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INTRODUCTION

The growth of chemical industries has led to an increase in the risk of occurrence of incidents associated with hazardous chemicals (HAZCHEM). Increased industrial activities and enhanced vulnerability lead to industrial and chemical accidents. Chemical accidents may originate in the manufacturing or formulation facility, or during the process operations at any stage of the product cycle, material handling, transpiration and storage of HAZCHEM. Vulnerability is sometimes compounded due to the location of Major accident Hazard (MAH) industries closer to densely populated areas. It is well documented that in case where the organization and the civil authorities were prepared to handle the situation, the losses were significantly less since these undesirable events occur suddenly and generally without immediate warning, especially the technological disasters, the result is an emergency. Though the management of factories and the authorities has responded to the challenge and has introduced no. of measures to minimize the hazards, still one can not forget the fact that accident can not be completely eliminated

“Zero Risk” simply does not exist. Hence the need for preparedness and planning for containing any likely emergency quickly and to keep the damages the absolute minimum is evident. The tragic drama that unfolded at Bhopal on that fateful night brought out this stark reality very vividly. The absolute lack of planning and unpreparedness for facing any kind of emergency led to gruesome consequences on the unfortunate city. These regulations speak out the guidelines for prevention and effective management of hazardous materials and the dangerous results of violating the same.

It is imperative that the legislation alone cannot fulfill the objectives but need complete cooperation and involvement of Industries, District Administration and the Public. It is equally important that Contingency Plan coordinating the resources is prepared and kept ready in full preparedness to handle any eventualities. It is in this context the Kaithal District Administration has taken initiatives in preparing a comprehensive off site emergency plan for Kaithal district to manage the eventualities from the Hazardous industries located in the District.

PREAMBLE

An offsite emergency arising out due to chemical is one, which has the potential to cause serious damage or loss of life beyond the plant boundary. In addition, accidents during transportation of hazardous chemicals by road, rail, pipeline, etc. can also cause offsite emergencies. Emergency services such as police, fire, medical etc. need to be prepared to handle such situations effectively. The snowballing of a small incident into a major chemical disaster and the subsequent effects on the life and property can be mitigated if there is a readily implement able emergency preparedness plan available with the concerned district authorities. In order to be in a state of preparedness to respond to the accidents and minimize their adverse impacts on the offsite population, Rule 14 of the MSIHC Rules, 1989 (Amended in 2000), under EPA, 1986, requires an offsite emergency plan to be prepared by the District Collector for every district or industrial area, as applicable.

Objectives, Extent & Scope of the Plan

The main objectives of the Off Site Emergency Plan are:

- To Provide resources and methods for effective control of emergencies arising out the leakage ,explosion and fire due to hazardous materials ;
- To prevent emergency turning into disaster;
- Synchronized action from all the coordinating agencies with least possible delay.
- To minimize damage to the property, people and the environment
- Effective rescue operation and treatment of the casualties
- To train the people and the concerned to act efficiently and with confidence in an emergency;
- To bring back normal situation in the least possible time;
- To provide authoritative information to the news media and government agencies;
- No panic among the general public .No exploitation or exaggeration of the situation by any agency.

District Crisis group (DCG) Kaithal comprise the following members:-

- | | | |
|-----|--|-------------|
| 1. | Deputy Commissioner, Kaithal | Chairperson |
| 2. | Fire Officer of Municipal Corporation, Kaithal | Member |
| 3. | General Manager, District Industries centre Kaithal | Member |
| 4. | Senior Superintendent of police, Kaithal | Member |
| 5. | District Public Relation Officer, Kaitahl | Member |
| 6. | Executive Engineer, PWD(Public Health), Kaithal | Member |
| 7. | One representative of Trade Unions to be nominated by
Deputy Commissioner | Member |
| 8. | Assistant Director, Industrial Safety & Health, Kaithal | Member Sec. |
| 9. | Civil Surgeon, Kaithal | Member |
| 10. | Executive Officer, Municipal Council, Kaithal | Member |
| 11. | Regional Officer, Haryana State Pollution Control Board, Panchkula | Member |
| 12. | Deputy Director, Agriculture | Member |
| 13. | (i) Senior Assistant Director, Industrial safety and health, Gurgaon
(ii) Assistant Director, Industrial Safety & Health, Hisar | Member |
| 14. | General Manager, Haryana Roadways, Kaithal | Member |
| 15. | One representative of industries to be nominated by
Deputy Commissioner | Member |

INDUSTRIAL PROFILE (LIST CHEMICAL INDUSTRY)

Chemical Accident Hazard Units in Kaithal District

S.No.	District	Address of The unit	Hazardous Material being Manufactured handled, stored & imported (Appox.)
1.	Kaithal	M/S The Kaithal Co-Operative Sugar Mills Ltd. Kaithal	Sulphur = 30 Tons Lime = 40 Tons
2	Kaithal	M/S Cheeka Solvent Pvt. Ltd. 2 KM.Stone Patiala Road , Cheeka	Hexane = 50 KL
3	Kaithal	M/S Jain Udyog Sovent Extraction Plant, Jind Road , Kaithal	Hxane = 30 KL
4	Kaithal	Kaithal Solvent Pvt. Ltd. Kaithal Road, Cheeka	Hxane = 50 KL
5	Kaithal	Vitrag Extractions Pehowa Road, Dhand	Hxane = 30 KL

HAZARD SCENARIOS & EMERGENCY ORGANIZATION-AREA MAPS TO SCALE

TOPOGRAPHY

Kaithal district is located on the Northrn side of Haryana. The Map of the District with location of Major Accident Hazard (MAH) units and surrounding areas is given at Table.

Post emergency activities.

Activity	Responsibility
Check the industrial unit for possible secondary effect of delayed relapse.	Technical experts
Provide notification at the shelters of termination of emergency	Communications Coordinator
Restoration of water, electricity and gas supplies	Utilities Coordinator
Arrange for transportation of evacuees back to residence	Transportation coordinator
Restoration of law and order in the affected areas	Security coordinator
Establish grievance cell	Liaison & PR coordinator and chairperson of Local Crisis Group (LCG)
Hold press conference	Public Relations Coordinator

Hold public meetings for answering their queries	PR coordinator in association with officials of the concerned Major Accident Hazard (MAH) unit
Arrange for providing interim relief to the affected people	District Collector
Undertake accident investigation and documentation	Technical coordinator
Arrange further relief to the affected people based on claim applications	District Collector
Plan updating, if so required	District Crisis Group (DCG) / Local Crisis Group (LCG)
Provide training to community and staff	DCG/LCG

DUTIES & RESPONSIBILITIES OF THE DEPUTY COMMISSIONER IN

CASE OF DISASTER IN THE DISTRICT

Pre-Incident:

1. The District Magistrate is overall incharge of all emergency operations to deal with Disaster arising any where in the district.
2. To constitute the District Crisis group in accordance with the Govt. Notifications S.O. 64/CA (EPP and R.) R. /2001.
3. Assessment of possible major hazards in the district with special focus on major hazard industry/ installations, major railway/ road accidents, air raids and the natural calamities e.g. Earth quake, flood, lightning etc.
4. Make the assessment of facilities and equipment available with all departments, organization and to suggest improvement for the up gradation of facilities and equipment for dealing with emergency.
5. Formulate District Disaster Management Control plan in order to mitigate the effects of disaster so as to minimize the loss of life property & environment. Nominate additional DDM Controller or his subordinate to take charge of control room in case of disaster.
6. To establish the District Disaster control room with suitably skilled person for taking action in case of emergency and to equip it with necessary information, documents route map, MSDS, composition and sufficient & effective mean of communication.
7. Issue instructions, standing order to all departments, organization, industries and services to prepare and act in accordance with the District Disaster Management Plan.
8. Be familiar with the major hazards industries and installation as well as possible effects of natural calamities.
9. Ensure the training of all the members of DDM/P.
10. Ensure awareness in respect of the public emergency preparedness through News Paper, Radio, and T.V. & D. P.R.O. etc.
11. Hold periodical mock/ training exercise to ensure optimum operational preparedness.
12. Review the efficiency of the DDM/P.

During the Emergency / Incident:

1. On getting information of the incident Deputy Commissioner will contact the site incident controller. Other sources of information for detailed information regarding the level of emergency.
2. If he is satisfied that the emergency is major he will immediately put all the emergency services into action as per procedure laid down in the District Disaster Management Plan. After that he will rush to the scene of emergency if it is localized.
3. On reaching the accident site he will assess the gravity of the emergency.
4. He will ensure the arrival of all the emergency services at the site.
5. Direct and co-ordinate the activities of various agencies involved in the emergency operation like fire fighting, rescue operation, evacuation of employees and General public, shifting of injured to hospitals and management of casualties.
6. Keep in constant touch with District emergency control room.
7. Take latest information of the situation.
8. Direct the rescue operation.
9. Seek help from State crises group and Central Crisis group, adjoining Districts and Central Government if required.

After the emergency / incident:

1. Declare the emergency to be over.
2. Arrange for the rehabilitation of evacuated public.
3. Ensure essential amenities for the public.
4. Keep watch on any disease/ epidemics due to and after effects of the emergency.
5. Arrange for the treatment rehabilitation of effected employees and public.
6. Provide relief under public liability Insurance Act 1991.
7. Investigate the cause of accident/ major emergency or constitute an investigating committee.
8. Arrange for the implementation of remedial action to prevent the recurring of emergency based on investigation.
9. Keep records of weakness/ shortfalls/ lapses and causes of failure of disaster control management plan during emergency operation and suggest measures for improvement.

DUTIES AND RESPONSIBILITY IN EMERGENCY

FIRE SERVICE

Pre - Incident:

1. To be aware of the location of major hazard units and potentially hazardous installation as well as the level of possible emergency.
2. To be familiar with works incident controller and key personal of each unit and their role.
3. To be familiar to deal with the leakage of flammable toxic substances.
4. To keep a list of adverse effects of chemicals and methods to deal with emergency involving each chemical in each unit.
5. Prepare the team to attend the emergency on each particular location.
6. Review the adequacy of existing facilities available with fire service Deptt. Concerned major hazard units and suggest/ arrange to procure the additional equipments / facilities.
7. Review the adequacy of fire prevention arrangements in each unit (before and after the installation) and suggest making adequate fire prevention arrangements.
8. Participate in mutual aid programmed/ scheme with major hazard units and suggest for improvement in the existing plan.
9. Involve in on site emergency rehearsals/ mock drills.
10. Prepare the rescue plan for each unit in consultation with the management and review the arrangements for rescue operation suggest to procure or arrange to procure essential equipments for rescue operation.
11. Identify roads/ routs of access and escape.
12. Impart training to the fire fighting staff including the employees of major hazard units.

During the incident:

1. After getting the information, quickly rush to the scene of emergency.
2. Take incharge of fire fighting and rescue operations from works main controller and start the fire fighting operation.
3. Assess the level of emergency and inform district administration to take further action for evacuation.
4. Evacuate the employees inside the building/ plant.
5. Co-ordinate fire fighting activities of mutual aid group and the concerned unit.
6. Co-ordinate the operation to stop leakage or release of flammable / toxic substance.
7. Keep in touch with site incident controller of the industry and district administration.

8. Advise the district administration for the development of additional fire fighting personnel/ requirement of additional equipment etc.
9. Seek help of police/ civil defense in fire fighting operation.
10. Safe guard the adjacent property/ population from fire by confining the fire spread.
11. Search for injured/ trapped/ buried persons and casualties and take them out for first aid/ medical aid.

After the incident:

1. Ensure that there is no chance of re-ignition of fire/ leak / release at site before leaving the site.
2. Search for injured / casualties etc.
3. Make record of damages/ casualties / losses.
4. Make record of fire fighting facilities used.
5. Record the lapses/ promptness in action during fire fighting operation.
6. Check the conditions of drains/ Storm drain for the presence of harmful substances.
7. Investigate into the cause of fire in collaboration with investigating officer and suggest remedial measures for future.

DUTIES AND RESPONSIBILITY IN EMERGENCY

POLICE

Pre - Incident:

1. To help the planning team in the preparation of emergency plan.
2. To be aware of nature, causes and consequences of emergencies.
3. To be familiar with Major Hazard Units with personal visit.
4. To set up and maintain the emergency control room.
5. To stop/ control of dwelling in the vicinity of Major Hazard Units.
6. To control the encroachment/ congestion on the roadways leading to Major hazard unit.
7. Constitute teams to deal with emergency in different area on call and assign duties to SHO's of the area concerned.
8. Arrange for the participation in rehearsal.
9. Arrange for public address system and siren.
10. Explain evacuation procedure to general public.
11. Make arrangement for evacuation and dealing with Injured/ casualties.
12. Plan for traffic control for different areas.

During the incident:

1. Rush to the scene of emergency.
2. Be in regular contact of control room and Deputy Commissioner.
3. Take charge of fire fighting, rescue and evacuation operation.
4. Keep in touch with works main controller of affected unit.
5. Arrange to send the Injured/ affected persons to hospitals.
6. Arrange to control the traffic.
7. Arrange to cordoned off/ barricade the affected area.
8. Maintain the law and order in the area.
9. Declare and arrange for the evacuation of general public to a predetermined safe place. Communicate with General public.
10. Arrange to guard the public property in the evacuated area.
11. Search the affected area for injured/ affected person and casualties in the unit and out side the unit.
12. Report all significant development and activities to D.C.

13. Take/ preserve evidences.
14. Arrange to deal with casualties.
15. Assist the medical services.
16. Assist the fire fighting team.

After the incident:

1. Arrange for the rehabilitation of evacuated person.
2. Arrange to put the traffic to normal.
3. Communicate the situation to general public.
4. Arrange to give information of Injured/ affected personals and casualties to their relatives.
5. Keep the record of injured / casualties.
6. Set up communication center to give information to the relatives of affected persons.
7. Keep watch on law and order situation.

DUTIES AND RESPONSIBILITY IN EMERGENCY

MEDICAL DEPARTMENT

Pre - Incident:

1. Keep a list of Major Hazard Units and hazardous chemicals used.
2. Prepare a list of antidote for each chemical.
3. Have the estimate of affected persons in case of emergency in each major hazard unit.
4. Make necessary arrangements for first aid and affected people in various hospital/ nursing home.
5. Keep liaison with all nursing homes and hospitals and have the information of their capabilities along with services available.
6. Send notices to all the nursing homes/ hospital to be prepared for emergency specifying the services to be rendered during emergency.
7. Plan for medical services area wise i.e. select / appoint the hospitals for each area or unit.
8. Arrange/ nominate the medical crew to reach at site for medical aid.
9. Arrange for ambulance/ mobile medical aid for affected site.
10. Arrange to plan adequate beds for affected persons.
11. Arrange to deal with casualties.
12. Plan for additional capacity in hospitals.
13. Arrange for rehearsal and training of medical staff.
14. Arrange for the buffer stock of medicine.
15. Establishment of information center capable of providing relevant information in an emergency on the diagnosis, treatment and rehabilitation of persons injured by chemicals.
16. Take part in exercise with the other relevant authorities involved in emergency plan.

During the incident:

1. On getting information rush to the hospital.
2. Arrange for relevant emergency medicine, blood and antidote in sufficient quantity.
3. Keep in constant touch with D.C. / SP/ ADC to know the scale of emergency and no. of people affected.
4. Send the medical crew and ambulances to the affected site for onsite medical aid.
5. Ensure the arrival of all medical staff to their pre-assigned locations.
6. Inform the various hospitals to arrange for immediate medical aid.
7. Direct the injured / affected people to different hospital as per premedical plan.

8. Arrange for the treatment for injured and affected person.
9. Take account of the persons attended in the hospitals and admitted for treatment.
10. Deal with casualties.
11. Inform any development or change to Deputy Commissioner.

After the incident:

1. Take account of the affected / admitted persons.
2. Arrange for the treatment of the side effects (long term)
3. Research for any kind of chronic disease/ epidemics after the incident due to long term effect of chemicals.
4. Attend the injured people in hospital.
5. Report all significant development to D.C.
6. Arrange to release the people after treatment.
7. Record all developments/ treatment given during emergency.
8. Give preventive advice and medicine to public.
9. Advise the people and district authorities to take particular precaution related with health, in future i.e. preventive measures and medicine.
10. Arrange medical camps in affected are for the treatment of general public and study purpose.
11. Ensure the availability of essential/ life saving drugs in affected area.
12. Arrange for follow up medical examination.

DUTIES AND RESPONSIBILITY IN EMERGENCY

TRANSPORT

Pre - Incident:

1. To be familiar about the probable locations/ installation/ industries where emergency can arise.
2. To be well familiar with the routes of the potential hazardous installations.
3. To be familiar with the level of emergency and the no. of person to be shifted from the site of emergency.
4. To earmark the safe and shortest route from the probable scene of emergency/ installation to the shelter.
5. To earmark the shelters & hospitals.
6. Plan to provide sufficient number of vehicle for evacuation & necessary medical services.
7. Make the evacuation point on which the vehicle will be provided for evacuation of General public at the time of emergency.
8. Training to the driver and concerned person in rendering the efficient transport.
9. Decide the alternate route for emergency.
10. To maintain the transport in an efficient and roadworthy condition.

During the incident:

1. After getting the information of level of emergency send the required number of vehicles.
2. Arrange the sufficient number of vehicle to shift the injured from emergency spot to hospital / camp evacuation.
3. Arrange the sufficient vehicle for the casualties.
4. To make arrangement for quick repairs of vehicles or to kept ample rescue spare vehicle or repairing part.
5. Earmark the vehicle for rescue operation.
6. Help in evacuation of the general public.

After emergency:

1. Arrange to normalize the traffic
2. Make arrangement for shifting of general public from shelter to their residence after the situation become normal.

DUTIES AND RESPONSIBILITY IN EMERGENCY

PUBLIC RELATION OFFICER

Pre - Incident:

1. Collect the information of major hazard units, chemicals used, their adverse effects, toxicological data and emergency measure to be adopted.
2. Prepare plan of evacuation in consultation with MAH unit, police and Fire Brigade which should include points of evacuation, vehicles to be used, shelter etc.
3. Translate the information regarding emergency procedure in the language best understood to the general public in the locality.
4. Publicize the information in the interest of public for awareness through.
 - Booklets/ Pamphlets
 - Radio / television
 - Film shows
 - Newspaper.
5. Arrange the mock drill.
6. To create the awareness among the General public by suitable means like -documentary film/ cable and door-to-door visit, meetings etc.
7. To involve the person from local community in the emergency evacuation.
8. Training personnel in emergency response.
9. Provide information to the general public, issued by the District administration from time to time.
10. Liaison with NGO's for participation in Emergency control.

During the incident:

1. After receiving the information immediately rush to the scene of emergency.
2. With the advice of chief co-coordinator start the evacuation of affected person by mean of public address system.
3. Ensure the safe route of evacuation.
4. Keep watch on new developments.
5. Provide factual position to the general public about the emergency to evert the panic & rumor situation.
6. Provide the information regarding the nature of emergency and action taken by the Govt.

7. Provide the necessary instruction as issued by the Govt. to the General public at the time of emergency.
8. Ensure the preventive steps are taken by various agencies.
9. Ensure the various agencies, those are participating in emergency control does not receive any complicity in composing message.
10. To keep in touch with DM/ SP/ other agencies involved in emergency operation.

After emergency:

1. Help in rehabilitation of the affected person by means of providing.
 - Food/ drinking water.
 - Shelter / clothing etc.
2. Develop the good relation between affected, Community Govt. and other agencies.
3. Issue the authentic information to the community, affected persons and mass media.
4. To mobilize public support after the emergency.
5. To get the feed back from the community with regard to any other new development.
6. To keep in touch with District Administration.

DUTIES AND RESPONSIBILITY IN EMERGENCY

INDUSTRIES

Pre - Incident:

1. To prepare the physically, practicable on site emergency plan.
2. To formulate the accident prevention and emergency preparedness plan.
3. To create awareness among the general public pertaining to the possible emergency due to industrial activity.
4. To conduct the risk assessment in the concern unit.
5. To assist the local administration in establishing the good harmonious relation with general public and other emergency response agencies and provide awareness how to act in case of off site emergency.
6. To create a emergency control room in unit.
7. To encourage the most dedicated & other employees in control of the emergency.
8. To monitor & ensure that all available facilities for emergency are in good working condition.
9. Up to date the on-site emergency plan/ emergency preparedness.
10. Prepare to respond or remove confusion to the general public.
11. Proper road & means of escape route should be earmarked.
12. According to risk assessment ensure the adequate quantity of water for fire fighting.
13. To provide the training to the all concern.

During the incident:

1. To mobilize all the emergency resources into action as per plan i.e. control the fire or stop the toxic release if possible.
2. And inform all the related agencies. Raise emergency alarm.
3. Assess the gravity of emergency and declare emergency.
4. Receive outside aid at the control room.
5. Help the local administration for safe evacuation.
6. Explain the level of emergency to the local administration with facts.
7. Co-ordinate with other rescuers & combating operation team.
8. Provide the technical guidance to the various operation team & local administration.
9. All key personnel must be keeping in touch with local administration.
10. Shut down the plant to confine the emergency.

After emergency:

1. Declare the termination the emergency after assessment.
2. Clean the spot site as soon as possible and dispose off the harmful substances in safe manner.
3. Establish links with general public/ leaders and local administration.
4. Keep watch on the situation for any other new development and inform to local administration.
5. Help the rehabilitation & salvage team for quick aid.

DUTIES AND RESPONSIBILITY IN EMERGENCY

MUNICIPAL COMMITTEE

Pre - Incident:

1. To be familiar with major hazard units possible emergency situation their consequences etc.
2. Plan to provide the building/ guesthouses at different locations to establish control room. First aid, Medical center or shelter at the time of emergency.
3. Review the equipments, vehicle, crane manpower etc. for rescue, demolition or salvage purposes in relation to the possible level of emergency.
4. Prepare a rescue demolition / salvage team to be rushed to the scene of emergency on call.
5. Be familiar with the routs of emergency scene and escape routes.
6. Procure the equipment's essential for dealing with emergency.
7. Insure the training of team in emergency operation.

During the incident:

1. Emergency team will rush to the scene of emergency immediately on call.
2. Help in rescue and fire fighting by providing the suitable equipments like dumper dozer, crane earthmover etc.
3. Help in taking out the people trapped in the building, plant by removal of debris and other obstruction.
4. Help in taking out the dead bodies from debris.
5. Help to prevent the flow of flammable/ toxic materials into the common drain.
6. Help to drain out the pool of water / excessive water from the site.
7. Help in any construction / demolition activity required for dealing with emergency.

After emergency:

1. Help in removal of debris from the site.
2. To repair the damaged services like water, sewer line and road etc.
3. To clean the entire sewer and a surrounding to protect the general public from disease.
4. To repair the damaged road.
5. Help in normalizing the general life.
6. Arrange for the corps and disposal service.

DUTIES AND RESPONSIBILITY IN EMERGENCY

CIVIL DEFENCE

Pre - Incident:

1. To be familiar with major hazard units, chemicals used and other information regarding the emergency.
2. Arrange for shelter at different locations for general public with the help of Municipal Corporation and other department in respect of probability of population to be affected.
3. Make arrangements to help in fire fighting and salvage operation.
4. Plan for food and water supplies in shelter camp with the help of NGO's and Govt. Deptt.
5. Create public awareness for emergency procedures i.e. preventive measure and evacuation procedures during emergency.
6. Plan for medical aid with the help of CMO.
7. Plan for rehabilitation in collaboration with the district administration.
8. Co-ordinate the activities of all NGO's and social organization.
9. Help in developing evacuation procedure and liaison with Public Relation Officer.
10. Plan to help in medical and first aid.

During the incident:

1. Help in fire fighting and rescue operation.
2. Help in evacuation operations.
3. Help the police in maintaining law and order and piece.
4. Help in controlling the traffic.
5. Involve in first aid / medical aid team.
6. Help in dealing with casualties and injured people.
7. Help in providing shelter, food, water and other essential amenities for general public.
8. Help in maintaining relation with public.
9. Help in giving information to the relatives of the affected persons.
10. Provide all equipment and manpower for dealing with emergency.

After emergency:

1. Help in the rehabilitation of the general public in planned manner.
2. Help in providing the supplies of essential immunities in perfect condition.
3. Help in maintaining the peace and develop confidence in the general public.
4. Help in relief operation.
5. Help in maintaining law and order.

DUTIES AND RESPONSIBILITY IN EMERGENCY
ASSISTANT DIRECTOR (INDUSTRIAL SAFETY & HEALTH)

Pre - Incident:

1. Make inspection/ examination of the premises, plant, machinery, chemical/ substances in the industries and ensure the adequacy of the safety arrangement by directing the occupier to do so.
2. Examine the adequacy of emergency arrangements in the industries and direct the occupier to take corrective action, if arrangements are not satisfactory.
3. Enforce statutory provisions pertaining to safety in all industrial establishments.
4. Direct the management to prepare and submit on site emergency plan of the industrial units.
5. Direct the management for the hazard assessment of their units by conducting safety audit, hazop study, hazard analysis etc. of the units and have the copy of the same to get information and to suggested corrective action.
6. Constitute the mutual and growth of the industries to deal with emergency.
7. Get the sufficient information hazards and mitigation efforts from each industry.
8. Arrange the meeting of district crises growth.
9. Participate in preparation of District Disaster Management Plan.
10. Arrange rehearsal of the district disaster management plan and review the plan.
11. Review the actions and rehearsal of MAG.

During the incident:

1. Rush to the scene of emergency.
2. Assist the control room and D.C. in technical manner.
3. Be in constant touch with control room and DC for technical support.
4. Provide guidelines for combating the situation and evacuation of the people.
5. Provide technical support to the works main incident controller.
6. Keep a watch on the overall situation and involve in advising on emergency operation.

After emergency:

1. Arrange for an investigation of the incident and collect information.
2. Keep the D.C. informed of the investigation and information.

3. Suggest remedial measures to prevent recurrence.
4. Direct the management to implement adequate safety measures suggested by him.
5. Ensure rehabilitation of affected area in safe manner.

DUTIES AND RESPONSIBILITY IN EMERGENCY

POLLUTION CONTROL BOARD

1. On receipt of information officer of the Pollution control board shall proceed to the affected site.
2. Conduct investigation including collection of data.
3. Ensure that the spills have been totally contained with no further damage possible to humans and environment.
4. In the case of any contamination to the environment, to arrange, with the help of the industry and other agencies, decontamination of the area. Further to declare the area fit for re-entry after the decontamination is completed.
5. In case of an environmental disaster, the pollution control board shall, based on the contaminant released in to the environment, carry out with the help of the industry and other agencies, such investigations as may be necessary to establish the degree of contamination. Arrange for suitable decontamination using resources available in the area as well as with the board.

DUTIES AND RESPONSIBILITY IN EMERGENCY

PUBLIC HEALTH DEPARTMENT (PWD)

Before the Incident:

1. To be familiar about the probable locations/ installation/ industries where emergency can arise.
2. Make standby arrangement of generator for running the water pumps.
3. Ensure availability sufficient spare parts.
4. Ensure the availability of site plan of drinking water line and fire water line.
5. Keep sufficient manpower to repair and restore the water supply arrangements.
6. Keep sufficient number of water tanker for the supply of water in emergency.

During the incident:

1. Rush to his office.
2. Call the essential person of PWD department.
3. Be in the state of readiness to attend the damage on call.
4. After receiving the call of damage in water supply system, send the manpower along with material for repair.
5. Arrange to send the drinking water by tanker in the area where water supply is disturbed.
6. Arrange to start the supply of contaminated water.
7. Arrange for decontamination of water or water sources.

After the incident:

1. Ensure the repair of all water supply arrangement.
2. Ensure the supply of pure water in all areas.
3. Inspect entire system of water supply.
4. Restore water supply in all areas.

DUTIES AND RESPONSIBILITY IN EMERGENCY

PWD

Before the Incident :

1. Executive Engineer will lead the rescue team.
2. Be aware of all MAH units and vulnerable buildings.
3. Constitute a rescue team of his own department and nominate the employees for rescue team.
4. Liaise with District authority and give account of all equipments and facilities available with the CPWD department.
5. Earmark the route for each MAH units and vital installation.

During the incident:

1. After getting the information of incident, rush to his office.
2. Ensure to call all members of the rescue team and call back all equipments from various site.
3. Remain in the state of readiness to rush to the site of incident and wait for call.
4. Get in constant touch with D.C. and district administration.
5. Rush to the scene of emergency with all manpower and equipment on request.
6. Direct rescue operation at site.
7. Arrange for the recovery of injured/ dead from damaged building.
8. Make provision of demolition on the request of the service department.

After the incident:

1. Demolish the weak structure/ building which are likely to cause hazard to the public.
2. Arrange to provide the supports or repair the buildings.
3. Arrange for the repair of roads.
4. Arrange for the restoration of situation.
5. Help in removal of debris and contaminated water.

DISASTER CONTROL MEASURES

A. Basic Assumptions:

Localized Response - Need:

As is the case with any other planning, there would be some assumptions in emergency planning as well. HAZMAT emergencies give very little warning and have very small onset time. Response in such situations is confined to local levels. Due to this typical restraint it is to be realized that it is not possible to have a unified single remote command person/ centre, while responding to HAZMAT emergencies. Additionally, there would be many organizations performing different tasks in a response simultaneously; some of them under the guidance of specialists or experts and some by using the special purpose equipments, which will require a closer supervision and guidance.

The tasks to be accomplished are the links in the long chain of sequence, in tandem, with an objective of reducing the damage. Any break in the link would affect the response. The time available is very much on premium. The success will mainly depend upon;

1. Response related capability
2. Resources availability and their reliability - manpower and machinery.
3. Co-ordination presumed and reality - the gap between, the time, communication, supervision.
4. Simulations practiced and other exercises how near they are to real situations and how methodically they have been executed and assessed.
5. Judgment about the grey areas and unforeseen developments.

Psychology:

It should also be realized that for successful tackling of emergencies one has to consider the psychological factors that can affect the performance during response and recovery stages. It is applicable for both, the rescuers and being rescued. This plan however has not considered these finer but essential aspects of emergency planning.

Additionally the development of judgments for logistics and resources in off-site emergency management plan requires determination of damage potential from various possible accident scenarios. This is normally done through simulation of various losses of containment scenarios such as fire, explosion, release of gases and spill.

Centre of Action:

Chemical accidents occur suddenly and leave no room for graduated response. Normally, the effects of accident last for 30-60 minutes giving little time for external agencies to reach the scene of the accident to take control of the off-site situation. There are, further, constraints posed by quality of communication

notifying the incident. All these point towards the centre of emergency action to have it located in the immediate vicinity of the scene of the incident. The district authority can, at best, play an advisory and overview role and assist in organizing necessary support and reinforcement in case the situation out of control.

Control Room:

Police Control Room is best option in view of its resources base due to high integrity communication system linked with the entire district, district authorities, and emergency response agencies. It can be used more effectively by suitable upgrading and additions as thought below:

- Up to date information on the hazards present in the area and inventory, properties of hazardous materials, historical data on local meteorology, emergency response etc in as easily retrievable form.
- Details map of the area showing location of industries, residential building, sensitive location, water course and access routes etc.

Resources:

The requirement of resources for off-site emergency management organization will mainly be in the form of training, planning and co-ordination. Material resources that would be required are communication and warning facilities, transport, and medical services to treat the affected. In addition, fire services would be required to deal with any on-site situations and transport accidents.

The medical professionals in the area should also examine the need for any special medicines (industry specific medicines/ antidotes).

B. Accident Types:

The type of accidents involving hazardous material can be classified as under.

- Industrial accident (static installations)
- Transportation Accidents
- Pipeline accidents
- Environmental Accident
- Natural calamities

C. Liaison: Liaison between the various agencies involved in the DDMP shall be constantly maintained during periodical meetings and mock drills organized by the member Secretary of the District Crisis Group (Assistant Director IS&H)

D. Rescue and Relief Plan:

(i) Communication

(a) Notification of incident :

Incident notification has to be brief and precise. It has to take into account the fact that several of the variables may not be fully intimated at the time of notification. The factory or person/ authority/ individual mostly in respect of transport emergency, informing the emergency to the local control room should bear these factors in mind. The following information is considered essential for notification.

- Name of person notifying the emergency.
- Chemicals involved in accident.
- Likely magnitude of accident (release quantity).
- Prevailing wind direction (if available)
- Any other important information (impact, toxicity etc.)
- Extent of damage, as a distance.

Since incidents could also be notified by anyone in the public (in the case of transport or other emergencies), the notification requirements must be simple. The notification should, further, enable the local control room to take action based on the minimal parameters notified. Once minimum required is provided in the control room (Local Police Station with wireless facility), this information could be gainfully utilized by it to assess the vulnerable zones. This would, however, depend upon facilities provided, the skills of personnel available which depends upon their levels of training and preparedness.

(b) Intimation of emergency :

Once the incident has been notified to the control room, the situation has to be conveyed to others for information and necessary action as follows:

- Responding agencies having action at site, responders under MAG, technical experts are to be contacted first for the emergencies other than fire. The Police in turn should inform the D.C., City Magistrate, SDM and other officials to initiate action at their level;
- It may be noted that during emergency the communication should be as brief and precise as possible. To achieve this certain protocol is to be followed strictly. The protocol would be mitigation, rescue/ relief (which includes treatment to injured) and rehabilitation. Each, responding organization should have such a procedure that it will notify not more than two other organizations/ individuals according to protocol demanded by the situation. If one organization is burdened with communication with all responders/ responding agencies, no sooner, its communications channels will be jammed.
- The district control room must first be informed by wireless, by local level police station, to initiate the co-ordination process at the district level and initiating the district machinery or by the affected industry through telephone or other suitable means.

- Other support agencies should either be informed to keep them in readiness for action or for initiating the action.
- Neighboring communities should be informed of occurrence of an emergency situation in the area. Some of the bigger units with populations around have already provided the sirens with some conditions. In some cases, installed public address system should be to inform the neighbors to inform regarding emergency situations. It will be necessary to ensure that the surrounding population understands the various codes and takes the required precautions when notified. The drills and exercise involving neighboring population would be very much useful to achieve this.
- District Emergency communication chart is attached as annexure - 2.

(ii) The Action Plan:

A. For Static Emergencies:

The Action Plans given below are for control room, are of generic nature. It is better to take them as reminder. All these instruction will have to be understood along with the specifics of the site of the factory and hazard being considered. The dovetailing and action details will have to be worked out case by case as we are not opting for the specific individual off-site plan for each factory. At simulation/ drills level it is expected to overcome these shortcomings which are basically due to generalization in the approach to planning.

Upon receiving information from facility (or any other agency) regarding an accident with off-site consequences, the Control Room shall take the following actions in accordance with the roles and responsibilities:

- Inform the nominated technical experts to assemble in the Control room.
- Inform City Magistrate/ SDM through police wireless network of need for local level action.
- Inform response agencies e.g. fire, medical, industry to reach the area where their assistance would be required.
- Advise neighboring communities to take protective action based on the advise of the experts. Some of the common advise can be :
 - Keep calm and follow instruction.
 - Keep windows closed and remain inside the house
 - Keep wet cloth or handkerchief over your nose and
 - Evacuate area and proceed cross wind.
- Based on prevailing wind direction, evaluate vulnerable area requiring attention.

- With the help of technical experts available, take emergency action as required. This can be as follows :

- Cordon off the area affected and regulate traffic.
- Maintain law and order in the area.
- Ensure safety and security of the affected area

Organize evacuation if required,

Protect evacuee property, and

Co-ordinate emergency operation with other agencies.

The District Control Room shall also take the following action upon receipt of information:

- Inform the Deputy Commissioner and Superintendent of Police of the incident and provide them with continuing information based on progress in the field.
- Arrange for the Directorate and Pollution Control Board and industrial safety & health to be informed of the incident.
- Perform such tasks as may be required by the Deputy Commissioner / Superintendent of police in mobilizing additional resources for emergency response.
- Keep communication channel open for emergency purposes.

B. Action Plan for Transport Emergencies:

Upon receipt of information regarding transport emergencies, the police shall proceed to the location and take the following precautions and actions as outlined in the roles and responsibilities outlined in Annex. 2

- Inform nominated technical expert nearest to the area to reach the spot of the incident for assistance.
- Approach incident from an upwind direction, if possible.
- Do not walk into or touch any spilled material.
- Avoid inhaling fumes, smoke or vapors unless specifically cleared by technical expert. Do not assume that gases or vapors are harmless because of lack of smell.
- Use the Transport Emergency Guide and isolation/ evacuation table for initiating emergency action in Annex. 3
- Evaluate person from the area and building as far as recommended in evacuation table.
- Isolate to a distance of 800 m. in all directions in the event of a tanker fire.
- Observe suitable personal protection e.g. full protective clothing, SCBA, Canister masks etc. as recommended.
- Regulate traffic to enable response personnel to take emergency action.

- Do not allow use of water where this is contra-indicated and
- Clothing and equipment of response and other personnel involved in the area of the accident should be decontaminated as soon as possible after contact occurs.

(iii) Appointment of key personnel or Emergency Management Structure:

The emergency management structure of the district is given in the Annexure-1. The functions of the various agencies are briefly described in the structural diagram.

Apart from the emergency management structure various Govt authorities are entrusted emergency services as under:

- | | | |
|-----|--|---|
| 1. | Chief District Emergency
Controller | Dy. Commissioner |
| 2. | Casualty Service | Civil Surgeon Kaithal |
| 3. | Rescue Service | Ex. Engineer CPWD and Fire Officer
Kaithal |
| 4. | Transport Service | G.M. Haryana Roadway Kaithal |
| 5. | Telecommunication Service | G.M. Telecommunication |
| 6. | Welfare Service & Shelter | City Magistrate / SDM Kaithal
assisted by DPRO, Municipal
Council, Food & supply, Red cross,
NGO |
| 7. | Salvage Service | SDM/ Tahsildar Kaithal |
| 8. | Corps Disposal Service | Sanitary Inspector |
| 9. | Fire Fighting/ Combating Service | Fire Officer Kaithal |
| 10. | Law and Order & Traffic service | S.P. Kaithal |
| 11. | Water Supply & Sewage | Ex. Engineer Public Health Kaithal |
| 12. | Electricity | Ex. Engineer HSEB Hisar |
| 13. | Food & Supply | District Food & Supply Officer and
Red cross/ NGO |
| 14. | Technical Advisor | Asstt. Director (IS&H) |
| 15. | Evacuation | DPRO assisted by Police, Fire
Service & Transport |

(iv) The Control Room :

The control of crisis during major accidents is to be exercised through a Control Room established at an easily accessible central location in the area. This control Room should be capable of functioning on being required to be activated at any time. The Control Room for off-site plan is thus over and above the Control Room set up by each unit for its on-site plan. The Control Room shall:

- (i) Act as a focal point of emergency management.
- (ii) Keep records of all messages.
- (iii) Inform operation officer on receipt of first information relating to accident.
- (iv) Monitor implementation of mutual aid.
- (v) Serve as the focal point for meeting of the Crisis management group (CMG).

In order to operate the Control Room round the clock, manpower and transport are required on a shift basis. The Control Room should be equipped with proper communication system, data processing network and should be a storehouse of information to combat emergencies.

(v) Communication Network System:

An efficient and reliable communication system is required for the success of the off-site emergency plan. The efficient communication system is required to alert:

- (a) Off-site Emergency Authorities and services.
- (b) Neighboring factories in the area and public in the vulnerable zone.

A communication network of the following type may be helpful:

- (i) Radio communication between Control Room to Unit Control Rooms of the Industrial Unit and respondent outside the area.
- (ii) Hotlines between Control Room to industrial units and Emergency Services. Meteorological Station and the Media.
- (iii) Paging system with the Control Room for alerting the members of the CMG and Operation Response Group.
- (iv) Data processing Network hooked to all Computers / PCs.

A Communication flow chart is to be prepared and kept in the Control Room. An up-to-date Telephone Directory of key personnel concerned with the emergency should be available at all times.

In coordinating the communication system efficiently, there should be a Communication Officer in Control Room to ensure that all the modes of communication are functional round the clock. All

communication operators should maintain a log-book for the message received in/ out and actions taken. These activities should be incorporated in the data processing system.

(vi) Warning System :

In an off-site Management Plan, one of the most important pre-requisites a good 'Warning System'. Efficient warning system will save lives, prevent injuries and reduce losses. Emergency Commander will decide the appropriate Warning System and implement it. The Superintendent of Police will be responsible for implementation of the Warning System.

The Warning Systems are of the following types:

(a) Disaster Warning : (Maximum Credible loss Scenario)

High pitched continuous wailing siren

(b) Fire/ Toxic Release :

Long Siren followed by short Siren

(c) All Clear :

Long Continuous

Note: Depending upon the nature of hazards and the area affected, other methods of warning may be used as follows:

(a) Out-Door Warning Siren

(b) Public Address System with Police

(c) ARP Sirens

(d) Mass media

(e) Door to Door visit by Civil Defense Personnel.

(f) Telephonic contact with schools and other organization / public institutions.

(g) Information to be provided at common gathering places such as Canteens, Shops etc.

(vii) Public Information System :

During a crisis following an accident, the people of the area and large number of media representatives would like to know about the situation from time to time and the response of the district authority to the crisis. It is important to give timely information to the public in order to prevent panic and rumour mongering. The emergency public information could be carried out in three phases.

(a) Before the Crisis :

This will be including the safety procedure to be followed during an emergency through posters, talks and mass media in different languages including local languages. Leaflets containing do's/ don'ts should be circulated to educate the people in the vicinity.

(b) During the Crisis :

Dissemination of information about the nature of the incidents, actions taken and instructions to the public about protective measures to be taken, evacuation, etc. are the important steps during this phase.

(c) After the Crisis :

Attention should be focused on information concerning restoration of essential services, travel restrictions etc.

Various tasks of the public information system could include:

- (a) Quick dissemination of emergency instructions to the public.
- (b) To receive all calls from media/ public regarding emergency situations and respond meticulously.
- (c) Obtain current information from the Central Control Room.
- (d) Prepare news release.
- (e) Brief visitors/ media.
- (f) Maintain contact with hospital and get information about the casualties.

(viii) Fire Fighting System :

The industrial areas having major accident-prone hazardous installations should have special fire fighting arrangements. In most of the industries, gaseous hydro-carbons or liquid hydro-carbons having low flash points are used thereby posing great risk of fire explosion, spillage of hazardous liquid or release of toxic gases. In order to tackle such possible situations, there is need for constant preparedness to mobilize all available fire fighting and toxicity control resources in minimum time. There should be an inside control of all fire fighting resources in the affected areas under the overall fighting resources in the affected areas under the overall charge of the Fire Officer. The operational response will be coordinated from the Central Control Room. The planning for fire fighting should be as follows:-

(a) Before the Crisis :

- (i) Proper road and means of escape should be identified.
- (ii) Considering the possible hazards, there must be adequate water supply.
- (iii) Training of the personnel in fire fighting duties in the industry.
- (iv) Provision of adequate and proper arrangement of fire fighting vehicles is important.

(b) During the Crisis :

Immediate response to an emergency should be coordinated by the Control Room by matching all the resources. In a major emergency having wide off-site implications, more than one industry would be affected necessitating concurrent fire fighting operations at a number of places. In this case, the whole area may be divided in different fire zones. The task of the fire zone commanders should be as under:

- (a) Command and control of all fire fighting resources in the respective fire zones.
- (b) Deployment of additional fire resources allocated by Control Room.
- (c) Coordination of fire fighting institutes.

(ix) Mutual Aid :

All the industrial units in the affected areas should have mutual aid arrangement for getting/ extending help in fire fighting facilities, special fire fighting agents, trained manpower etc. The Control Room will allocate additional resources to fire zone including protective equipments kept centrally as a pool.

(x) Health & Medical :

A major off-site emergency in an area may affect a number of units and the surrounding colonies resulting in more casualties. The medical response plan has to cater for immediate pooling of all available medical resources and provide emergency medical treatment to the victims of the incident. For an emergency from poisoning, a reference is invited. A coordinated utilization of all available local medical resources in the incident areas as well as the additional resources should be mobilized under the overall charge of the District Health Department. The operational response should be coordinated by the Civil Surgeon from the Control Room. Before the Crisis, the following actions should be carried out:

- (i) Specialized training of doctors relating to chemicals hazards.
- (ii) Blood grouping of all employees working in the industrial unit
- (iii) Maintenance of list of blood donors group wise.
- (iv) Arrangement of adequate buffer stock of essential medicines.
- (v) Stocking of anti-dotes and special medicines for hazardous substances.
- (vi) Planning of additional capacity in the base hospital for large-scale casualties.

During the crisis, medical plan in terms of manpower, transport and equipment as per organizational response be implemented. The organizational response structure should be set up as under:-

- (a) First - aid Post
- (b) Casualty Response Centre
- (c) Base Hospital.

It is essential to guide medical relief and establish public health measures like sanitation immunization etc. In the absence of proper information about the chemical exposure, their symptoms, first aid and treatment, the physicians attending such emergencies are generally faced with great problems. Information on some widely used toxic chemicals is compiled and given in Annexure- 6.

(xi) Transportation :

A large number of ambulances would be necessary to transport casualties to the casualty response centre and base hospital. For this purpose, jeeps/ matadors/ special wagons which can be converted as ambulance at short notice should be kept at the unit and the Control Room.

(xii) Security & Police :

Security, protection of life and property and traffic control and maintenance of law and order are the traditional and statutory functions of the police. During an emergency, duties and responsibilities of the police may be:

- (a) Cordoning of the incident area
- (b) Warning public about the hazards
- (c) Traffic Control
- (d) Assist fire fighting services
- (e) Assist first aid and medical teams
- (f) Assist evacuation and ensure protection of property in evacuated areas.

Control of security operations in the area should be exercised by the Superintendent of Police. Different phases of emergency management practices would be as under:

(a) Before the Crisis :

Contingency plan of manpower, transport and communication network to coordinate possible incident areas and to regulate traffic should be made for each industry in the area.

(b) During the Crisis :

The Security Commander / Superintendent of Police of the area will set in motion the relevant contingency plan to control the operation.

(c) After the Crisis :

Protect property in the evacuated area.

(xiii) Media :

The Control Room should release up-to-date information to the media.

(xiv) Evacuation including safe Evacuation Areas :

In a disaster situation, evacuation is the movement of people from the place of danger to places of relative safety. It is most effective action to protect people. A comprehensive and coordinated planning is necessary to implement orderly evacuation of population.

The process of evacuation should be based on the nature of threat, possibility of spreading of toxic gases and weather conditions. In this case, the hazard analysis in maximum credible loss scenario would help in planning of evacuation. The people of the area should be advised to leave the threatened area and to

take shelter in the nearest reception centers. The whole process is required to be completed within the quickest possible time. The command and control of the evacuation should be under the supervision of the District Public Relation Officer / District Development Officer. The evacuation process should be carried out in three phases.

(a) Before the Crisis :

(i) The public should be informed and educated properly for chemical hazards. Local police should warn the people in this regard and install the siren in the vulnerable places.

(ii) The probable affected areas should be divided in several evacuation centers which are entirely site specific.

(iii) Detailed contingency plan of evacuation of various scenarios should be prepared.

(iv) Availability of all transport resources needs to be ensured. Planning of adequate reception centers including accommodation, food, water supply and sanitary arrangements for the affected population should be done.

(b) During the Crisis :

Implementation of the plan should be done in the quickest possible time.

(c) After the Crisis :

Once the crisis is over, the affected people should be rehabilitated and the follow up measures should be taken up.

(xv) Duties & Responsibilities of various agencies:

Duties & responsibilities of various agencies are mentioned in annexure-5.

(xvi) Welfare of Evacuated:

In the event of major accident large number of people may be rendered homeless, without food or without adequate clothing. Grave social problem resulting from death, injury, loss of home and family disorganization would be handled by the welfare service headed by the City Magistrate/ SDM Kaithal assisted by the various departments shown in the organization structure chart as annexure -1.

The functions of this service are

(i) Information:

Supply of information regarding missing relatives, dead, etc nature of facilities and assistance available for affected.

(ii) Care of homeless:

Provisions of centers where homeless people may be given temporary shelter, food and clothing.

(iii) Evacuation:

Disposal of population from the large congested and hazardous areas to the safe area and making suitable arrangements for evacuees.

(xvii) Post Emergency Management:

(a) Post emergency management of an incident requires a proper assessment of the after effect of accident. It is expected that City Magistrate/ SDM or Executive Officer Municipal Council, District Commissioner, representative of the Directorate of ISH & Pollution Control Board, experts and other relevant agencies would reach the incident site. These persons together with the technical experts have to decide on post emergency actions regarding.

- Review of mitigation measures being carried out and corresponding augmentation of all response related activities.
- Rescue related efforts.
- Restoration of normally in the area.
- Organizing further medical attention for the affected persons either locally or at other locations based on the nature of treatment required.
- Victim identification, helping the kith and kins in formalities, financial relief, arranging for morque funerals etc.
- Shelter for affected if required.
- Decision to decontaminate the area and prepare the area for re-entry of evacuees.
- Order investigation of incident including assessment of damage to life, property and the environment.
- Make suitable release to the media conveying information on the accident. This should, normally, be authorized by the District Collector/ Commissioner.

(b) Relief to the Victims :

Post emergency activities include the relief to the victims. The Public Liability Insurance Act - 1991 provides for the owners who has control over handling hazardous substances to pay specified amount of money to the victims as interim relief by taking insurance policy for this purpose. The district collector has definite role in implementation of PLI 1991 as mentioned in hereunder.

- (i) Whenever it comes to the notice of the collector that an accident has occurred at any place within his jurisdiction, he shall take action, among other things, to provide relief to the victims.
- (ii) He will receive applications in the prescribed forms accompanied by supporting documents.
- (iii) He may follow summary procedure for conducting an enquiry on the application for relief.
- (iv) He shall maintain a register of the applications as also a register of awards and payment made.

(v) On receipt of an application under sub section 6, the collector after giving notice of the application to owner and after giving the parties an opportunity of being heard, hold an enquiry into the claim and may make an award determining the amount of relief which appears to him to be just and specifying the person or persons to whom such amount of relief shall be paid.

(vi) The collector shall be responsible for disbursement of the funds to the victims. He may, for this purpose, draw upon the insurance companies or emergency relief fund as the case may be. For this, he would liaise with the units, the nearest insurance companies and the control pollution control board.

(vii) He should ensure that the owners of the MAH units or the units covered under PLI Act 1991 shall take. Insurance policy before handling any hazardous substance and get renewed from time to time before the expiry of the period of validity.

PLAN TESTING AND UPDATION

TRAINING OF RESPONDERS:

Appropriate and adequate programmes for building up the capabilities of all the agencies involved, mostly those or the parts of off-site planning; will have to be carried out, along with their refresher courses. Such a programme will also include the activities of sensitisation and orientation related courses for decision makers at senior levels. The expertise available with some of the factories will be of help for such courses and its involvement will benefit all the concerned. Once LLCG & DLCCG are functional, it will be essential to organize these orientation programmes for group members, to ensure better deliberation in their meetings. The second area is that of emergency management. This required a through knowledge of the roles and responsibilities and linkages that have to be ensured during emergencies. This aspect can only be checked through a plan testing process in which an emergency situation is simulated. The testing of the plan is discussed below.

TESTING OF PLAN:

Effective testing of plan is only possible through drills and exercise alone. Field drills are very much essential for following reasons:

- To perfect the response vis-a-vis the plan document.
- To build confidence amongst the responders
- To assess the appropriateness of the equipment,
- To assess the level of preparedness.

- To gain an experience akin to one, gained from real situation.

The suggested method provides a step by step approach for testing the plan, devoid of such limitations. This approach suggesting a sequence of exercises and drills helps in improving the response related capabilities. It is also useful in identification of resources and personnel requirement, and thus, fine tuning the plan.

To satisfy these requirements, the exercises or drills will have to be planned in a particular sequence. The sequence has to be chosen in such a fashion that it builds capability, first at individual level, follows by organization or team responding to the task contemplated. At a later stage, it will gradually percolate to all people's agencies, wings or teams. Once such a capability is evident, it will gradually expand the scope and size of drill and ultimately lead to various types of drills. The following sequence is recommended based on experience. Due to adaptability and flexibility built in these types of exercise, minor variation in sequencing might not affect the objectives.

A careful study of a plan will reveal various components of emergency planning. These would be communication, fire fighting, repairs, calling external assistance, cordoning etc. These components could be the tasks for individual or teams. The tasks if they have to be successful will require appropriate skills. The analysis of plan on the basis of components and tasks will facilitate procedures for preparedness.

Truncated drill

Full Scale/ field drill

Demonstration drill

Drills, as would be experienced, are multipurpose and versatile tools. Therefore one can opt for a particular objective, component, or parameter of planning to be tested. Those can be evaluated or even corrected by conducting a drill.

Drill can be tailored to evaluate:

- a. Response time,
- b. Response quality
- c. Co-ordination and Communication.

The broad classification of drill objectives are as under:

Assessment of

Size of emergency organization,

Capability.

Skills of individuals,

Response methodology,

Response time,

Adequacy of infrastructure and resources.

2. Identification of gaps in planning and resources.

3. Search for alternatives wherever applicable.

Exercise objectives, can be further subdivided and limited to only one or few of the following components, to facilitate the assessment in those areas:

Co-ordination

Sequence

Correctness of action

Communication

Schedule of resources required (on time scale)

By this method, it will be easier to identify drawbacks and difficulties, and search for right solutions for quick and correct actions.

TABLE TOP STUDY:

In a table top exercise members of the response team take part in a "paper exercise" to ensure that each member known his, or her, role in an emergency situation, that has been pre-prepared in written form. The written scenario should identify clearly the following:

- The objectives of the drill
- The components of the plan to be tested.
- The expected participants.
- The sequence of events
- The simulated hazard levels and
- Exercise evaluation checklists.

The written scenario should be as realistic as possible, and could be taken from the sequence of events from an actual emergency.

Critique sessions during which the results of the evaluation are presented are crucial. The plan should be modified following these sessions, to rectify any shortcomings highlighted by the drill.

A table top exercise is particularly useful for testing a new plan, for the following reasons.

- A new plan is likely to have many short comings which will be readily discovered during a table top exercise.
- The Participants in the exercise will have an opportunity to work closely together probably for the first time. When members of an emergency team can meet frequently, and work together,

they are much more likely to be able to co-operate effectively and efficiently during a real emergency and

- Desk top exercises are far less expensive than full scale emergency drills.

FULL SCALE TESTING:

Nothing can replace a full scale emergency drill as a means of identifying further area requiring improvement in an off-site emergency management plan. Careful pre-planning of the drill, preparing a drill scenario and the evaluation process, are all critical elements to a successful test. The emphasis of these drill might be on one or all of the inter action aspects of the plan. Some examples are given below to indicate this.

- That the degree of co-operation achieved between the various agencies and services involved in plan implementation.
- Test the use and performance of the emergency equipment such as fire extinguishers, breathing apparatus, decontamination equipment, fire engines, ambulances, specialized hospital equipment and services etc.
- The setting up of road block
- Traffic control
- Decontamination
- Environmental monitoring and
- Community alerting evacuation return.

PLAN UPDATING:

The results of a mock trial should be analyses to find out if the intentions of the plan have been adequately meet. Normally, observers are posted at various locations to study the progress of the emergency action at various stages. Thereafter, the planning team, together with the observers and responders examine in detail the various aspects of emergency action. The net result is the following:

- To identify aspects of plan which have not worked as planned.
- To evolve modifications to the plan to make the plan properly workable and
- To assure information between planners, responders and the communities on the revisions made to the plan.

Based on the analysis of the trials, the plan is updated. Normally, minor modifications to the plan are updated through addendum to the plan. When the plan accumulated a large number of addenda, the plan is expected to be reissued for sake of clarity.

UPDATING SCHEDULE:

It is expected that the meeting at division level is organized at least once in a six months to start with, to review and update the plan. In between a small group comprising of DISH, SDO/ MC and representatives of industry shall review and authorize regarding these up-dating.

The note communicating the amendments, correction and changes should be signed by one of the member of this group. It is expected that he recipient of these note, tags in his document the amendment and maintains a written record of such correction giving the No. and date and who has authorized such correction. It is hoped to prepare the circulation list of all those to whom this amendment will be notified, which would include amongst others -

The Heads of all responding Organizations, in Government and outside,

The Works Main Controller of Emergencies of all MAH factories

The Member of Local Level Crisis Groups,

The Members of District Crisis groups,

The Members of State Crisis groups,

The Organizations and individuals who are expected to resource base, though directly not involved in response, e.g. the control rooms of Police, Mantrayala Control Room, Casualty Departments of Hospitals, Experts etc.

BRIEF OUTLINE ON HUMAN RESPONSE TO CHEMICAL EXPOSURE AND THEIR SYMPTOMS, FIRST -AID AND TREATMENT

Handling of hazardous chemicals involves risks to workers as they are constantly exposed to these chemicals during various operations and storages. In the event of an accident, not only the workers but also the general public can be exposed to dangers. The problem of medical treatment of the victims is aggravated by the fact that there is paucity of information on the antidotes required for these chemicals. Keeping this in view, it has been decided to compile the information on widely used hazardous chemicals and their symptoms along with first-aid and line of treatment. For detailed information, "Handbook of Medical Management of Industrial Emergencies, their First-aid and treatment, 1992" published by Thane-Belapur Industries Association, Bombay may be referred to.

1. ACIDS AND CORROSIVES

volatile Acids	Chlorine	Bromine	Phosphoric Acid
and fumes	: Iodine	Fluorine	Hydrofluoric Acid
			Hydrochloric Acid

Nitric Acid

Sulphuric Acid

Acetic Acid

SYMPTOMS:

The strong mineral acids exert primarily a local corrosive effect on the skin and mucous membranes. In severe burns, circulatory collapse may result.

Symptoms include severe pain in the throat and upper gastrointestinal tract, marked thirst, bloody vomits: difficulty in swallowing, breathing and speaking.

Inhalation of volatile acids, fumes or gases such as chlorine, fluorine, bromine or iodine causes severe irritation of the throat and chest with paroxysmal coughing and inhibition of respiration, followed by pulmonary oedema.

FIRST AID AND TREATMENT:

Ingested:

Dilute immediately by giving 200 ml of diluted milk of magnesia, diluted aluminium hydroxide gel, milk, raw egg, or water to drink. Do not give bicarbonate or carbonates.

Relieve pain and treat shock:

Perform esophagoscopy promptly to determine the presence of injury. Perforation, peritonitis, and major bleeding are indications for surgery.

Skin Contact:

Flood with water for 15 minutes. Use on chemical antidotes; the heat of the reaction may cause additional injury. Relieve pain and treat shock.

For hydrogen fluoride (hydrochloric acid) burns, inject 0.5 ml of 10% calcium gluconate with local anesthetic per square centimeter under the burned area.

Eye Contact:

Flood with water for 5 minutes, holding the eyelids open. Relieve pain by use of local anesthetic agent. Arrange for slitlamp examination.

Inhalation:

Remove from further exposure to fumes or gas.

Check skin and clothing.

Treat pulmonary oedema and laryngeal oedema.

Analgesics or morphine for pains.

Steroids to prevent oesophageal and pyloric strictures.

Antibiotics to prevent infection.

Amyl nitrite by inhalation for 30 seconds in a minute.

Sodium nitrite intravenously 10 ml of 30% solution immediately followed by a very slow injection of 50 ml of 25% solution of sodium thiosulphate taking about 10 minutes for the injection of 1% solution of methylene blue is recommended.

Dicobalt edatate is suggestive.

2. **AMMONIA** :

SYMPTOMS:

Irritant, affecting upper respiratory tract and in large concentration affecting CNS with spasm.

Affection of eyes with rapid penetration of the cornea and even death of the eye ball.

FIRST AID:

Prompt treatment is essential remove the patient from the Ammonia exposed area to an area where fresh air is available.

Start artificial respiration immediately. Administer oxygen as soon as possible. Olive oil can be given by mouth for relief from throat irritation. He should drink warm milk.

If gaseous or liquid ammonia has come into contact with eyes.

- (i) When fumes have caused irritation of eyes, wash eyes while holding lids apart and using copious quantity of water or normal saline water or a solution of 0.5 - 1% alum.
- (ii) Administer few drops of boric acid solution to reduce pain. Lactic acid can also be used.
- (iii) To prevent eye inflammation eye drops with antibiotics may be used. If internal injury is caused due to Ammonia. SOFRACART AND ACTROQUINE eye drops could be used.
- (iv) For external injury to the eye, wash the eye with water or normal saline water and then apply ointment SOFRAMYCIN.

If liquid ammonia is swallowed by chance.

If the patient has swallowed ammonia and complains of burning pain from mouth to stomach with strong soapy, nauseous taste and vomiting occurs, stain will be found on lips and chin.

Mucous membrane swells, tongue and lips become brown and swell extensively.

The pharynx, when damaged, becomes constricted, respiration is difficult.

Urine is small in quantity, and strongly alkaline.

Purging may occur with tenesmus and blood is stained. Mucous shock may occur.

Destruction of gastric glands, perforation of stomach, visual disturbance etc. may also occur.

- (i) No attempt should be made to induce vomiting.
- (ii) Stomach tubes and emetics should not be used. But soft stomach tube or Levine tube can be passed with care within an hour of ingestion.
- (iii) Dilution with water, if practised, should be done with caution, since heat may be generated during dilution.
- (iv) Weak acids such as vinegar, lemon juice or orange juice could be given to neutralise alkali.

- (v) Keep the patient under observation and take necessary action. The period of treatment depends on the injury. The patient may have to be under treatment for about 3 to 4 weeks.

TREATMENT:

If ammonia water is splashed into the eyes, first-aid consists of immediate washing with a large amount of water or a solution of 0.5 - 1% alum. An ophthalmologist should immediately be consulted, even if the injured worker complains of no pain.

Affected parts of the skin should be washed with clean, and a lotion is applied consisting of a 5% solution of acetic, citric, tartaric or salicylic acid.

In the event of ammonia poisoning through the respiratory tract, the person should breathe fresh air and inhale warm water vapour (if possible with the addition of vinegar or citric acid) and a 10% solution of menthol in chloroform.

He should drink warm milk. In the event of asphyxia, oxygen should be inhaled, preferably under low pressure, until the breathlessness or cyanosis is eased followed by a subcutaneous injection of 1 cm² of 1 % solution of atropine.

Resuscitation must be applied if breathing is interrupted or stops. Cardiac preparations or tranquilisers may be given, if advised by a physician. If pulmonary oedema develops, the person must be kept as quiet as possible and kept warm and oxygen must be administered as soon as possible followed by symptomatic treatment for pulmonary oedema.

3. **CHLORINE:**

SYMPTOMS:

Being irritant causes conjunctivitis and damage to cornea. Asphyxia, affection of respiratory tract, may lead to Bronchitis, Bronchospasm, Pulmonary oedema.

FIRST AID:

Prompt treatment is essential. Remove the patient to an area where fresh air is available. Do not give anything by mouth to an unconscious patient.

CHLORINE GAS INHALATION:

If chlorine gas inhalation is mild and the patient is only coughing etc. the following line of treatment can be given :

- (i) Loosen the clothes and remove shoes. Give Ammonia by inhalation.

- (ii) Place the patient on his back with head and back elevated. Keep the patient warm with a blanket to avoid chilling.
- (iii) Rest is a must.
- (iv) Milk, buttermilk, coffee can be given for relief from throat irritation.
- (v) Cough syrups like Hitadrine, Coughrol, Linctus, Codeine, etc . and common throat lozenges such as Vox, Vicks tablets, Halls etc can be given for soothing the throat irritation.
- (vi) If gas inhalation is severe but breathing has not ceased start oxygen immediately. Phlebotomy (500 - 700 ml), Caffeine and Sodium benzoate 0.5 - 1.0 gm, 1M.
- (vii) In case breathing has ceased start artificial respiration.

If gaseous or liquid chlorine has come into contact with eyes :

- (i) Flush eyes immediately with running water or normal saline water for about 15 minutes.
- (ii) Hold eye lids apart to ensure complete neutralisation with water.
- (iii) Do not try to neutralise with chemicals.
- (iv) Administer 2 to 3 drops of 0.5% solution of Pontocaine or other effective topical anaesthetic in the eyes.
- (v) Do not use oils or oily ointments in the eyes.

If gaseous or liquid chlorine has come into contact with the skin :

- (i) Remove contaminated clothes.
- (ii) Flush the affected portion with copious amount of running water.
- (iii) Wash skin with copious amount of soap and water.
- (iv) Do not apply greases.

If liquid chlorine is by chance swallowed :

Swallowing of liquid chlorine is extremely unlikely if swallowed and the patient is conscious.

- (i) Ask the patient to drink copious quantity of lime water, ammonia water, (1 ml in 60 ml of water), milk of magnesia or fresh water.
- (ii) No attempt should be made to induce vomiting.
- (iii) Keep the patient under observation and take necessary action.

TREATMENT:

1. Pulmonary oedema

- (i) Administer 60 to 100% oxygen at 6 lit. min.
- (ii) Intermittent positive pressure breathing apparatus, set to delivery positive pressure of 5-15 cm of water in the inspiratory cycle, is valuable in reducing the formation of edema.
- (iii) Symptomatic treatment. 'Lazyx' is suggestive.
- (iv) Aminophylene intra venously.

2. Bronchospasm

- (i) There is no known antidote for acute chlorine exposures. The exposure is associated with acute symptomatology requiring supportive therapy only. Early treatment is the most effective.
- (ii) Broncho dilators nebulized into the intermittent positive pressure gas stream are often beneficial.

4. **OLEUM:**

SYMPTOMS:

Corrosion of severe nature.

Severe chemical burns of the affected part alongwith pain.

Affection of respiratory tract and mucus membranes of the exposed parts.

Severe bouts of cough with spasm of bronchial tree.

Flooding of the lungs with fluid in serious exposure and asphyxia.

FIRST AID:

Wash with copious water for long duration. Contaminated clothes to be discarded.

Irrigation of all the affected parts.

Eyes should be irrigated for long time.

TREATMENT:

Symptomatic treatment particularly one recommended for Corrosives.

5. **CYANIDE COMPOUNDS:**

SYMPTOMS:

Hydrocyanic acid and the cyanides cause death by inactivation of the respiratory enzyme, preventing utilization of oxygen by the tissues. The clinical combination of cyanosis, asphyxia, and the odour of bitter almonds of the breath is diagnostic. Respiration is first stimulated and later depressed. A marked drop in blood pressure may occur.

FIRST AID:

1. Poisoning by inhalation - Place patient in open air in recumbent position. Remove contaminated clothing. Give artificial respiration.
2. Poisoning by ingestion - Induce vomiting immediately with a finger down the patient's throat. Do not wait until lavage tube has arrived; death may occur within a few minutes.
3. Give amyl nitrite inhalations for 15 - 30 seconds every 2 minutes until intravenous antidotes are given.

TREATMENT:

Use nitrites to form methemoglobin, which combines with cyanide to form nontoxic cyanmethemoglobin. Then give thiosulphates to convert the cyanide released dissociation of cyanmethemoglobin to thiocyanate.

Administration of antidotes must be based on haemoglobin level. At 14 g / dl haemoglobin, give 0.39 ml/kg of 3% sodium nitrite intravenously and 1.95 ml/kg of 25% sodium thiosulphate intravenously. At lower haemoglobin levels, reduce dosage in exact proportion. Further administration should not exceed 40% methemoglobinemia, inject sodium nitrite over 10-15 minutes, monitoring blood pressure during administration.

Cobalt edentate intravenously if cyanide poisoning is confirmed and should never, be given to a conscious patient.

EMERGENCY RESPONSE GUIDE FOR DEFERENT CHEMICALS

1. Emergency response guide for Ammonia :

POTENTIAL HAZARDS

Health Hazards :

- Poisonous, may be fatal if inhaled or absorbed through skin.
- Contact may cause burns to skin and eyes.
- Contact with liquid may cause frostbite.
- Clothing frozen to the skin should be thawed before being removed.
- Runoff from fire control or dilution water may cause pollution.

Fire or Explosion :

- Some of these material may burn, but none of them ignites readily.
- Cylinder may explode in heat of fire.

EMERGENCY ACTION

Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind, out of low areas, and ventilate closed spaces before entering.

Positive pressure self-contained breathing apparatus (SCBA) and chemical protective clothing which is specifically recommended by the shipper or manufacturer may be worn. It may provide little or no thermal protection.

Structural firefighters' protective clothing is not effective for these material.

Isolate the back or spill area immediately for at least 150 feet in all directions. See the table of initial isolation and protective action distance. If you find the ID Number and the name of the material there, begin protective action.

Fire :

Small Fires : Dry chemical or CO₂.

Large Fires : Water spray, fog or regular foam.

Do not get water inside container.

Move container from fire area if you can do it without risk.

Apply cooling water to sides of containers that are exposed to flames until well after fire is out.

Stay away from ends of tanks.

Isolate area until gas has dispersed.

Spill of Leak :

Stop leak if you can do it without risk.

Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.

Use water spray to reduce vapor, do not put water directly on leak or spill area.

Small Spills : Flush area with flooding amounts of water.

Large Spills : Dike for ahead of liquid spill for later disposal.

Do not get water inside container.

Isolate area until gas has dispersed.

First Aid :

Move victim to fresh air and call emergency medical care; if not breathing give artificial respiration; if breathing is difficult, give oxygen.

In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site.

Keep victim quiet and maintain normal body temperature.

Effects may be delayed; keep victim under observation.

2. **Emergency response guide for L.P.G. and Hydrogen :**

POTENTIAL HAZARDS

Health Hazards :

Vapors may cause dizziness or suffocation.

Contact with liquid may cause frostbite.

Fire may produce irritating or poisonous gases.

Fire or Explosion :

Extremely flammable; may be ignited by heat, sparks or flames.

Vapours may travel to a source of ignition and flash back.

Container may explode in heat of fire.

Vapour explosion hazard indoors, outdoors or in sewers.

EMERGENCY ACTION

Keep unnecessary people away, isolate hazard area and deny entry.

Stay upwind, out of low areas, and ventilate closed spaces before entering.

Positive pressure self-contained breathing apparatus (SCBA) and chemical protective clothing which is specifically recommended by the shipper or manufacturer may be worn. It may provide little or no thermal protection.

Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire.

Fire :

Let tank, tank car or tank truck burn unless leak can be stopped, with smaller tanks or cylinders, extinguish/ isolate from other flammable.

Small Fires : Dry chemical or CO₂.

Large Fires : Water spray or fog.

Move container from fire area if you can do it without risk.

Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks.

For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if this is impossible, withdraw from area and let fire burn.

Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire.

Spill of Leak :

Shut off ignition sources, no flames, smoking or flames in hazard area.

Do not touch or walk through spilled material; stop leak if you can do it without risk.

Use water spray to reduce vapors; isolate area until gas has dispersed.

First Aid :

Move victim to fresh air and call emergency medical care; if not breathing give artificial respiration; if breathing is difficult, give oxygen.

In case of frostbite, thaw frosted parts with water.

Keep victim quiet and maintain normal body temperature.

3. Emergency response guide for Petrol & Petroleum Oils :

POTENTIAL HAZARDS

Health Hazards :

- May be poisonous if inhaled or absorbed through skin.
- Vapors may cause dizziness or suffocation.
- Contact may irritate or burn skin and eyes.
- Fire may produce irritating or poisonous gases.
- Runoff from fire control or dilution water may cause pollution.

Fire or Explosion :

- flammable/ combustible material maybe ignited by heat, sparks or flames.
- Vapours may travel to a source of ignition and flash back.
- Container may explode in heat of fire.
- Vapour explosion hazard indoors, outdoors or in sewers.
- Runoff to sewer may create fire or explosion hazard.

EMERGENCY ACTION

- Keep unnecessary people away, isolate hazard area and deny entry.
- Stay upwind, out of low areas.

Positive pressure self-contained breathing apparatus (SCBA) and chemical protective clothing which is specifically recommended by the shipper or manufacturer may be worn. If may provide little or no thermal protection.

Isolate for 1/2 mile in all direction if tank, rail car or tank truck is involved in fire.

Fire :

Small Fires : Dry chemical or CO₂, water spray or regular foam.

Large Fires : Water spray, fog or regular foam.

Move container from fire area if you can do it without risk.

Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks.

For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if this is impossible, withdraw from area and let fire burn.

Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire.

Spill of Leak :

Shut off ignition sources, no flares, smoking or flames in hazard area.

Stop leak if you can do it without risk.

Water spray may reduce vapours; but it may not prevent ignition in closed paces.

Small Spills : Take up with sand or other noncombustible absorbent material and place into containers for later disposal.

Large Spills : Dike for ahead of liquid spill for later disposal.

First Aid :

Move victim to fresh air and call emergency medical care; if not breathing give artificial respiration; if breathing is difficult, give oxygen.

In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water.

Remove and isolate contaminated clothing and shoes at the site.

4. Emergency response guide for Natural Gas :

POTENTIAL HAZARDS

Health Hazards :

- May be poisonous if inhaled.
- Contact may cause burns to skin and eyes.
- Vapors may cause dizziness or suffocation.
- Contact with liquid may cause frostbite.
- Fire may produce irritating or poisonous gases.

Fire or Explosion :

- Extremely flammable;
- May be ignited by heat, sparks or flames.
- Vapours may travel to a source of ignition and flash back.
- Container may explode in heat of fire.
- Vapour explosion hazard indoors, outdoors or in sewers.

EMERGENCY ACTION

- Keep unnecessary people away, isolate hazard area and deny entry.
- Stay upwind, out of low areas, and ventilate closed spaces before entering.
- Positive pressure self-contained breathing apparatus (SCBA) and chemical protective clothing which is specifically recommended by the shipper or manufacturer may be worn. It may provide little or no thermal protection.

Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire.

Fire :

Let tank, tank car or tank truck burn unless leak can be stopped, with smaller tanks or cylinders, extinguish/ isolate from other flammable.

Small Fires : Dry chemical or CO₂.

Large Fires : Water spray, fog or regular foam.

Move container from fire area if you can do it without risk.

For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if this is impossible, withdraw from area and let fire burn.

Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire.

Cool container with water using unmanned device until well after fire is out.

Spill of Leak :

Shut off ignition sources, no flares, smoking or flames in hazard area.

Stop leak if you can do it without risk.

Water spray may reduce vapour, but it may not prevent ignition in closed spaces.

Isolate area until gas has dispersed.

First Aid :

Move victim to fresh air and call emergency medical care; if not breathing give artificial respiration; if breathing is difficult, give oxygen.

In case of frostbite, thaw frosted parts with water.

Keep victim quiet and maintain normal body temperature.

5. Emergency response guide for Chlorine :

POTENTIAL HAZARDS

Health Hazards :

- Poisonous may be fatal if inhaled.
- Contact may cause burns to skin and eyes.
- Contact with liquid may cause frostbite.
- Runoff from fire control or dilution water may cause pollution.

Fire or Explosion :

- May be ignite other combustible material (wood, paper, oil etc.)
- Mixture with fuels may explode.
- Cylinder may explode in heat of fire.
- Vapour explosion hazard indoors, outdoors or in sewers.

EMERGENCY ACTION

- Keep unnecessary people away, isolate hazard area and deny entry.
- Stay upwind, out of low areas, and ventilate closed spaces before entering.
- Positive pressure self-contained breathing apparatus (SCBA) and chemical protective clothing which is specifically recommended by the shipper or manufacturer may be worn. It may provide little or no thermal protection.

Structural firefighters' protective clothing is not effective for these materials.

Isolate the back or spill area immediately for at least 150 feet in all directions. See the table of initial isolation and protective action distance. If you find the ID Number and the name of the material there, begin protective action.

Fire :

Small Fires : Water only, No dry chemical, CO₂ or Halon.

Contain and let burn. If fire must be fought, water spray or fog is recommended.

Move container from fire area if you can do it without risk.

Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks.

For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if this is impossible, withdraw from area and let fire burn.

Spill of Leak :

Keep combustibles (wood, paper, oil etc.) away from spilled material.

Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.

Stop leak if you can do it without risk.

Water spray may be used to reduce or direct vapors.

Isolate area until gas has dispersed.

First Aid :

Move victim to fresh air and call emergency medical care; if not breathing give artificial respiration; if breathing is difficult, give oxygen.

In case of contact with material, immediately flush eyes with running water for at least 15 minutes.

Remove and isolate contaminated clothing and shoes at the site.

Keep victim quiet and maintain normal body temperature.

Effects may be delayed, keep victim under observation.

6. Emergency response guide for Sulphuric Acid & Oleum : **POTENTIAL HAZARDS**

Health Hazards :

- Poisonous if inhaled or swallowed.
- Contact may cause burns to skin and eyes.
- Runoff from fire control or dilution water may cause pollution.

Fire or Explosion :

- Some of these materials may burn, but none of them ignites readily.
- May be ignite other combustible material (wood, paper, oil etc.)
- Violent reaction with water.
- Flammable/ poisonous gases may accumulate in tanks and hopper cars.
- Runoff to sewer may create fire or explosion hazard.

EMERGENCY ACTION

- Keep unnecessary people away, isolate hazard area and deny entry.
- Stay upwind, out of low areas, and ventilate closed spaces before entering.
- Positive pressure self-contained breathing apparatus (SCBA) and chemical protective clothing which is specifically recommended by the shipper or manufacturer may be worn. It may provide little or no thermal protection.

Structural firefighters' protective clothing is not effective for these material.

Isolate the back or spill area immediately for at least 150 feet in all directions. See the table of initial isolation and protective action distance. If you find the ID Number and the name of the material there, begin protective action.

Fire :

Do not get water inside container.

Small Fires : Dry chemical or CO₂ .

Large Fires : Flood fire area with water from a distance.

Do not get solid stream of water on spilled material.

Move container from fire area if you can do it without risk.

Apply cooling water to sides of containers that are exposed to flames until well after fire is out.
Stay away from ends of tanks.

Spill of Leak :

Do not touch or walk through spilled material, stop leak if you can do it without risk.

Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.

Use water spray to reduce vapor, do not put water directly on lead, spill area or inside container.

Keep combustibles (wood, paper, oil etc.) away from spilled material.

Spills : Dike for later disposal. Do not apply water unless directed to do so.

Cleanup only under supervision of an expert.

First Aid :

Move victim to fresh air and call emergency medical care; if not breathing give artificial respiration; if breathing is difficult, give oxygen.

In case of contact with material, immediately flush eyes with running water for at least 15 minutes.

Speed in removing material from skin is of extreme importance.

Remove and isolate contaminated clothing and shoes at the site.

Keep victim quiet and maintain normal body temperature.

7. Emergency response guide for Hydrochloric Acid : **POTENTIAL HAZARDS**

Health Hazards :

- Contact may cause burns to skin and eyes.
- If inhaled, may be harmful.
- Fire may produce irritating or poisonous gases.
- Runoff from fire control or dilution water may cause pollution.

Fire or Explosion :

- Some of these materials may burn, but none of them ignites readily.
- Flammable/ poisonous gases may accumulate in tanks and hopper cars.
- Some of these materials may ignite other combustible (wood, paper, oil etc.)

EMERGENCY ACTION

- Keep unnecessary people away, isolate hazard area and deny entry.
- Stay upwind, out of low areas, and ventilate closed spaces before entering.
- Positive pressure self-contained breathing apparatus (SCBA) and chemical protective clothing will provide limited protection.
- If water pollution occurs, notify the appropriate authorities.

Fire :

- Some of these material may react violently with water.
- Small Fires :** Dry chemical or CO₂ .water spray or regular foam.
- Large Fires :** Water spray, fog or regular foam.
- Move container from fire area if you can do it without risk.
- Apply cooling water to sides of containers that are exposed to flames until well after fire is out.
- Stay away from ends of tanks.

Spill of Leak:

- Do not touch or walk through spilled material, stop leak if you can do it without risk.

Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal.

Small Dry Spills: With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.

Large Spills: Dike for ahead of liquid spill for later disposal.

First Aid:

- Move victim to fresh air and call emergency medical care.
- In case of contact with material, immediately flush eyes with running water for at least 15 minutes.
- Remove and isolate contaminated clothing and shoes at the site.
- Keep victim quiet and maintain normal body temperature.

8. Emergency response guide for Methanol & Liquid Poisonous & Flammable Pesticides :

POTENTIAL HAZARDS

Health Hazards :

Poisonous, may be fatal if inhaled, swallowed or absorbed through skin.

Contact may cause burns to skin and eyes.

Runoff from fire control or dilution water may cause pollution.

Fire or Explosion:

Flammable/ combustible material may be ignited by heat, sparks or flames.

Vapors may travel to a source of ignition and flash back.

Container may explode in heat of fire.

Vapour explosion and poison hazard indoors, outdoors or in sewers.

Runoff to sewer may create fire or explosion hazard.

EMERGENCY ACTION

Keep unnecessary people away, isolate hazard area and deny entry.

Stay upwind, out of low areas, and ventilate closed spaces before entering.

Positive pressure self-contained breathing apparatus (SCBA) and chemical protective clothing will provide limited protection.

Structural firefighter's protective clothing is not effective for these material.

Isolate for 1/2 mile in all direction if tank, rail car or tank truck is involved in fire.

Fire :

Small Fires: Dry chemical or CO₂ .water spray or alcohol - resistant foam.

Large Fires: Water spray, fog or alcohol - resistant foam.

Move container from fire area if you can do it without risk.

Dike fire-control water for later disposal, do not scatter the material.

Apply cooling water to sides of containers that are exposed to flames until well after fire is out.

Stay away from ends of tanks.

Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire.

Spill of Leak:

Shut off ignition sources; no flares, smoking or flames in hazard area.

Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.

Do not touch or walk through spilled material, stop leak if you can do it without risk.

Water spray may reduce vapor, but it may not prevent ignition in closed spaces.

Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal.

Large Spills: Dike for ahead of liquid spill for later disposal.

First Aid:

Move victim to fresh air and call emergency medical care; if not breathing give artificial respiration; if breathing is difficult, give oxygen.

In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Speed in removing material from skin is of extreme importance.

Remove and isolate contaminated clothing and shoes at the site.

Keep victim quiet and maintain normal body temperature.
Effect may be delayed, keep victim under observation.

9. Emergency response guide for Solid & Liquid Poisonous Pesticides : **POTENTIAL HAZARDS**

Health Hazards:

Poisonous, may be fatal if inhaled, swallowed or absorbed through skin.

Contact may cause burns to skin and eyes.

Runoff from fire control or dilution water may give off poisonous gases and cause water pollution.

Fire may produce irritating or poisonous gases.

Fire or Explosion:

Some of these materials may burn, but none of them ignites readily.

Container may explode violently in heat of fire.

EMERGENCY ACTION

Keep unnecessary people away, isolate hazard area and deny entry.

Stay upwind, out of low areas, and ventilate closed spaces before entering.

Positive pressure self-contained breathing apparatus (SCBA) and chemical protective clothing which is specifically recommended by the shipper or manufacturer may be worn. It may provide little or no thermal protection.

Structural firefighter's protective clothing is not effective for these materials.

Remove and isolate contaminated clothing at the site.

Fire:

Small Fires: Dry chemical, water spray or regular foam.

Large Fires: Water spray, fog or regular foam.

Move container from fire area if you can do it without risk.

Fight fire from maximum distance. Stay away from ends of tanks.

Dike fire-control water for later disposal, do not scatter the material.

Spill of Leak:

Do not touch or walk through spilled material, stop leak if you can do it without risk.

Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.

Use Water spray to reduce vapor.

Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal.

Large Spills: Dike for ahead of liquid spill for later disposal.

First Aid:

Move victim to fresh air and call emergency medical care; if not breathing give artificial respiration; if breathing is difficult, give oxygen.

In case of contact with material, immediately flush eyes with running water for at least 15 minutes.

Speed in removing material from skin is of extreme importance.

Remove and isolate contaminated clothing and shoes at the site.

Keep victim quiet and maintain normal body temperature.

Effect may be delayed, keep victim under observation.

MATERIAL SAFETY DATA SHEET

Name of Product/ Chemical: **Diesel**

IDENTITY OF MATERIAL	
Product Name	Diesel Oil, Gas Oil
Trade Name	HSD
Formula	Complex mixture of Hydrocarbons
UN NO.	1202
CAS No	
HAZCHEM Code	3 Y
Label / Class	Red Flammable Liquid
PHYSICAL AND CHEMICAL PROPERTIES	
Physical State	Liquid
Appearance	Light Brown/ Black
Odor	Diesel
Solubility in water	Insoluble (30 ppm)
Calorific value (Kcal/Kg.)	4.35E + 07
Boiling Point/ Range, Deg C	150-400
Melting/ freezing point Deg. C	
Vapor Density (Air=1)	18 to 46
Specific Gravity , 20 Deg. C	3 to 5
Dyn. Viscosity (PAS 30 deg. C)	0.81 to 0.91
Molecular weight	
Vapor Pressure at 38 Deg C. mm Hg	<1
Evaporation Rate at 30 deg. C	
Heat of Vaporisation, KCal/Kg	2.71 E + 05
Specific Heat Liq.	2.343 E + 03
FIRE AND EXPLOSION DATA	
Explosivity	Moderate
Flammability	Moderate
Auto ignition temp deg. C	256.6
Explosive Limits %	0.7 – 5
Flash point C, CC/OC	32 to 96
Burning Rate	4 mm / min
Extinguishing media	Foam, CO ₂ , DCP, water may be ineffective and cause fire to spread. May be used to cool fire exposed.
Special Procedures	
Unusual Hazards	Flash back may occur along vapour trail.
REACTIVE HAZARDS	
Stability	Stable
Hazardous Poly	
Incompatibility	Oxidizing agents

Hazardous Combustion/ Decomposition product	Toxic gases/ vapours (CO)
Condition to avoid	Keep away from heat and open flame
HEALTH HAZARD DATA	
Entry Route	Inhalation/ Skin absorption
TLV, PPM, Mg/ Cu.M	5 mg/m ³ (inhalation)
PEL, PPM, mg/Cu.m.	
STEL, PPM, mg./Cu.m.	10 mg/m ³
LD 50 oral, Rat g/kg	28
Odor Threshold, PPM	0.1
LD 50, Rabbit g/Kg	0.2
Delayed Toxicity	
SIGN/ SYMPTOMS OF EXPOSURE	
Inhalation	Dizziness, headache, Aspiration - rapidly developing, potential fatal chemical pneumonitis.
Ingestion	Nausea, vomiting
Contact	Skin-irritation, eyes-irritation, Dermatitis may result on prolonged contact
Emergency Treatment (Immediate Medical Attention Required)	
Inhalation	Remove victim to fresh air, give artificial respiration if necessary. If unconscious but breathing place in the unconscious (recovery) position. give external cardiac massage if necessary.
Ingestion	Do not induce vomiting
Contact	Remove contaminated clothing and wash affected part (skin/ eyes) with plenty of water.
HAZARD SPECIFICATION	
NFPA Rating	
Health	0
Stability	0
Flammability	2
Special	
Material Factor	10
KNOWN HAZARDS	
Combustible liquid	
Explosive Material	
Oxydiser	
Compressed Gas	
Carcinogen	
Flammable material	Flammable liquid
Unstable material	
Organic Peroxide	
Irritant	
Mutagen	

Phosphoric material	
Water reactive material	
Corrosive material	
Sensitizer	
Other	
SAFE USAGE DATA – PRECAUTIONS	
Ventilation	Adequate ventilation
<u>Protective Equipment</u>	
Eyes	Goggles / face shield
Respiratory	Self contained breathing apparatus for containment/ cleanup operations.
Gloves	Rubber
Clothing	Rubber
Others	
Handling and Storage	Diesel should be stored in well ventilated, properly labeled and approved containers, Sniffing, siphoning and use as a solvent and cleaning agent should be avoided. Do not transfer to unlabeled, unsuitable or incorrectly labeled containers. All containers should be kept out of reach of children and kept fully closed when not in use. Cleaning and inspection/ maintenance of storage tanks should be done according to proper procedures and precautions (work permit system, gas freeing of tanks, using lifeline and wearing air supplied breathing apparatus)
Others	
EMERGENCY RESPONSE DATA	
Release / Spill	Avoid spillage, should they occur, sand or earth are useful means of containment and absorption.
Waste Disposal	
ADDITIONAL INFORMATION	Gastric lavage should be done after endotracheal incubation, in view of risk aspiration which can cause chemical pneumonitis for which antibiotic and corticosteroid therapy may be indicated.
Manufacturer/ supplier	
Name	
Address	
Telephone No.	
Contact Person	

MATERIAL SAFETY DATA SHEET

Name of Product/ Chemical : **Fuel Oil**

IDENTITY OF MATERIAL	
Product Name	Fuel oil, Residual fuel oil, Bunker fuel oils
Trade Name	FO
Formula	Complex mixture of Hydrocarbons
UN NO.	1270
CAS No	
HAZCHEM Code	3 Y E
Label / Class	Not requested
PHYSICAL AND CHEMICAL PROPERTIES	
Physical State	Liquid
Appearance	Brown to black
Odor	Diesel fuel
Solubility in water	Insoluble
Calorific value (Kcal/Kg.)	4.34E + 07
Boiling Point/ Range, Deg C	185-500
Melting/ freezing point Deg. C	29 to (At 38 deg C, mm Hg.)
Vapor Density (Air=1)	3 to 5
Specific Gravity , 20 Deg. C	0.9 to 1.05
Dyn. Viscosity (PAS 30 deg. C)	
Molecular weight	
Vapor Pressure at 38 Deg C. mm Hg	<1 mm Hg 20 C (Approx.)
Evaporation Rate at 30 deg. C	
Heat of Vaporisation, KCal/Kg	2.9 E + 05
Specific Heat Liq.	1.9 + 03
FIRE AND EXPLOSION DATA	
Explosivity	
Flammability	Moderate
Auto ignition temp deg. C	263 to 407
Explosive Limits %	1 to 5
Flash point C, CC/OC	66 C and above
Burning Rate	4 mm / min
Extinguishing media	Foam, CO ₂ , DCP, water may be ineffective and cause fire to spread. May be used to cool fire exposed. containers.
Special Procedures	If a leak or spill has not ignited, use water spray to disperse the vapours and to provide for men attempting to stop a leak. Water spray may be used to flush spills away from exposure area.
Unusual Hazards	

REACTIVE HAZARDS	
Stability	Stable
Hazardous Poly	
Incompatibility	Oxidizing agents
Hazardous Combustion/ Decomposition product	Toxic gases/ vapours (CO)
Condition to avoid	Keep away from heat and open flame
HEALTH HAZARD DATA	
Entry Route	Inhalation/ Skin absorption
TLV, PPM, Mg/ Cu.M	5 mg/m ³ (inhalation)
PEL, PPM, mg/Cu.m.	
STEL, PPM, mg./Cu.m.	10 mg/m ³
LD 50 oral, Rat g/kg	
Odor Threshold, PPM	0.1
LD 50, Rabbit g/Kg	
Delayed Toxicity	
SIGN/ SYMPTOMS OF EXPOSURE	
Inhalation	Dizziness, headache
Ingestion	Nausea, vomiting
Contact	Skin-irritation, eyes-irritation, Dermatitis may result on prolonged contact
Emergency Treatment (Immediate Medical Attention Required)	
Inhalation	Remove victim to fresh air, give artificial respiration if necessary. If unconscious but breathing place in the unconscious (recovery) position. give external cardiac massage if necessary.
Ingestion	Do not induce vomiting as it may load to chemical pneumonitis.
Contact	Remove contaminated clothing and wash affected part (skin/ eyes) with plenty of water, kerosene / gasoline should never be used.
HAZARD SPECIFICATION	
<u>NFPA Rating</u>	
Health	0
Stability	0
Flammability	2
Special	
Material Factor	10
KNOWN HAZARDS	
Combustible liquid	Combustible liquid
Explosive Material	
Oxydiser	
Compressed Gas	
Carcinogen	

Flammable material	Flammable liquid
Unstable material	
Organic Peroxide	
Irritant	
Mutagen	
Phosphoric material	
Water reactive material	
Corrosive material	
Sensitizer	
Other	
SAFE USAGE DATA – PRECAUTIONS	
Ventilation	
<u>Protective Equipment</u>	
Eyes	Goggles / face shield
Respiratory	
Gloves	neoprene, butyl rubber
Clothing	Rubber
Others	
Handling and Storage	Fuel oil should be stored in well ventilated, property labeled and approved containers.
Others	
EMERGENCY RESPONSE DATA	
Release / Spill	Avoid spillage, should they occur, sand or earth are useful means of containment and absorption.
Waste Disposal	
ADDITIONAL INFORMATION	Gastric lavage should be done after endotracheal incubation, in view of risk aspiration which can cause chemical pneumonitis for which antibiotic and corticosteroid therapy may be indicated.
Manufacturer/ supplier	
Name	
Address	
Telephone No.	
Contact Person	

MATERIAL SAFETY DATA SHEET

Name of Product/ Chemical : **Gasoline**

IDENTITY OF MATERIAL	
Product Name	Petrol, Motor, Spirit, AV gas, Automotive fuel
Trade Name	Gasoline
Formula	Complex mixture of Hydrocarbons
UN NO.	1203
CAS No	
HAZCHEM Code	3 Y* E
Label / Class	Red and white flammable liquid/ 3.2 Group II
PHYSICAL AND CHEMICAL PROPERTIES	
Physical State	Liquid
Appearance	Colourless
Odor	Gasoline
Solubility in water	Insoluble
Calorific value (Kcal/Kg.)	4.5E + 07
Boiling Point/ Range, Deg C	32 – 215
Melting/ freezing point Deg. C	92 to -75
Vapor Density (Air=1)	3 to 4
Specific Gravity , 20 Deg. C	0.69 to 0.77
Dyn. Viscosity (PAS 30 deg. C)	
Molecular weight	
Vapor Pressure at 38 Deg C. mm Hg	300 to 600
Evaporation Rate at 30 deg. C	10 approx.
Heat of Vaporisation, KCal/Kg	2.93 E + 05
Specific Heat Liq.	2.2 E + 03
FIRE AND EXPLOSION DATA	
Explosivity	Moderate
Flammability	Dangerous
Auto ignition temp deg. C	257
Explosive Limits %	1.3 - 7.6
Flash point C, CC/OC	45
Burning Rate	4 mm / min
Extinguishing media	Foam, CO ₂ , DCP, water may be ineffective and cause fire to spread. May be used to cool fire exposed. containers.
Special Procedures	If a leak or spill has not ignited, use water spray to disperse the vapours and to protect men attempting to stop a leak. Water spray may be used to flush spills away from exposures.
Unusual Hazards	Flash back may occur along vapour trail.

REACTIVE HAZARDS	
Stability	Stable
Hazardous Poly	
Incompatibility	Oxidizing agents
Hazardous Combustion/ Decomposition product	Toxic gases/ vapours (CO)
Condition to avoid	Keep away from heat and open flame
HEALTH HAZARD DATA	
Entry Route	Inhalation/ Skin absorption
TLV, PPM, Mg/ Cu.M	300 ppm/ 900 mg/m ³
PEL, PPM, mg/Cu.m.	
STEL, PPM, mg./Cu.m.	500 ppm/1500 mg/m ³
LD 50 oral, Rat g/kg	
Odor Threshold, PPM	0.25
LD 50, Rabbit g/Kg	900 ppm/ 1 hr
Delayed Toxicity	
SIGN/ SYMPTOMS OF EXPOSURE	
Inhalation	In very high conc. causes loss of consciousness, coma and sudden death, In less severe cases headache, nausea, mental confusion and depression occurs. Moderately toxic by inhalation.
Ingestion	Irritation of gastrointestinal tract with vomiting, colic and diarrhea, Fatal dose for adult 350 g and for children 10-15 gms.
Contact	Skin dry and defeat skin with dermatitis, splash contact with eyes causes pain and slight transient corneal epithelial disturbances.
Emergency Treatment (Immediate Medical Attention Required)	
Inhalation	Remove victim to fresh air, give artificial respiration (not mouth to mouth) if breathing is stopped. Oxygen if breathing is labored, Resources should take suitable precautions to prevent being overcome by high vapour conc.
Ingestion	Give conscious victim water to drink, do not induce vomiting. Liquid paraffin, olive oil or some vegetable oil is to be given orally to retard absorption of gasoline. Gastric lavage and induction of vomiting are not advisable.
Contact	Remove contaminated clothing and wash affected part.
HAZARD SPECIFICATION	
NFPA Rating	
Health	1
Stability	0
Flammability	3

Special	
Material Factor	16
KNOWN HAZARDS	
Combustible liquid	
Explosive Material	
Oxydiser	
Compressed Gas	
Carcinogen	
Flammable material	Flammable liquid
Unstable material	
Organic Peroxide	
Irritant	
Mutagen	
Ptsophoric material	
Water reactive material	
Corrosive material	
Sensitizer	
Other	
SAFE USAGE DATA – PRECAUTIONS	
Ventilation	Adequate ventilation
<u>Protective Equipment</u>	
Eyes	Goggles / face shield
Respiratory	Self contained breathing apparatus for containment/ cleanup operations.
Gloves	Rubber
Clothing	Rubber
Others	
Handling and Storage	Gasoline should be stored in well ventilated, properly labeled and approved containers, Sniffing, siphoning and use as a solvent and cleaning agent should be avoided. Do not transfer to unlabeled, unsuitable or incorrectly labeled containers. All containers should be kept out or reach of children and kept fully closed when not in use. Cleaning and inspection/ maintenance of storage tanks should be done according to proper procedures and precautions (work permit system, gas freeing of tanks, using lifeline and wearing air supplied breathing apparatus) Additional precautions are required where tanks may contain leaded gasoline.
Others	
EMERGENCY RESPONSE DATA	
Release / Spill	Avoid spillage, should they occur, sand or earth are useful means of containment and absorption. Because the vapours can travel along the ground for considerable distances, naked flames in

	surrounding areas should be extinguished. Any action which might cause ignition of gasoline/ vapours should be avoided. Any body in the nearby low laying confined space should be evacuated immediately until the area has been thoroughly ventilated and checked as safe to re-enter. The sand/ earth should be removed to safe area.
Waste Disposal	
ADDITIONAL INFORMATION	Gastric lavage should be done after endotracheal incubation, in view of risk aspiration which can cause chemical pneumonitis for which antibiotic and corticosteroid therapy may be indicated.
Manufacturer/ supplier	
Name	
Address	
Telephone No.	
Contact Person	

MATERIAL SAFETY DATA SHEET

Name of Product/ Chemical : **Kerosene**

IDENTITY OF MATERIAL	
Product Name	Kerosene, Stove oil, Jet fuel, illuminating oil, range oil fuel oil No. 1 Coal oil
Trade Name	Kerosene
Formula	Complex mixture of Hydrocarbons
UN NO.	1223
CAS No	
HAZCHEM Code	3 Y
Label / Class	Red flammable liquid/ 3.3 Group II
PHYSICAL AND CHEMICAL PROPERTIES	
Physical State	Liquid
Appearance	Colourless
Odor	Gasoline like
Solubility in water	0.0002 to 0.0004
Calorific value (Kcal/Kg.)	4.35E + 07
Boiling Point/ Range, Deg C	145 – 300
Melting/ freezing point Deg. C	43 to -49
Vapor Density (Air=1)	4.1
Specific Gravity , 20 Deg. C	0.80 to 0.85
Dyn. Viscosity (PAS 30 deg. C)	
Molecular weight	
Vapor Pressure at 38 Deg C. mm Hg	5
Evaporation Rate at 30 deg. C	
Heat of Vaporisation, KCal/Kg	2.72 E + 05
Specific Heat Liq.	2.09 E + 03
FIRE AND EXPLOSION DATA	
Explosivity	Moderate
Flammability	Moderate
Auto ignition temp deg. C	
Explosive Limits %	
Flash point C, CC/OC	
Burning Rate	
Extinguishing media	Foam, CO ₂ , DCP, water may be ineffective and cause fire to spread. May be used to cool fire exposed containers.
Special Procedures	If a leak or spill has not ignited, use water spray to disperse the vapours and to provide men attempting to stop a leak. Water spray may be used to flush spills away from exposures.
Unusual Hazards	

REACTIVE HAZARDS	
Stability	Stable
Hazardous Poly	
Incompatibility	Oxidizing agents
Hazardous Combustion/ Decomposition product	Toxic gases/ vapours (CO)
Condition to avoid	Keep away from heat and open flame
HEALTH HAZARD DATA	
Entry Route	Skin absorption
TLV, PPM, Mg/ Cu.M	500 ppm
PEL, PPM, mg/Cu.m.	
STEL, PPM, mg./Cu.m.	
LD 50 oral, Rat g/kg	20 gm/ kg
Odor Threshold, PPM	1
LD 50, Rabbit g/Kg	2.8
Delayed Toxicity	0.2 (oral)
SIGN/ SYMPTOMS OF EXPOSURE	
Inhalation	Dizziness, headache and nausea, CNS depressant / anesthetic effect. Continued inhalation procures visual and auditory, hallucinations, delirium and mania. Also symptoms of fatigue, somnolence, staggering gait, loss of memory.
Ingestion	Spontaneous vomiting, low to moderate oral toxicity. Irritation of mouth, throat & gastro intestinal tract, nausea, weakness, dizziness, slow and shallow respiration, convulsions, unconsciousness.
Contact	Skin irritation, prolonged contact can result in drying of skin, dermatitis and eye irritation.
Emergency Treatment (Immediate Medical Attention Required)	
Inhalation	Remove victim to fresh air, give artificial respiration if breathing has stopped. Oxygen if breathing is labored.
Ingestion	Give conscious victim water to drink, do not induce vomiting. Liquid paraffin, olive oil or some vegetable oil is to be given orally to retard absorption of gasoline. Gastric lavage and induction of vomiting are not advisable.
Contact	Remove contaminated clothing and wash affected part (skin/ eyes) with plenty of water.
HAZARD SPECIFICATION	
<u>NFPA Rating</u>	
Health	0
Stability	0
Flammability	2
Special	

Material Factor	16
KNOWN HAZARDS	
Combustible liquid	
Explosive Material	
Oxydiser	
Compressed Gas	
Carcinogen	
Flammable material	Flammable liquid
Unstable material	
Organic Peroxide	
Irritant	
Mutagen	
Phosphoric material	
Water reactive material	
Corrosive material	
Sensitizer	
Other	
SAFE USAGE DATA – PRECAUTIONS	
Ventilation	Adequate ventilation
<u>Protective Equipment</u>	
Eyes	Goggles / face shield
Respiratory	Self contained breathing apparatus for containment/ cleanup operations.
Gloves	Rubber
Clothing	Rubber
Others	
Handling and Storage	Kerosene should be stored in well ventilated, properly labeled and approved containers, Sniffing, siphoning and use as a solvent and cleaning agent should be avoided. Do not transfer to unlabeled, unsuitable or incorrectly labeled containers. All containers should be kept out of reach of children and kept fully closed when not in use. Cleaning and inspection/ maintenance of storage tanks should be done according to proper procedures and precautions (work permit system, gas freeing of tanks, using lifeline and wearing air supplied breathing apparatus).
Others	

EMERGENCY RESPONSE DATA	
Release / Spill	
Waste Disposal	
ADDITIONAL INFORMATION	Gastric lavage should be done after endotracheal incubation, in view of risk aspiration which can cause chemical pneumonitis for which antibiotic and corticosteroid therapy may be indicated.

Manufacturer/ supplier	
Name & ADDRESS	

MATERIAL SAFETY DATA SHEET

Name of Product/ Chemical : **Naptha**

IDENTITY OF MATERIAL	
Product Name	Naptha, Petroleum, solvent, Benzene, Mineral, Light Ligorin
Trade Name	Naptha
Formula	Complex mixture of Hydrocarbons
UN NO.	1225
CAS No	8052 - 41- 3
HAZCHEM Code	3 Y*E
Label / Class	Red and white flammable liquid/ 3.2 Group II
PHYSICAL AND CHEMICAL PROPERTIES	
Physical State	Liquid
Appearance	Colourless
Odor	Gasoline
Solubility in water	Insoluble
Calorific value (Kcal/Kg.)	4.5E + 07
Boiling Point/ Range, Deg C	35 – 205
Melting/ freezing point Deg. C	<30
Vapor Density (Air=1)	2.5 to 4.8
Specific Gravity , 20 Deg. C	0.69 to 0.78
Dyn. Viscosity (PAS 30 deg. C)	
Molecular weight	
Vapor Pressure at 38 Deg C. mm Hg	0 to 67
Evaporation Rate at 30 deg. C	10 approx.
Heat of Varporisation, KCal/Kg	2.9 E + 05
Specific Heat Liq.	2.2 E + 03
FIRE AND EXPLOSION DATA	
Explosivity	Moderate
Flammability ⁰	Dangerous
Auto ignition temp deg. C	229 to 293
Explosive Limits %	1.1 - 5.9
Flash point C, CC/OC	20 to 50
Burning Rate	4 mm/ min.
Extinguishing media	Foam, CO ₂ , DCP, water may be ineffective and cause fire to spread. May be used to cool fire exposed containers.
Special Procedures	If a leak or spill has not ignited, use water spray to disperse the vapours and to provide men attempting to stop a leak. Water spray may be used to flush spills away from exposures.
Unusual Hazards	
REACTIVE HAZARDS	
Stability	Stable

Hazardous Poly	
Incompatibility	
Hazardous Combustion/ Decomposition product	
Condition to avoid	Keep away from heat and open flame
HEALTH HAZARD DATA	
Entry Route	Inhalation / Skin absorption
TLV, PPM, Mg/ Cu.M	500 ppm / 2000 mg/m ³
PEL, PPM, mg/Cu.m.	
STEL, PPM, mg./Cu.m.	
LD 50 oral, Rat g/kg	0.5 to 5.0
Odor Threshold, PPM	5
LD 50, Rabbit g/Kg	1600 ppm
Delayed Toxicity	2.5 g/ kg
SIGN/ SYMPTOMS OF EXPOSURE	
Inhalation	In very high con. causes loss of consciousness, coma and sudden death. In less severe cases headache, nausea, mental confusion and depression occurs. Moderately toxic by inhalation.
Ingestion	Irritation of gastrointestinal tract with vomiting, colic and diarrhea, fatal dose for adult 350 g and for children 10-15 gms.
Contact	Skin dry and defeat skin with dermatitis, splash contact with eyes causes pain and slight transient corneal epithelial disturbances.
Emergency Treatment (Immediate Medical Attention Required)	
Inhalation	Remove victim to fresh air, give artificial respiration (not mouth to mouth) if breathing has stopped. Oxygen if breathing is labored. Rescuers should take suitable precautions to prevent being overcome by high vapour conc.
Ingestion	Give conscious victim water to drink, do not induce vomiting. Liquid paraffin, olive oil or some vegetable oil is to be given orally to retard absorption of gasoline. Gastric lavage and induction of vomiting are not advisable.
Contact	Remove contaminated clothing and wash affected part (skin/ eyes) with plenty of water.
HAZARD SPECIFICATION	
<u>NFPA Rating</u>	
Health	1
Stability	0
Flammability	3
Special	
Material Factor	16
KNOWN HAZARDS	

Combustible liquid	
Explosive Material	
Oxydiser	
Compressed Gas	
Carcinogen	
Flammable material	Flammable liquid
Unstable material	
Organic Peroxide	
Irritant	
Mutagen	
Phosphoric material	
Water reactive material	
Corrosive material	
Sensitizer	
Other	
SAFE USAGE DATA – PRECAUTIONS	
Ventilation	Adequate ventilation
Protective Equipment	
Eyes	Goggles / face shield
Respiratory	Self contained breathing apparatus for containment/ cleanup operations.
Gloves	Rubber
Clothing	Rubber
Others	
Handling and Storage	Naptha should be stored in well ventilated, properly labeled and approved containers, Sniffing, siphoning and use as a solvent and cleaning agent should be avoided. Do not transfer to unlabeled, unsuitable or incorrectly labeled containers. All containers should be kept out of reach of children and kept fully closed when not in use. Cleaning and inspection/maintenance of storage tanks should be done according to proper procedures and precautions (work permit system, gas freeing of tanks, using lifeline and wearing air supplied breathing apparatus).
EMERGENCY RESPONSE DATA	
Release / Spill	Avoid spillage, should they occur, sand or earth are useful means of containment and absorption. Because the vapours can travel along the ground for considerable distances, naked flames in surrounding areas should be extinguished. Any action which might cause ignition of gasoline/ vapours should be avoided. Any body in the nearby low laying confined space should be evacuated immediately until the area has been thoroughly ventilated and checked as safe to re-enter. The sand/ earth should be removed to safe area.
Waste Disposal	
ADDITIONAL INFORMATION	Gastric lavage should be done after endotracheal incubation, in view of risk aspiration which can cause chemical pneumonitis for which antibiotic and corticosteroid therapy may be indicated.

Manufacturer/ supplier	
Name	
Address	

Material Safety Data Sheet

Hexanes MSDS

Section 1: Chemical Product and Company Identification

Product Name: Hexanes

Catalog Codes: SLH2335, SLH2032

CAS#: 110-54-3

RTECS: MN9275000

TSCA: TSCA 8(b) inventory: Hexane

Cl#: Not applicable.

Synonym:

Chemical Name: Hexane

Chemical Formula: C6-H14

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name CAS # % by Weight

Hexanes 110-54-3 98.5-99.9

Toxicological Data on Ingredients: Hexane: ORAL (LD50): Acute: 25000 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (permeator), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast.

TERATOGENIC

EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to peripheral nervous

system, skin, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

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Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids

open. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 225°C (437°F)

Flash Points: CLOSED CUP: -22.5°C (-8.5°F). (TAG)

Flammable Limits: LOWER: 1.15% UPPER: 7.5%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances:

Highly flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in

presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards:

Extremely flammable liquid and vapor. Vapor may cause flash fire.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Flammable liquid, insoluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk.

Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful

that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

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Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material.

Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with skin. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection**Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Safety glasses. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves (impervious).

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 500 (ppm) from OSHA (PEL) [United States] Inhalation TWA: 1800 (mg/m³) from OSHA (PEL) [United States] Inhalation

TWA: 176 (mg/m³) from ACGIH (TLV) [United States] SKIN TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA:

500 STEL: 1000 (ppm) from ACGIH (TLV) [United States] Inhalation TWA: 1760 STEL: 3500 (mg/m³) from ACGIH (TLV)

[United States] Inhalation Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Gasoline-like or petroleum-like (Slight.)

Taste: Not available.

Molecular Weight: 86.18g/mole

Color: Clear Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 68°C (154.4°F)

Melting Point: -95°C (-139°F)

Critical Temperature: Not available.

Specific Gravity: 0.66 (Water = 1)

Vapor Pressure: 17.3 kPa (@ 20°C)

Vapor Density: 2.97 (Air = 1)

Volatility: Not available.

Odor Threshold: 130 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.9

Ionicity (in Water): Not available.

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Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:

Soluble in diethyl ether, acetone. Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not available.

Special Remarks on Reactivity: Hexane can react vigorously with strong oxidizers (e.g. chlorine, bromine, fluorine)

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.

Acute oral

toxicity (LD50): 25000 mg/kg [Rat]. Acute toxicity of the gas (LC50): 48000 ppm 4 hours [Rat].

Chronic Effects on Humans:

MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. May cause damage to the following organs: peripheral nervous

system, skin, central nervous system (CNS).

Other Toxic Effects on Humans:

Very hazardous in case of ingestion, of inhalation. Hazardous in case of skin contact (permeator). Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May cause adverse reproductive effects based on animal data. May be tumorigenic based on animal data. May affect genetic material. Passes through the placental barrier in animal.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: May cause mild skin irritation. It can be absorbed through the skin in harmful amounts.

Eyes: May cause mild eye irritation. Inhalation: May be harmful if inhaled. Inhalation of vapors may cause respiratory tract

irritation. Overexposure may affect, brain, spinal cord, behavior/central and peripheral nervous systems (lightheadness,

dizziness, hallucinations, paralysis, blurred vision, memory loss, headache, euphoria, general anesthetic, muscle weakness,

numbness of the extremities, asphyxia, unconsciousness and possible death), metabolism, respiration, blood, cardiovascular

system, gastrointestinal system (nausea) Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation

with abdominal pain and nausea. May also affect the liver, blood, brain, peripheral and central nervous systems. Symptoms of

over exposure by ingestion are similar to that of overexposure by inhalation.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

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Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Hexane UNNA: 1208 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Hexanes Illinois toxic substances disclosure to employee act: Hexanes Illinois

chemical safety act: Hexanes New York release reporting list: Hexanes Rhode Island RTK hazardous substances: Hexanes

Pennsylvania RTK: Hexanes Florida: Hexanes Minnesota: Hexanes Massachusetts RTK: Hexanes Massachusetts spill

list: Hexanes New Jersey: Hexanes New Jersey spill list: Hexanes Louisiana spill reporting: Hexanes TSCA 8(b) inventory:

Hexanes SARA 313 toxic chemical notification and release reporting: Hexanes CERCLA: Hazardous substances.: Hexanes:

5000 lbs. (2268 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the

European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2B: Material causing other toxic effects

(TOXIC).

DSCL (EEC):

R11- Highly flammable. R20- Harmful by inhalation. R38- Irritating to skin. R51/53- Toxic to aquatic organisms, may cause

long-term adverse effects in the aquatic environment. R62- Possible risk of impaired fertility. R65- Harmful: may cause lung

damage if swallowed. R67- Vapors may cause drowsiness or dizziness. S9- Keep container in a well-ventilated place. S16- Keep away from sources of ignition - No smoking. S29- Do not empty into drains. S33- Take precautionary measures against static discharges. S36/37- Wear suitable protective clothing and gloves. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets. S62- If swallowed, do not induce vomiting: seek medical advice immediately and show this

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: g

National Fire Protection Association (U.S.A.):

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Health: 1

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves (impervious). Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent.

Wear

appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:19 PM

Last Updated: 11/01/2010 12:00 PM

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GUIDE LINES FOR PUBLIC EVACUATION & LANDUSE NEAR TO MAJOR HAZARD

WORKS

(Prescribed In the Major Hazard Control Manual Published By International Labour Officer Geneva)

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 are likely to need evacuation, 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 themselves from the fire. This latter case particularly applies if the installation at risk could produce a fireball with very severe thermal radiation effects (e.g. LPG storage).
- (c) For release or potential releases 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 houses which can exist close to factories, particularly in developing countries, offer little or no protection.

The major difference between release 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 meters per minute covers a large area of land very quickly. Any consideration of evacuation must take this into account.

Although a plan should have sufficient flexibility built into cover the consequences of the range of accidents identified for the on-site plan, it is suggested that it should cover in some detail the handling of the emergency to a particular distance from each major hazard works. This distance may be judged to be similar to the separation zone distance or the information to the public distance as mentioned below in the Land use near to major hazard works.

LAND USE NEAR TO MAJOR HAZARD WORKS:

It should generally be considered to try to separate works & storing and using significant quantities of hazardous materials from nearby centers of population including housing, shopping centers, schools, hospitals etc. through land use planning legations. Separation should be maintained in the development stage from the major works. This will achieve almost complete protection from the more common but relatively minor accidents and in addition, worth while but not complete protection from the severe but very rare major events.

Based on this approach, the table given hereunder gives suggested approximate separation distance for a range of major hazard works. These distances should be regarded as tentative and would need to be considered under local circumstances to decide on their applicability.

Categorization of Development:

In deciding on the separation required from a works, it can be helpful to categories the proposed development. This will enable individual development decisions to be made within the framework of a consistent approach.

Categories of development can take account of a number of relevant factors in deciding on whether to permit development, e.g. amount of time individuals spend in the development, ease of implementing an emergency plan, vulnerability of occupants of the development (old people more vulnerable to thermal radiation).

One broad categorisation which has been widely used is based on three general categories :

Category A : Residential, including houses, hotels, flats;

Category B : Industrial, including factories (unless they have high density employment), warehouses.

Category C : Special, including schools, hospitals, old people's homes.

Other types of developments can then be added to the most appropriate of these categories, e.g. theatres/ cinemas and shopping centres could be included as Category A.

The separation distances given should be considered as follows :

- (a) Within the separation distance - no Category C development.
- (b) Within about two thirds of the distance- no category A development.
- (c) No restriction of Category B development.

Suggested Approximate Separation Distance for Major Hazard Works

Substance	Largest tank size (t)	Separation distance (m)
Liquified petroleum gas, such as propane and butane, held at a pressure greater than 1.4 bar absolute	25-40	300
	41-80	400
	81-120	500
	121-300	1000
	25 or more, only in cylinders or small bunk tanks of upto 5 te capacity.	100
Liquified petroleum gas, such as propane and butane, held under refrigeration at a pressure of 1.4 bar absolute or less	50 or more	1000
Phosgene	2 or more	1000
Chlorine	10 -100	1000
	More than 100	1500
Hydrogen fluoride	10 or more	1000
Sulphur trioxide	15 or more	1000

Acrylonitrile	20 or more	250
Hydrogen cyanide	20 or more	1000
Carbon disulphide	20 or more	250
Ammonium nitrate and mixtures of ammonium nitrate where the nitrogen content derived from the ammonium nitrate exceeds 28% of the mixture by weight	500 or more	See note 1
Liquid oxygen	500 or more	500
Sulphur dioxide	20 or more	1000
Bromine	40 or more	600
Ammonia (anhydrous or as solution containing more than 50% by weight of ammonia)	More than 100	1000
Hydrogen	2 or more	500
Ethylene oxide	5 - 25	500
	More than 25	1000
Propylene oxide (atmospheric pressure storage)	5 or more	250
(stored under pressure)	5 - 25	500
	More than 25	1000
Methyl isocyanate	1	1000

Classes of substances not specially named

1. Gas or any mixture of gases which is flammable in air and is held in the installation as a gas (except low pressure gasholders)	15 or more	500
2. A substances or any mixture of substances which is flammable in air and is normally held in the installation above its boiling point (measured at 1 bar absolute) as a liquid or as a mixture of liquid and gas at a pressure of more than 1.4 bar absolute.	25 - 40	300
	41 - 80	400
	81 - 120	500
	121 - 300	600

	More than 300	1000
	25 or more only in cylinder or small bulk tanks or upto 5 te capacity	1000
3. A liquified gas or any mixture of liquefied gases which is flammable in air, has a boiling point of less than 0°C (measured at 1 bar absolute) and is normally held in the installation under refrigeration or cooling at a pressure of 1.4 bar absolute or less	50 or more	1000
4. A liquid or any mixture of liquids not included in items 1-3 above which has a flashpoint of less than 21°C	10000 or more	250

CONTROL ROOMS

S.No.	Control Room.	Location	Phone No.
1	District crisis	D.C. Office kaithal	01746-224240

Expert Agency

S.No.	Agency	STD code	Phone No.
1	National Crisis Control Room	011	24360734
2	Dr. V Rajgopalan, Joint Secretary, Ministry of Environment & Forests, Govt. of India	011	24361760, 24101754
3	Director, Hazardous Substance Management Division	011	24360060
4	DG-FASLI, Mumbai	022	4074358 4092203
5	National Safety Council, Mumbai	022	4073694 4073285
6	Disaster Management Institute, Bhopal	0755	566715 293592
7	Mr. B N Jha, Assistant Director (S), Inspectorate of Dock Safety, Near Bunder Gate, New Kandla	07249	270724

8	Dy. Controller of Explosives, Raopura, Vadodara	0265	2420512
9	Dr. T V Subbaiah, Director Manufacturing, Alembic Chemical Works Co. Ltd., Vadodara	0265	2338466, 2330550 2340816
10	Dr. H N Saiyed, Director, National Institute of Occupational Health, Ahmedabad	079	2865142, 2866237
11	Dr. T Rangarajan, Exec. Director (Technical), KRIBHCO, Surat	0261	8420061, 8420426 8420986
12	Mr. J S Baxi, GM, ONGC, Chandkheda Complex, Ahmedabad	079	2486176
13	Mr. D V Chudasama, Sr. Manager development, Excel India Ltd., Bhavnagar	0278	225322 to 225326
14	Mr. D R Babalal, Nisarg Environmental Protection Agency, Gandhinagar	079	2321945
15	Mr. Naveen Saini, Assistant Director Industrial Safety & Health(Chemical), Ambala		9416120928
16	Mr.Animesh Kumar, Chief State Coordinator, IOC, Vill. Gudha (Karnal)	01748	259149,259094 Fax-259150 9416011616
17	Mr.P.S.Bhatti (Plant Manager) IOC, Vill. Gudha(Karnal)	01748	259252,259254 08901000789
18	Mr.Umesh Pal (Sales Officer) C-14, IOC Colony, Ambala Cantt.		9416911619
19	Mr.Joginder Pal Cheema SRM, HPC Jind	01681	252027,254983
20	Mr.Pardeep Tanwar Plant Manager, HP Jind		9996628838
21	Mr.Mithun Taneja, Area Manager,HP		9896142929
22	Mr.Gagandeep Singh, Sales Officer, HP, Jind gaganskarir@hpcl.co.in	01681	254983, 9729030094
23	Mr.Jaijeet Kumar (Plant Manager, Banud (Pb.),BP	01762	275276, 9466133277
24	Mr.Chirag (Sales Officer) Vill. Banud (Punjab),BP chiragminocha@bharatpatroleum.co.in	01762	653760, 9466139014
25	NFL, Panipat	0180	2522302,2522372

(i)	Mr.B.K.Gulati, Sr.DM ,NFL		9896066311
(ii)	Mr.R.K.Bhatia, Exe.Dir. NFL	0180	2652676, 2652481 Fax-2652515
26 (i)	Indian Oil Cor.Panipat	0180	2522001,2578804 Fax-2578833
(ii)	Fire Station, IOCL, Panipat Mr.Ashwani Sharma,Exe.Director	0180	2522301,2522372 9416206003
27	NAVY, Delhi	011	23011706,23010823,23010503
28	Army, Ambala	0171	2623421,2626422

Phone number of POLICE STATIONS and Police Officers in Kaithal District

S.No	Address of Police Station/ Police Officers	Phone No.
1.	Police station city, Kaithal near Geeta Bhawan Mandir	01746-230934
2.	Police station Sadar, Kaithal, Dogaran Gate, Kaithal	97299-90223,01746-269995
3.	Police station , Civil Line Kaithal	97299-90231,01746-235936
4.	Police station , Pundri	97299-90221,01746-271909
5.	Police station Dhand, District Kaithal.	97299-90220,01746-250533
6.	Police station Rajound District Kaithal,	97299-90222,01746-256524
7.	Police station Kalayat District Kaithal.	97299-90225,01746-260933
8.	Police station Siwan, District Kaithal.	97299-90226,01746-240778
9.	Police station Cheeka, District Kaithal	97299-90227,01743-221800
10.	Police station Guhla , District Kaithal,	97299-90228,01743-221810
11.	Police station Ttram, Titram Mor, Kaithal,	97299-90233,
12.		
13.		
14.		
15.		
16.		
17.		
18.		
S. No.	Address & Post of Police Officers.	Phone No.
1.	Police post,Kithana	97299-90236
2.	Police post, Sangtpura	97299-90234
3.	Police post Keorak	97299-90242
4.	Police post, Gran Markeet, Kaithal,	97299-90230

5.	Police post, GRP, RailwayStation	94666-07744
6.	Police post Ajingarh	97299-90239
7.	P.P. M/Pur	97299-90237
8.	P.P. Ramthali	97299-90238
9.	P.P.Harnaui	92299-90241
10	P.P.Bhagal	97299-90240
11.	P.P. Pundri	92299-90235
12.		
13.		
14.		
15.		
16.		
17.		

Phone number of District Administration, Kaithal.

S.No.	Name of Post	Phone No.
1	Dy. Commissioner	01746-234208,224240
2	Add. Deputy Commissioner	01746-234203,235786
3	CTM, Kaithal	01746-234280,235236
4	SDM, Kaithal	01746-234220,234045
5	SDM, Gulha	01743-221234,221281
6	Estate Officer, HUDA	01746-235019
7	DRO	01746-234358
8	GM, Roadways	01746-222415
9	SE/Executive Engineer,UHBVN	01746-234704
10	DIPRO Kaithal	01746-235447
11	Executive Engineer (B&R) Kaithal.	01746-222282
12	SE/ Executive Engineer PWD (Public Health) Kaithal.	01746-230681,222250
13	Executive Officer MC, Kaithal	01746-232987
14	DTO	01746-227456

Add. and phone No. of NON GOVERNMENTAL ORGANISATIONS

S.No.	Address	Phone No.
1	Red cross society, Kaithal	01746-231397
2	Sewa Sang, Kaithal	98963-27700
3	District Child Welfare Ssociety	01746-234081

PRESS AND MEDIA

S.No	Name & Add. of contact person	Name of agency	Phone No.
1	Sh. Surinder Miglani r/o Kaithal	Hindustan Times	01746-223169
2	Sh. Satish Seth r/o Kaithal	The Tribune	01746-2222398,94161-21113
3	Sh.Naresh Bhardwah r/o Kaithal.	Danik Bhaskar	96717-88728
4	Sh.Vinod Mittal r/o Kaithal.	Punjab Keshri	01746-235038
5	Sh.Naveen Malhotra r/oKaithal.	D.D. News	01746-222040
6	Sh. Mahipal Singh r/o Kaithal.	Danik Jagran	01746-235434
7	Sh, Rohtash Sharma r/o Kaithal.	Danik Bhaskar	01746-96717-16539
8	Sh. Sewa Singh r/o Kaithal.	Danik Tribune	92531-17086
9	Sh. Rajeev Paruthi r/o Kaithal	Haryana News	94161-21034
10	Sh, Rakesh Seth r/o Kaithal.	T.V.-24	94163-84414
11	Sh. Narinder Bhardwaj	Standard Word	9896448080
12	Sh. Sunil Sharma r/o Kaithal	MH-01	9991100008
13	Sh, Kamal Wadahan. r/o Guhla	Harayana News	93158-53258
14	Sh. Pawan Pashi r/o Chewka	Danik Bhaskar	9034225199
15	Sh.Parmod Bhargav r/o Cheeka	Punjab Keshri	01746-221039
16	Sh.Rajinder Chabra r/o Kalyat	Danik Jagran	01746-260018
17	Dr. Madan Parmar r /o Kalayat	Danaik Tribune/NRI	94164-08210
18	Sh. Jagsish Kawatrea r/ o Pundri	Punjab Keshri	01746-270 433
19	Sh. Jaipal Sharama r/o Pundri	Danik Bhaskar	01746-2270216
20	Sh.Bhadur Saini r/o Kaithal	Danik Tribune	01746-240157
21	Sh. Durga Dutt r/o Rajound	Danik Jagran	94160-73641
22	Sh. Lalit Kumar r/o Rajound	Danik Tribune	94666-52514
23			

RESOURCES AVAILABLE AT FIRE STATIONS

S.No.	Name	phone	No. of fire tender	Rescue tender	Fire Suit	Self-contained breathing apparatus (SCBA)
1	Fire Station,Kaithal	01746-224211 01746-224041 101	2 small fire tenders and 1 water Bouser(Fire Tender)	---		
2						
3						
4						

MAJOR HOSPITAL AND RESOURCES

Sr No	Name & Add.	Phone No.	Beds	Burn Ward	Poisoning Treatment Facility	Ambulance
1	S.I.G.M.S.H, Kaithal	01746-234613	100	Nil	Yes	Yes
2						
3						
4						
5						
6						
7						

BLOOD BANKS

Sr. No.	Name & Add	Phone No.
1	Smt.Indira Gandhi Multi Specialty, Kaithal.	01746-234766

MEDICAL TEST LABORATORIES

Sr. No.	Name & Add	Phone No.
1	SIGMS, Kaithal	01746-234613

AVAILABILITY OF CRANES & EARTH MOVERS MACHINE SUPPLIERS

Sr No	Name & Add. Of Vender	Equipmnet	Quantity	Phone No.
1	G.M. Roadways, Kaithal.	Cranes	1	01746-22245
2				
3				
3				

INDICATIVE LIST OF MEDICINES / EQUIPMENT

Medicines to be stocked at Treatment Center (per 1000 persons)

ITEM	QTY.	ITEM	QTY.
General Medicines			
Methyl Cellulose Eye Drops, 5 ml.	50	Injection Tetanus Toxoid, multidose	10

Surgical Spirit	2 ltrs	5% GNS IV Fluid, 540 ml.	100
Normal Saline Fluid, 540 ml.	50BL	Sterile Distilled Water, 500 ml.	5
Vinegar	2Ltr	Liquid Paraffin	5
Vaseline	1 Kg	Tincture Benzoin	1
Tincture Iodine	1Ltrs	Tincture Cetrimide	1
Savlon Liquid	50	Ointment Soframycin	10
Ointment Atropine (Eye)	50	Atropine Eye Drops	10
Neosporin Dusting Powder	20	Pilocarpine Eye Drops	10
Acridflavin Gauze with Plastic Jar	10 Jar	Ointment Gentamycin (Eye)	100
Gentamycin Eye Drops	100	-	
Decadron			
Decadron	20	Deriphyline	20
Coramine			
Coramine		Calcium Glutamate	5
Adrenaline			
Adrenaline	5	Dopamine Hydrochloride	2
Mephentine			
Mephentine	1	Sodium Bicarbonate	2
Atropine Sulphate			
Atropine Sulphate	20	Aminophyline	2
Lasix			
Lasix	10	Vitamin K	5
Lignocaine Hydrochloride			
Lignocaine Hydrochloride	5	Salbutamol	5
Perinorm			
Perinorm	10	Pethidine Hydrochloride	5
Ampicillin			
Ampicillin	100	Avil	10
Clampose			
Clampose	10	Morphine Sulphate	5
Surgical Items			
Eye Plastic Undine		Absorbant Cotton Wool	10 Role
Bandage 2", 4", 6"	5Dz each	Adhesive Plasters (Different sizes)	2 Role
Oxygen Cylinders	5	Mackintosh (Rubber Sheet 3' x 6')	20Mts
Polyethylene Masks (Surgical)	50	Pathology Gloves (Misc. sizes)	200 PAIRS
Disposable Syringes (2, 5 & 10 ml.)	200 each	Catgut Chromic	4DZ

Suture Needles Cur. Cutting (Different sizes)	4Pkt	Suture Needles Str. Cutting (4, 6, 8 mm)	4Pkt
Catgut Plain	2 Dz	BB Silk	2 Dz
Operation Scissors, str.	6	Operation Scissors, Cur.	6
Tracheotomy Set	2	Forceps Artery, Str.	6
Forceps Artery, Cur	6	Forceps Mosquito	6
Plaster of Paris Bandage (10 & 15 cm)	20 each	Forceps Dissecting (Toothed & Non-toothed)	6 each
Forceps Cheatles	6	Thomas Splints (arm/hip)	2
Boyels Apparatus	2	Respirator Bear (Adult/child)	2
Laryngoscope (Adult/child)	1 each	Endotracheal Tubes (diff. sizes)	2
IV Set, Disposable	100	Wooden Splints	20
Elastic Bandage	10	Electric Sterilizer	2
Hypodermic Needles (diff. Sizes)	100	SS Tray with Lid (rectangular)	10
EI Jar, (5")	4	EI Jar, (12")	4
Scissors shop	6	Basins (18" dia)	6
Kidney Tray	6	Loup (Eye Examination)	2
Others			
G N S IV Fluid	50	Water	
Plasma	10	Oxygen Cylinders	10
Miscellaneous Items			
Overshoes	4 pair	Torchlight (3 Cells)	4
Torch Cells	12	Stretchers	2
Mattress	20	Wheel Chairs	4