handling same hazardous materials.
c) LOCATION AND STORAGE CONDITION -
The location, configuration and condition under which the hazard substances are stored, handled greatly help in risk analysis step of hazard analysis. The inter-distances play an important role as far as passive protection is concerned.

5.1.2 VULNERABILITY ANALYSIS:

Vulnerability analysis is the second step of hazard analysis and provides estimation of the zones of influence or vulnerable zones. The process of estimation of zone of influence comprises of the following:

a) The maximum single storage of hazardous substance, should be identified and then probable maximum loss scenario should be determined.

b) Considering the probable maximum loss scenario, the vulnerable zone(s) that will be affected by the effect/consequences of the accident should be considered.

To estimate the effects of the accident and draw evacuation plan, the population statistics, the facilities and the environment encompassed within the vulnerable zone should be available with the occupier.

5.1.3 RISK ANALYSIS:

Risk analysis is the third step of hazard analysis process, which provides a relative measure of the likelihood and severity of various possible hazardous events and enable the emergency plan to focus on the greatest potential risk.

Risk : Risk is defined as follows:

Risk = Consequence x Probability

One method of characterising the equipment failure is to assume that the failure is "worst possible" failure, the failure that would produce the largest hazardous zone which is often called catastrophic failure and includes such events as a tank collapse, rupture of vessels etc. This approach will be useful in emergency response planning i.e. to determine the maximum area required for evacuation. Catastrophic events are often least likely to occur. Therefore, the hazard assessment that includes only catastrophic event may not address the failures that will expose the public at the greatest risk.

A thorough hazard assessment and all risk must consider both catastrophic and less severe release. The less severe releases include gasket leak/failure, pump and compressor seal failures, discharge of the relief valve to the atmosphere, tank filling piping failure, hose rupture etc.

After calculating the risk, it must be brought to a level of "Maximum Tolerable Criterion" above which the risk is regarded as intolerable whatever the benefit may be and must be reduced below this level. The risk should also be made "As Low As Reasonable Practicable". While conducting the risk analysis quantitative determination of risk involves three major steps:

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1. determining the probability of occurrence of each event of interest.

2. determining the consequence of each event.

3. calculating the risk by multiplying the probability of occurrence of each event by the consequences of that event and then summing up the results.

**Probability of occurrence:**

Before the probability of occurrence of an event can be calculated, it is first necessary to identify which event will be included in the analysis. For hydrocarbon Industry the types of event commonly considered are those that would produce the following hazards.

a) Heat effects.

b) Over pressure effects.

Thus the types of event normally considered in risk analysis are those that lead to one or more of the following :

a) Flammable vapour cloud fire (burning of a flammable gas/air mixture).

b) Toxic vapor cloud (toxic gas mixed with air)

c) Storage tank on fire

d) Pool fire (burning pool of liquid fuel)

e) Torch fire (burning of gas or liquid being released under pressure)

f) Vapor cloud explosion (rapid combustion of flammable gas outdoors)

g) Physical explosion (failure of a pressure vessel due to internal pressure).

h) Confined space explosion (rapid combustion of flammable gas in an enclosure).

i) BLEVE (catastrophic failure of a pressure vessel containing superheated liquid).

**Hazardous event probability** -

Once the hazardous event of interest has been determined the probability of each individual event occurring must be estimated. Such estimate can be based on following :

a) historical data based on experience of identical/similar system

b) Generic failure rate for similar type of equipment.

c) fault tree analysis

d) engineering practices.
Consequence Analysis -

The expected adverse effects that would result if each hazardous event of interest was to occur must be quantified before the risk can be determined. The adverse effects that may be quantified range from merely being exposed to a hazardous condition, to being fatally injured by exposure to the hazardous condition. Consequences of interest will vary according to the purpose and scope of the risk analysis.

During consequence analysis, it is necessary to know the population density and distribution around the facility. It is also necessary to know the minimum levels of exposure to hazardous conditions that will produce the consequences of interest (for example, what is the minimum level of thermal radiation that is capable of causing burn injury/fatalities within particular exposure time?). Only then can the consequences be quantified by overlaying the hazard zones of interest on the local population, and counting the number of persons exposed to the hazard.

Risk quantification -

Once the probability of occurrence and potential consequence of a hazardous event has been quantified, the risk associated with that event can be calculated by multiplying the probability.

Risk assessment –

The risk calculated above can be compared to various levels of risk that may be considered acceptable by general public, plant workers, govt. agencies etc.. This helps decision maker to decide whether or not the risk association with operation of the facility is low enough to be acceptable.

Risk reduction measures -

If the risk basis on the selected event are too high it may be possible to reduce the risk by risk reduction factors such as -

- a) modifying the facility to eliminate or reduce the probability of occurrence of hazardous events.
- b) modifying the facility so that hazardous events are eliminated.
- c) restricting the consequence of some of the events by improving hazard mitigation systems.
- d) reducing the exposed population by increasing safe distances by acquiring property around the facility.

5.2 Hazard Analysis Methods

- a) Hazard and Operability Study.
- b) Accident Consequence Analysis.
- c) Event Tree Analysis.
- d) Fault Tree Analysis.
- e) Failure Modes, Effects and Criticality Analysis.

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5.2.1 Hazard and Operability Study (HAZOP):

The technique plays a vital role in the hazard identification step. The HAZOP study systematically identifies all possible deviations from normal operation. It also establishes the likelihood and consequences of events. Deviations that could lead to a hazardous event or operability problem are identified. Consequences of possible deviations are assessed and potential means for detection and correction are examined.

5.2.2 Accident Consequences Analysis:

The method is used in the analysis of identified hazard. An accident consequences analysis should be carried out to determine the consequences of a potential major accident on the Installation, the workers, the neighbourhood and the environment. It should contain:

a) A description of the potential accident (tank fire, pool fire, rupture of pipeline, tank truck on fire at Tank Truck Loading Gantry, failure of safety valve and fire).

b) An estimation of quantity of hazardous materials re-leased (flammable and explosive).

c) Where appropriate, a calculation of the dispersion of the material released (gas or evaporating liquid like Naphtha/gasoline).

d) An assessment of the harmful effects (heat, radiation, blast wave).

The techniques of accident consequence analysis should include physical models for dispersion of pollutants in the atmosphere, propagation of blast waves, thermal radiation etc. depending on type of hazardous substance present in the Installation. The results of the analysis should be used to determine which preventive measures such as fire fighting system, alarm system of pressure release system are required.

5.2.3 Failure Modes, Effects and Criticality Analysis (FMECA):

The method find application in hazard identification stage. In this method, a tabulation system is adopted for every unit of equipment along with it failure modes; the effect of each failure on the system or unit, and what constitutes critical failure to the integrity of the system as a whole. Thereafter, the failure modes is critically analysed and ranked to determine which are the most likely to cause a serious accident.

5.2.4 Fault Tree Analysis:

This is a formalised deductive technique that works backward from an accident defined to identify and graphically display the combination of equipment failures and operational errors that lead up to the accident. This method can be used to estimate the quantitative likelihood of events. In Consequence analysis.

5.2.5 Event Tree Analysis:

This method is a formalized deductive technique to the Fault Tree Analysis that works forward from specific events or sequences of events that could lead to an accident. It graphically displays events that could result in hazards and can be used to calculate

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the likelihood of an accident sequences occuring. It is a reverse of the Fault
Tree Analysis and finds application in Hazard identification.

5.3 Applicability for Marketing Locations

The hazard analysis methods evolve the consequence analysis for major failure cases
(catastrophic failure), based on which Emergency Preparedness Plan is prepared. The
methods stated above are generally applied in process unit. The marketing locations in
petroleum industry generally store and handle petroleum products and as such the above
sophisticated methods have limited application in our case. Based on the operations
undertaken in marketing locations, it is suggested to consider Accident Consequences
Analysis Method for ascertaining probable maximum loss accident scenario(s). However,
depending on specific requirement, the location may apply any of the above techniques
to undertake hazard analysis.

Based on experience and accident statistics the following potential incidents may be
considered by the oil Industry marketing locations for evaluation to arrive at the Maximum
Loss accident Scenario(s).

POL TERMINALS

a) Storage tank on fire (to be considered for each tank)
b) Pool fire in tank farm
c) Flange joint leakage in Pipelines
d) Fire in TT / TW gantry.
e) Hose rupture.

LPG PLANTS

a) Vapour cloud explosion
b) BLEVE
c) Liquid/vapour discharge from defective cylinder.
d) Release of liquid through failure of Flange gaskets, thermowell, pipeline, weld joint
of storage vessel.
e) rupture of hose.
f) Popping of SRVs.
g) Failure of Mechanical seal of pumps.

6.0 PREPARATION OF EMERGENCY PREPAREDNESS PLAN

An On-site Emergency is caused by an accident that takes place in an Installation
and the effects are confined within the premises involving only the people working in the
unit. An On-site Emergency Plan should contain the following key elements:
6.1 **Basis of the plan:**

A thorough hazard assessment and all risk analysis must consider both catastrophic and less severe but frequent releases. The consequences as derived from the hazard analysis form the basis for drawing the Emergency Preparedness Plan and the same shall be brought out in clear terms. It describes the management of the industry, information on areas where accident can take place, likely severity, spread and measure that could be taken to mitigate/contain the effects.

6.2 **Accident prevention procedures / measures.**

After determining the basis of the plan, the accident preventive measures/procedures shall be detailed. The following measures are provided in general at oil industry marketing locations:

a) Safety, Health and Environment Policy

b) Proper layout and inter facility distances

c) Safety Committees.

d) Safety Audits/inspections

e) Work permit system.

f) Early warning/alarm system particularly in LPG bottling plants (Gas Monitoring System, Heat detection, High level Alarms, Low pressure/high pressure alarms etc.)

g) In-built safety/inter lock system in design (SRVs, TSVs, NRVs, ROVs & other various emergency trip systems in LPG plants).

6.3 **Emergency Preparedness Procedures / Measures**

After detailing the prevention measures, preparedness measures to tackle/handle the emergency shall be explained. Following emergency preparedness measures are prevalent in locations -

a) Fire Drills and Mock Exercises.

b) Mutual Aid.

c) Training and awareness programmes.

6.4 **Response Procedures/ Measures**

Containing the consequences of an emergency requires well planned and documented procedures to ensure prompt response and coordination among various task groups. The following response procedures/measures as prevalent in the location shall be detailed:

6.4.1 **Zoning and Maps**
The zones and maps shall be prepared highlighting the accident prone areas of the unit so that in case of an emergency it gives a basis for taking the action. This gives the size of the area within which human life is seriously endangered by the consequences of accident scenarios. This should also indicate the location of assembly points and emergency control rooms.

6.4.2 Layout/flow diagram -

Detailed layout and flow diagram for different activities such as Product Lines, LPG filling system, emergency shutdown system isolation valves etc. should be detailed. The important control valves should be highlighted.

6.4.3 Manpower -

The detailed manpower deputed on shift basis should be given in order to assess the requirement in case of emergency.

6.4.4 Organogram & their responsibilities -

The organogram should be drawn by appointing key personnel and defining their specific duties which will be handy in emergency. The number of coordinators at a location would depend on the manpower in location. However, three coordinators as detailed below will serve the purpose in general.

A. Main Incident Controller:

For On-Site Emergency Preparedness Plan (EPP), the Location-in-Charge shall be the Main Incident Controller to coordinate the execution of the plan during an emergency or a mock drill. He is responsible for preparation/updation of the plan, getting approval from the District authorities/Factory Inspectorate; and its implementation in the hour of need. His duties are -

a) Assess the magnitude of the situation and declare state of emergency. Activate EPP and ensure its implementation.

b) Mobilise the Main Coordinators/Key Personnel and exercise direct operational control of areas, other than those affected.

c) Declare danger zones and activate Emergency Control Centre.

d) Ensure calling in Mutual aid members and District emergency agencies like Fire Brigade, Police, Medical authorities.

e) Maintain a speculative continuous review of possible developments and assess these to determine most probable course of events and appropriate response.

f) Inform Area Office, Head Quarters, Police, Statutory authorities, District authorities about the magnitude of the emergency casualties and rescue operations.

g) Ensure casualties are receiving required attention and their relatives are informed.

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h) Ensure accounting of personnel.

i) Issue authorised statements to Press, Radio, TV etc., regarding the emergency and its possible impact on the surroundings.

j) Authorise procurement of emergency material.

k) Log important developments in chronological order and preserve material evidence for investigation. 12. Direct isolation of power supply, plant shutdown, and evacuation of personnel inside the premises as deemed necessary.


m) When effects are likely to be felt outside, get in touch with District Authorities, who will take over the management and declare "Off-Site Emergency".

n) Control rehabilitation of affected areas on cessation of emergency.

B. **Administration & Communication Coordinator:**

a) Liaise with Chief and other coordinators.

b) Inform and coordinate with External agencies and Mutual aid members for agreed assistance. Direct them on arrival to the respective coordinators.

c) In case communication means fail, send messengers to Mutual aid members/Emergency departments. 4. Coordinate with Police in controlling the traffic and mob outside the premises.

d) Activate the medical centre and mobilise medical team. Arrange ambulance and transfer casualties to hospitals. Also coordinate with police in case of fatalities.

e) Arrange for head count at the assembly points.

f) Arrange procurement of spares for fire fighting and additional medical drugs/appliances.

g) Mobilise Transport as and when required by various coordinators. Arrange to provide spark arrestors to emergency vehicles entering the premises.

h) Monitor entry/exit of personnel in the premises. Permit only authorised personnel/vehicles inside the premises.

i) Control and disperse crowd from the emergency site. Regulate traffic inside the location.

j) Arrange food, beverages and drinking water for all those involved in execution of EPP in case the emergency prolongs.

k) Communicate with relatives of persons injured/involved in fire fighting activities.

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l) Arrange evacuation of premises as directed by Main incident controller.

m) Coordinate with civil authorities for evacuating public from the danger zone and arrange for refreshments at the evacuation centre.

C. Safety Coordinator

a) Ensure safe stoppage of the Operations; Switching off main instruments, shut off valves on product lines; and isolation of affected area.

b) Demarcate Danger and Safe zones by putting RED and GREEN flags.

c) Mobilise the Fire fighting crew and direct the Fire Fighting operation.

d) Effectively deploy manpower, both internal and external.

e) Direct & utilise the Fire Brigade personnel.

f) Arrange the replacement of various Fire Fighting squads with the Mutual and External aid members on need basis.

g) Ensure/maintain sufficient pressure in the Hydrant mains.

h) Assess water level in the storage tank/reservoir and plan replenishment.

i) Monitor the requirements of Fire equipment and coordinate for procurement of spares.

j) Arrange for flood lighting of the affected areas and dewatering of the Fire fighting area, if required.

k) Arrange to remove and park the tank lorries (Bulk & Packed) to a safer place, as necessary.

6.4.5 Resources (internal/external)

The list of resources such as fire fighting system, personnel protective equipment, etc. available within and with local fire brigade and mutual aid members shall be listed and updated. Typical format is given in Annexure-II.

Mutual Aid:

Combating major emergencies might be beyond the capability of individual unit and it is essential to have mutual aid arrangements with neighbouring industries. Mutual aid arrangements are to be worked out in the plan to facilitate additional help in the event of fire fighting or in rescue operation by way of rendering manpower, medical aid or fire fighting equipment etc. To make the emergency plan a success, the following exchange of information is considered essential:

a) The types of hazards in each plant and fire fighting measures.

b) The type of equipment, that would be deployed and procedure for making the replenishment.

c) Written procedure which spell out the communication system for help and how it will be responded. This is also required to get acquainted with operation of different fire fighting equipment available at Mutual aid members and compatibility for connecting at users place.

d) Joint orientation programme for staff, joint inspection and mock drills.

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6.4.6 INFRASTRUCTURE:

Emergency Control Room:

The emergency control room shall be set up at a safe location and marked on the site plan. The control room will be activated in case of an emergency to direct and coordinate the operations to handle the emergency. It should be furnished with external and internal telephone connections; PA/Paging/VHF etc. list of essential telephone numbers; list of key personnel and their address; fire fighting system and site plan. Depending upon site requirements, additional control room can be considered.

Assembly Points:

There should be pre-designated areas where the personnel like workers, staff, contractor workers etc. not involved in emergency operations (as per Emergency Preparedness Plan) shall assemble in case of an emergency. Depending on the location of the emergency, the assembly point can vary. For each potential hazardous zone, a specific assembly point(s) shall be identified and marked on the zones/maps (refer 6.4.1.). During emergency, Pre-designated persons would take charge of this point and take the roll call of the people reporting.

6.5 Recovery Procedure

After the emergency, the following activities need to be carried out in detail.

a) Post-emergency Recovery.

b) Incident Investigation.

c) Damage Assessment.

d) Clean-up and Restoration.

7.0 List of Attachments, Sketches etc.

In order to make the plan comprehensive, the following detailed sketches, attachments, etc. are required to be enclosed.

a) Layout showing various facilities, fire fighting system, hazardous zones and accompanying assembly point(s) control room, P&I diagram highlighting position of emergency shut off switches/valves.

b) Fire organisation chart detailing list of coordinators, alternate coordinators and task group members and their duties and responsibilities.

c) Address & telephone numbers of -
   i) Emergency coordinators and key persons in the location.

   ii) Mutual aid members.

   iii) Fire Brigade, Police and Hospitals.

   iv) Higher officials at region/zone/HO.

   v) Government officials like District Collector, Inspector of Factories, Commissioner of Police, Local controller of Explosives.

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d) List of fire fighting & safety equipment available at location.

e) Mutual aid Plan.

f) List of Do's and Don'ts during emergency.

h) Material Safety Data Sheets (MSDS) for each hazardous product handled in the location. (as per the format given in annexure - IV).

8.0 INFORMATION TO PUBLIC:

As per rule 41-B(4) of Factories Act and rule 15 of MSIHC rules, the safety measures to be taken in the event of an emergency shall be made known to the general public who are likely to be affected.

For the purpose, use of DOs' and DoNTs' shall be prepared and furnished to the local Criss Group (LCG) formed under "Rules and Emergency planning, preparedness and response for Chemical accidents Rules, 1996" for dissemination to public where the LCG is not available, the list shall be furnished to local authority.

9.0 ACTUATION OF ON-SITE EMERGENCY PLAN & DECLARATION REGARDING OFFSITE EMERGENCY PLAN:

Any emergency start as a small incident which may become a major accident if not controlled in time. At the initial stages, the fire organisation chart shall be put into action. If the incident goes beyond control the on-site emergency plan will be actuated by Main Incident Controller at the appropriate stage as considered necessary. During idle shift/holidays, the security personnel will combat the incident as per the fire organisation chart and at the same time inform various emergency controllers for guidance and control the situation.

When emergency becomes catastrophic and evacuation beyond the plant premises is considered necessary by the Main Incident Controller, the situation will be handed over to District Authority for implementing the off-site emergency plan.

The management of emergency henceforth has to be controlled by the district crisis management group from control room under the supervision of the District Collector.

For On-site Emergency Plan, Chief Inspector of Factories is the enforcement authority, who will also enforce directions and procedures in respect of preparation of Off-Site Emergency Plan in consultation with the District Collector.

In addition to preparation of on-site emergency plan, furnishing a relevant information to the district authorities (Collector) for the preparation of off-site emergency plan is a statutory responsibility of the occupier of every industry handling hazardous substance.

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10.0 TESTING AND UPDATING OF THE ON-SITE PLAN

Mock drills activating the Emergency Preparedness Plan should be conducted periodically for ensuring its efficiency during emergency as well as for refinement and updation. The above drills based on the plan will help to achieve the following objectives:

a) to familiarise emergency response personnel with their roles and duties to be performed.

b) to ensure the efficacy of the emergency response mechanism.

c) to check the coordination of reactions and response of emergency services.

d) to gain experience and confidence.

For the installation coming under the purview of MSIHC rules (Storage Quantity exceeding the threshold limit indicated under section 3.2.1 of the guidelines), the mock drill for an on-site emergency plan shall be carried out once in six months as per rules.

For other installations, (not falling under MSHIC Rules as above) the mock drill shall be carried out once a year. However for locations having more than one industry member, the annual mock drill can be carried out by one industry member in turn, thus ensuring one mock drill in every year at the location.

These mock drills will enable the unit/location to assess the capability of the individual and performance as a group. The frequent discussions and drills will help in eliminating the confusion/ shortcomings if any.

The Main incident controller is responsible for evaluating the effectiveness of the Emergency Preparedness Plan. The evaluation will help to identify the loopholes and to assess the response capability of the location. A regular review of the plan (atleast once in a year) be carried out to update the information or to incorporate the results of the mock drills. However, essential information like change in names/ addresses/ telephone numbers of the persons/members detailed in the Emergency Preparedness Plan, shall be updated as and when the change comes to notice.
REFERENCES

MANUAL ON
EMERGENCY PREPAREDNESS
FOR
CHEMICAL HAZARDS

Prepared by:
HAZARDOUS SUBSTANCES
MANAGEMENT DIVISION
MINISTRY OF ENVIRONMENT
AND FOREST, GOVERNMENT OF
INDIA NEW DELHI
1992

GUIDENCE FOR THE
PREPARATION OF A RISK
MANAGEMENT AND PREVENTION
PROGRAM

Prepared by:
CALIFORNIA OFFICE OF
EMERGENCY SERVICES
HAZARDOUS MATERIAL DIVISION
STATE OF CALIFORNIA

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FACTORIES ACT 1948.

SECTION 41 B:
Compulsory disclosure of information by the occupier of Factories involving hazardous processes.

SECTION 41 B (1)
The occupier is responsible for disclosing information to:
- Workers
- Chief Inspector
- Local Authority
- General Public in the vicinity.

NOTE:
Information to be disclosed has been described in the Model Rules.

SECTION 41 B (2)
The Occupier shall lay down a detailed policy with respect to the health and safety of the workers and intimate same to the Chief Inspector and the Local Authority. Under Section 7 A (3), he is also responsible for informing same to the workers.

SECTION 41 B (4)
Every Occupier shall, with the approval of the Chief Inspector draw up an on-site emergency plan and detailed disaster control measures for his factory and make known the workers employed therein and to the general public living in the vicinity of the factory the Safety measures required to be taken in the event of an accident taking place.

SECTION 41 B (7)
The Occupier of a factory involving a hazardous process shall, with the previous approval of the Chief Inspector, lay down measures for the handling, usage, transportation and storage of hazardous substance inside the factory premises and the disposal of such substances outside the factory premises and publicise them in the manner prescribed among the workers and the general public living in the vicinity.

Rule 4: General Responsibility of the occupier during industrial activity.

1. This rule shall apply to -

   (a) an industrial activity in which a hazardous chemical, which satisfies any of the criteria laid down in Part I of Schedule I and is listed in Column 2 of Part II of this Schedule is or may be involved, and

   (b) isolated storage in which there is involved a threshold quantity of a hazardous chemical listed in Schedule 2 in Column 2 which is equal to or more than the threshold quantity specified in the Schedule for that chemical in Column 3 thereof.

2. An occupier who has control of an industrial activity in terms of sub-rule (1) shall provide evidence to show that he has -

   (a) identified the major accident hazards; and

   (b) taken adequate steps to -

      (i) prevent such major accidents and to limit their consequences to person and the environment;

      (ii) provide to the persons working on the site with the information, training and equipment including antidotes necessary to ensure their safety.

RULE 5: NOTIFICATION OF MAJOR ACCIDENT -

1. Where a major accident occurs on a site or in a pipe line, the occupier shall (within forty eight hours notify) the concerned authority as identified in Schedule 5 of that accident, and furnish thereafter to the concerned authority a report relating to the accidents in instalments, if necessary, in Schedule 6.

2. The concerned authority shall on receipt of the report in accordance with sub-rule 1 of this rule shall undertake a full analysis of the major accident and send the (requisite information within 90 days to the Ministry of Environment and Forests through appropriate channel.

3. An occupier shall notify to the concerned Authority, steps taken to avoid any repetition of such occurrence on a site.

4. The concerned authority shall compile information regarding major accidents and make available a copy of the same to the Ministry of Environment and Forest through appropriate channel.

5. The concerned Authority shall in writing inform the occupier, of any lacunae which in its opinion needs to be rectified to avoid major accidents.

RULE 7: NOTIFICATION OF SITES -

1. An occupier shall not undertake any industrial activity (unless he has been granted an approval for understanding such an activity and has submitted) a written report to the concerned Authority containing the particulars specified in Schedule 7 at least 3 months
before commencing that activity or before such shorter time as the concerned authority may agree and for the purpose of this paragraph, an activity in which subsequently there is or is liable to be threshold quantity or more of an additional hazardous chemical shall be deemed to be a different activity and shall be notified accordingly.

2. The concerned Authority within 60 days from the date of receipt of the report, shall approve the report submitted and on consideration of the report if it is of the opinion that contravention of the provisions of the Act or the rules made thereunder has taken place, it shall issue notice under rule 19.

RULE 8 : UPDATING OF THE SITE NOTIFICATION FOLLOWING CHANGES IN THE THRESHOLD QUANTITY. -

Where an activity has been reported in accordance with rule 7(1) and the occupier makes a change in it (including an increase or decrease in the maximum threshold quantity of a hazardous chemical to which this rule applies which is or is liable to be at the site or in the pipeline or at the cessation of the activity) which affects the particulars specified in that report or any subsequent report made under this rule, the occupier shall forthwith furnish a further report to the concerned authority.

RULE 9 : TRANSITIONAL PROVISION - Where-

(a) at the date of coming into operation of these rules, an occupier is in control of an existing industrial activity which is required to be reported under rule 7(1); or

(b) within 6 months after that date an occupier commence any such new industrial activity ;

it shall be a sufficient compliance with that rule if he reports to the concerned authority as per the particulars in Schedule 7 within 3 months after the date of coming into operation of these rules or within such longer time as the concerned authority may agree in writing.

RULE 10 : SAFETY REPORTS -

1. Subjects to the following paragraphs of this rule, an occupier shall not undertake any industrial activity to which this rule applies, unless he has prepared a safety report on that industrial activity containing the information specified in Schedule 8 and has sent a copy of that report to the concerned authority at least ninety days before commencing that activity.

2. In the case of a new industrial activity which an occupier commences, or by virtue of sub-rule 2(a)(ii) of rule 6 is deemed to commence, within 6 months after coming into operation of these rules, it shall be sufficient compliance with sub-rule(1) of this rule if the occupier sends to the concerned authority a copy of the report required in accordance with that sub-rule within ninety days after the date of coming into operation of these rules.

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3. In case of an existing industrial activity, the occupier shall prepare a safety report in consultation with the concerned authority and submit the same within one year from the date of commencement of the Manufacture, Storage and Import of Hazardous Chemicals (Amendment) Rules, 1994, to the concerned Authority.

4. After the commencement of the Manufacture, Storage and Import of Hazardous Chemicals (Amendment) Rules, 1994, the occupiers of both the new and the existing industrial activities shall carry out an independent safety audit of the respective industrial activities with the help of an expert not associated with such industrial activities.

5. The occupier shall forward a copy of the auditor’s report along with his comments to the concerned authority within 30 days after the completion of such Audit.

6. The occupier shall update the safety audit report once a year by conducting a fresh safety audit and forward a copy of it with his comments thereon within 30 days to the concerned authority.

7. The concerned authority may if it deems fit, issue improvement notice under rule 19 within 45 days of the submission of the said report.

RULE 11: UPDATING OF REPORTS UNDER RULE 10 -

1. Where an occupier has made a safety report in accordance with sub-rule (1) of rule 10 he shall not make any modification to the industrial activity to which that safety report relates which could materially affect the particulars in that report, unless he has made a further report to take account of those modifications and has sent a copy of that report to the concerned authority at least 90 days before making those modifications.

2. Where an occupier has made a report in accordance with rule 10 and sub-rule (1) of this rule and that industrial activity is continuing the occupier shall within three years of the date of the last such report, make a further report which shall have regard in particular to new technical knowledge which has affected the particulars in the previous report relating to safety and hazard assessment and shall within 30 days send a copy of the report to the concerned authority.

RULE 12: REQUIREMENT FOR FURTHER INFORMATION TO BE SENT TO THE AUTHORITY -

Where in accordance with rule 10, an occupier has sent a safety report and the safety audit report relating to an industrial activity to the concerned authority, the concerned authority may, by notice served on the occupier, require him to provide such additional information as may be specified in the notice and the occupier shall send that information to the concerned authority within 90 days.

RULE 13: PREPARATION OF ON SITE EMERGENCY PLAN BY THE OCCUPIER -

1. An Occupier shall prepare and keep up-to-date an on-site emergency plan containing details specified in Schedule II and detailing how major accident will be dealt with on the site on which the industrial activity is carried on and that plan

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shall include the name of the person who is responsible for safety on the site and the names of those are authorised to take action in accordance with the plan in case of an emergency.

2. The occupier shall ensure that the emergency plan prepared in accordance with sub-rule (1) takes into account any modification made in the industrial activity and that every person on the site who is affected by the plan is informed of its relevant provisions.

3. The occupier shall prepare the emergency plan required under sub-rule (1) -
   (a) in the case of a new industrial activity before that activity is commenced;
   (b) in the case of an existing industrial activity within 90 days of coming into operation of these rules.

4. The occupier shall ensure that a mock drill of the on-site emergency plan is conducted every six months;

5. A details report of the mock drill conducted under sub-rule (4) shall be made immediately available to the concerned authority.

**RULE 14 : PREPARATION OF OFF-SITE EMERGENCY PLAN BY THE AUTHORITY**

1. It shall be the duty of the concerned authority as identified in Column 2 of Schedule 5 to prepare and keep up-to-date (an adequate an off-site emergency plan containing particulars specified 12 in schedule and detailing how emergencies relating to a possible major accident on that site will be dealt with and in preparing that plan the concerned authority shall consult the occupier and such other persons as it may deem necessary.

2. For the purpose of enabling the concerned authority to prepare the emergency plan required under sub-rule (1), the Occupier shall provide the concerned authority with such information relating to the industrial activity under his control as the concerned authority may require including the nature, extent and likely affects off-site of possible major accidents and the authority shall provide the occupier with any information from the off-site emergency plan which relates to his duties under Rule 13.

3. The concerned authority shall prepare its emergency plan required under sub-rule (1) -
   (a) in the case of a new industrial activity, before that activity is commenced;
   (b) in the case of an existing industrial activity, within six months of coming into operation of these rules.

4. The concerned authority shall ensure that a rehearsal of the off-site emergency plan is conducted at least once in a calendar year.

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RULE 15: INFORMATION TO BE GIVEN TO PERSONS LIABLE TO BE AFFECTED BY A MAJOR ACCIDENT -

1. The occupier shall take appropriate steps to inform persons outside the site either directly or through District emergency authority who are likely to be in an area which may be affected by a major accident about -
   a) The nature of the major accident hazard and
   b) The safety measures and the 'Do's and Don't's which should be adopted in the event of a major accident.

2. The occupier shall take the steps required under sub-rule (1) to inform persons about an industrial activity, before that activity is commenced, except, in the case of an existing industrial activity in which case the occupier shall comply with the requirements of sub-rule (1) within 90 days of coming into operation of these rules.

SCHEDULE - 11
(See Rule 13(1))

(DETAILS TO BE FURNISHED IN THE ON-SITE EMERGENCY PLAN)

1. Name & address of the person furnishing the information.

2. Key personnel of the organisation and responsibilities assigned to them in case of an emergency.

3. Out side organisations if involved in assisting during on-site emergency.
   (a) Type of accidents.
   (b) Responsibility assigned.

4. Details of liaison arrangement between the organisations.

5. Information on the preliminary hazard analysis:
   (a) Type of accidents.
   (b) Systems elements or events that can lead to a major accident.
   (c) Hazards.
   (c) Safety relevant components.

6. Details about the site:
   (a) Location of dangerous substances.
   (b) Seat of key personnel.
   (d) Emergency control room.

7. Description of hazardous chemicals at plant site:
   (a) Chemicals (Quantities and toxicological data)
   (b) Transformation if any which could occur.
   (c) Purity of hazardous chemicals.

8. Likely dangers to the plant.

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9. Enumerate effects of:
   (i) Stress and strain caused during normal operation:
   (ii) Fire and explosion inside the plant and effect if any, of fire and explosion outside.

10. Details regarding:
   (i) warning, alarm and safety and security systems.
   (ii) alarm and hazard control plans in line with disaster control and hazard control planning, ensuring the necessary technical and organisation precautions.
   (iii) reliable measuring instruments, control units and servicing of such equipments.
   (iv) precautions in designing of the foundation and load bearing parts of the building.
   (v) continuous surveillance of operations.
   (vi) maintenance and repair work according to the generally recognised rules of goods engineering practices.

11. Details of communication facilities available during emergency and those required for an off-site emergency.

12. Details of fire fighting and other facilities available and those required for an off-site emergency.

13. Details of first aid and hospital services available and its adequacy.

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## ANNEXURE- II

### RESOURCE MOBILISATION (MEN & EQUIPMENT)

<table>
<thead>
<tr>
<th>Details</th>
<th>Total Requirement</th>
<th>Available with Plant/ Terminal</th>
<th>Neighbouring Units</th>
<th>Civil Authorities</th>
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<tbody>
<tr>
<td>1</td>
<td>MANPOWER</td>
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<tr>
<td></td>
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<tr>
<td></td>
<td>Hospital Attendants</td>
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<tr>
<td></td>
<td>Others (Technicians/Helpers)</td>
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<tr>
<td>2</td>
<td>FIRE FIGHTING APPLIANCES/ EQUIPMENT/ CHEMICALS</td>
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<tr>
<td></td>
<td>Fire Tenders/Fire fighting engines</td>
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<td></td>
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<td>Compressed air B.A. Set</td>
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<td>Refill Cylinders for B.A. Set</td>
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<td>Cascade B.A Set</td>
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<td>COMMUNICATION</td>
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<td></td>
<td>Mobile Cranes</td>
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</tbody>
</table>

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### 6 MISCELLANEOUS

- Ropes (Metres)
- Empty drums
- Buckets
- Sand bags
- Dewatering pump
- Pneumatic pump
- Photo Camera
- Video Camera

### 7 EQUIPMENTS FOR CORPS DISPOSAL

- Light Metal Stretchers
- Tarpauline 12’ X 12”
- Rope fibre 3/8”
- Bucket
- Helmet
- Rubber gloves

### 8 LIST OF EMERGENCY DRUGS & APPLIANCES

- Canvas Stretcher
- Oxygen Cylinder
- Sterlite Bandages
- Cotton Sterilised
- Antibiotics
- Analgesics
- Sedatives
- Tetanus Toxoid
- Dressing Instruments
- Sterilisers
- Autoclave for sterilising Instruments, dressing
- B.P. Apparatus
- Suction Apparatus
- I.V. Set
- Antishock drugs
- Gluco Saline Set
- Gluco Saline Bottle

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ANNEXURE-III

METEOROLOGICAL DATA

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<th>Direction</th>
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MONTHLY AVERAGE TEMPERATURE DATA

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</table>

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ANNEXURE - IV

SCHEDULE - 9
(See Rule 17)

SAFETY DATA SHEET

1. CHEMICAL IDENTITY

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Chemical Classification</th>
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<tbody>
<tr>
<td>Synonyms</td>
<td>Trade Name</td>
</tr>
<tr>
<td>Formula CAS No.</td>
<td>U.N.No.</td>
</tr>
</tbody>
</table>

Regulated Shipping Name Hazchem No: Codes/Lable

Hazardous waste I.D.No.:

Hazardous Ingredients C.A.S.No. Hazardous Ingredients CAS No:

<p>| | |</p>
<table>
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<tr>
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<tbody>
<tr>
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<td>2</td>
<td>4</td>
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</table>

2. PHYSICAL AND CHEMICAL DATA

<table>
<thead>
<tr>
<th>Boiling Range/Point</th>
<th>Physical State</th>
<th>Appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting/freezing Point</td>
<td>Vapour Pressure @35 deg.C mm/Hg.</td>
<td>Odour</td>
</tr>
</tbody>
</table>

Vapour Density (Air = 1) Solubility in water @30 deg. C Others

Specific Gravity (Water = 1) PH

3. FIRE AND EXPLOSION HAZARD DATA

| Flammability Yes/No. | LEL | %Flash Point C | Autoignition C Temperature |
| TDG Flammability UEL | %Flash Point C |   |       |

Explosion Sensitivity to Impact Explosion Hazardous Sensitivity to State Hazardous Combustion Products

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Electricity

Hazardous Polymerisation

<table>
<thead>
<tr>
<th>Combustible Liquid</th>
<th>Explosive Material</th>
<th>Corrosive Material</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td>Flammable Material</td>
<td>Oxidiser</td>
<td>Others</td>
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<tr>
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</tr>
<tr>
<td>Pyrophoric Material</td>
<td>Organic</td>
<td>Peroxide</td>
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</table>

4. REACTIVITY DATA

Chemical Stability

Incompatibility with other Material

Reactivity

Hazardous Reaction Products

5. HEALTH HAZARD DATA

Routes of Entry

Effects of Exposure/Symptoms

Emergency Treatment

<table>
<thead>
<tr>
<th>TLV (ACGIH)</th>
<th>ppm</th>
<th>mg/m</th>
<th>STEL</th>
<th>ppm</th>
<th>mg/m</th>
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</thead>
</table>

Permissible Exposure Limit

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<tr>
<th>LD/50</th>
<th>ppm</th>
<th>mg/m</th>
<th>Odour LD/50 Threshold</th>
<th>ppm</th>
<th>mg/m</th>
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</thead>
</table>

NEPA Hazard Signals

Health Flammability Stability Special

6. PREVENTIVE MEASURES

Personnel Protective Equipment

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Handling and Storage Precautions

7. EMERGENCY AND FIRST AID MEASURE

Fire Extinguishing Media

Fire Special Procedures

Unusual Hazards

Exposure First Aid Measures

Antidotes/Dosages

Spills Steps to be taken

Waste Disposal Method

8. ADDITIONAL INFORMATION/REFERENCES

9. MANUFACTURER/SUPPLIERS DATA

Name of Firm Contact person in emergency

Mailing Address Local Bodies involved

Telephone/Telex Nos. Standard Packing

Telegraphic Address Tremcard Details/Ref.

10. Disclaimer:

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