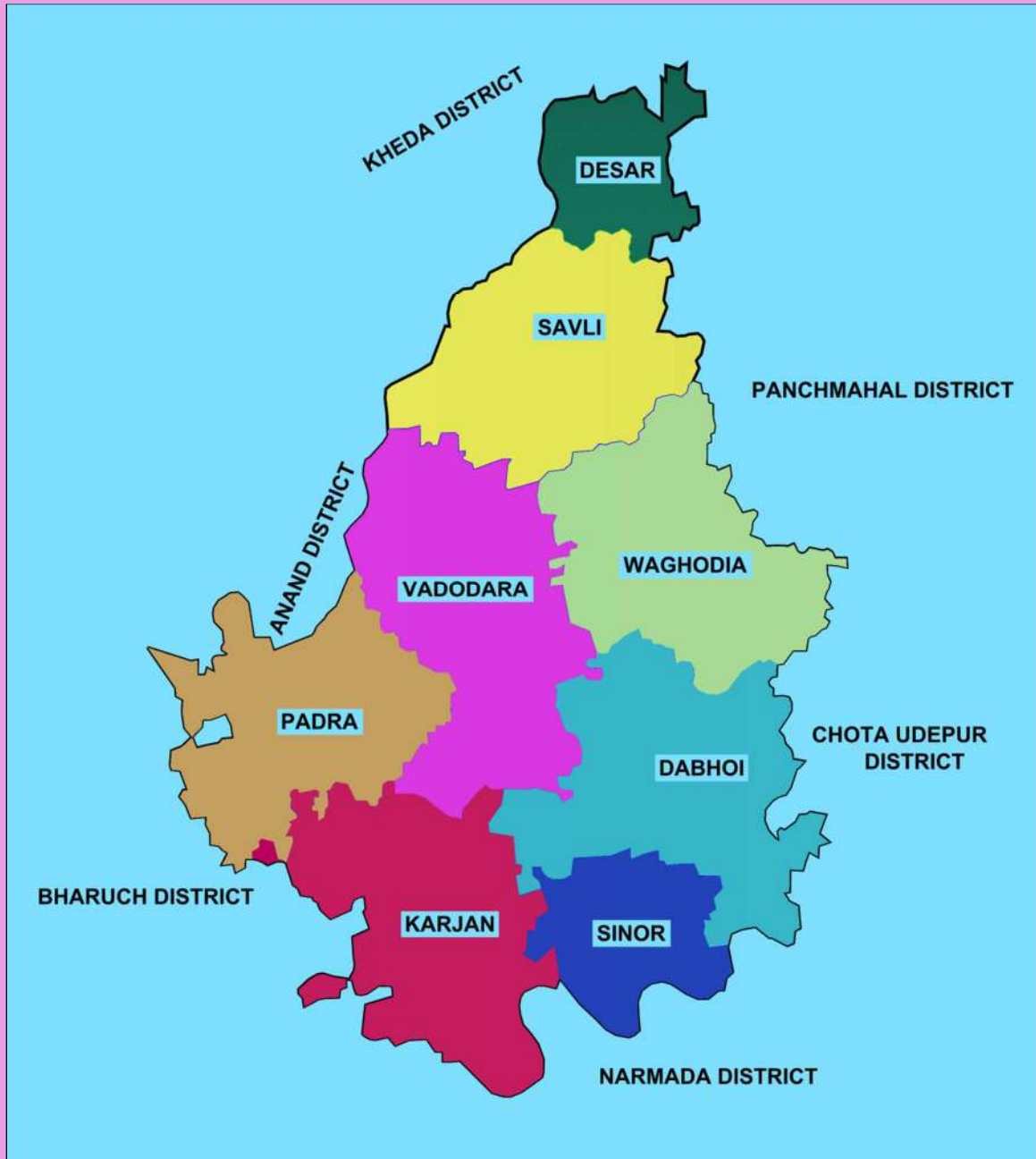


VADODARA DISTRICT

OFF SITE

EMERGENCY PLAN



Prepared By
VADODARA DISTRICT CRISIS GROUP
VADODARA
2025

FOREWORD

The Industrial accidents may result in Fire, Explosion, Gas Dispersion or toxic release; which may strike at any time and result into industrial Emergency. The damage caused by Emergency is immeasurable and varies with the geographical location, climate and the type of the surface /degree of the vulnerability. This influences the mental, socio-economic, political and cultural state of the affected area.

While On-site Emergency of Industry turns into Off-site Emergency, the Govt Authorities and District-Emergency Agencies have duties to control such Chemical Emergency and to protect the people, industry and environment at earliest.

The objective of Off-site Emergency Plan is the preparedness in advance steps taken to ensure adequate response to the impact of the hazards during chemical Emergency, with the participation of all members. Thus, members of concerned Departments/ Organizations/ Agencies; etc, have to prepare their own action plans by constituting working task-forces to handle & control such Industrial Emergencies by adequate resources at own level. It is also required that such resources are to be maintained in working conditions to meet any Industrial or Transportation Emergency even at any odd time also.

Previously, Off Site Emergency Plan-Vadodara; was prepared in 2022. Now, it is required to revise and update the said Off-site Emergency Plan due to changes and additions/alterations/omissions in industries in Vadodara District.

Shri H. P. Parmar, Dy. Director, Industrial Safety & Health, Vadodara & Member Secretary, District Crisis Group, Vadodara and his colleagues have put efforts in preparing this Document.

I thank to all the members of District Crisis Group, Vadodara, who have contributed valuable inputs in preparation of this Document.


(ANILBHAI DHAMELIYA), IAS

CHAIR PERSON
Vadodara District Crisis Group
Vadodara, &
COLLECTOR & DISTRICT MAGISTRATE,
Vadodara

PREFACE

The Off-Site Emergency Plan of Vadodara District was prepared in 2022. Now, it is to be updating and reviewing by adding/omissions of industries and changes with latest details to incorporate in new edition of Off-site Emergency Plan-2025.

Chemical Industrial Emergency means a catastrophic, mishap, calamity or grave occurrence affecting the industrial area and its surrounding area, which results in substantial loss of life or human suffering or damage to and destruction of property, damage to environment. While handling/processing of any off-site emergency, it is to be considered that minimizing the adverse effect of the hazards, with effective precautionary actions and ensure timely, appropriate and efficient organization and delivery of emergency response following the impact of a disaster.

The various statutory provisions, instructions, guidelines issued by different Authorities/Departments, various articles published by periodicals/ magazines/ chronicle/ books, etc. are referred in good faith. However, some of them are listed in preparing Off-site Emergency Plan, Vadodara-2025, in good faith, we are thankful to all.

1. National Disaster Management guidelines (Chemical Disasters) – April 2007 published by National Disaster Management Authority Government of India.
2. The Factories Act 1948(1987) and The Gujarat Factories Rules 1963(2004).
3. The Disaster Management Act 2005 and The Gujarat State Disaster Management Act 2003.
4. Chemical Accidents (Emergency Planning, Preparedness and Response) Rules-1996 (2000).
5. Manufacture, Storage and Import of Hazardous Chemical Rules 1989(2000).
6. Guidelines for preparation of Off Site Emergency Plans- June – 2011 published by Ministry of Environment & Forest, Government of India.
7. APELL: Awareness and Preparedness for Emergencies at Local Level – Chemical Emergency Prevention, Preparedness & Response (1995) - National Response Team – National Safety Council, Mumbai.
8. Major Accident Hazards Control and Techniques. CLI-Mumbai.

9. Planning of Off-Site Response for Chemical Hazards – Circulated by Environmental and Forest Department New Delhi.
10. Major Hazard Control – I. L. O. Geneva.
11. The guidelines on the preparation on On-site and Off-site Emergency Plan and related circulars issued by Chief Inspector of Factories (DISH), Gujarat State.
12. Papers, Articles or Techniques by experts/ authorities; as published on Off-site Emergency Plan in periodicals, Chronicles, Magazines, Books, Journals, etc.

I am thankful for guidance received from Shri D. K. Vasavasir - Jt. DISH and also thankful to my colleague Mr. A. V. Goswami - Dy. DISH, Mr. R. B. Makwana - Asst. DISH, Mr. S. P. Pathak - Asst. DISH, Mr. M. I. Vahora- Asst. DISH, , Mr. A. R. Pithiya- ISHO of Vadodara Region and others for cooperation and support.

I express my sincere thanks to Mr. Mayoore J. Vaghela, Competent Person & Chartered Engineer from HELPS, who have put efforts in preparing this Document.

I am again thankful for the help, co-operation and information provided by M.A.H. installations located in Vadodara District.



(H. P. PARMAR)
Member Secretary
Vadodara District Crisis Group
Vadodara, &
Dy. Director,
Industrial Safety & Health
Vadodara

VADODARA DISTRICT OFF-SITE EMERGENCY PLAN- 2025

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VADODARA DISTRICT OFF-SITE EMERGENCY PLAN- 2025

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ABBREVIATION

Amb.	Ambient	ICU	Intensive Care Unit
Atm.	Atmospheric	IDLH	Immediately Dangerous to Life and Health
BLEVE	Boiling Liquid Expanding Vapour Explosion	LCG	Local Crisis Group
CA (EPPR)	Chemical Accident (Emergency Planning Preparedness & Response) Rules-1996	LD50	Lethal Doses
CCG	Central Crisis Group	LPG	Liquefied Petroleum Gas
CCOE	Chief Controller of Explosive (PESO)	m/s	metres/second
CEO	Chief Executive Officer	MAH	Major Accident Hazardous Installation
CHC	Community Health Centre	MARG	Mutual Aid Response Group
CLI	Central Labour Institute	MOE & F	Ministry of Environment & Forests
CMVR	Central Motor Vehicles Rules	MSDS	Material Safety Data Sheet
CNG	Compressed Natural Gas	MSIHC	Manufacturing, Storage and Import of Hazardous Chemicals Rules 1989
CNS	Central Nervous System	NDMA	National Disaster Management Authority
CPR	Cardio Pulmonary Resuscitation	NGO	Non-Governmental Organization
DC	District Collector	NIOH	National Institute of Occupational Health
DCG	District Crisis Group	OISD	Oil Industry Safety Directorate
DDO	District Development officer	PESO	Petroleum & Explosive Safety Organization
DEA	District Emergency Authority	PHC	Primary Health Centre
DGFASLI	Director General, Factory Advice Services & Labour Institutes	PNGRB	Petroleum & Natural Gas Regulatory Board
Dir	Director	PPE	Personal Protective Equipment
DISH	Directorate of Industrial Safety & Health	Pre	Pressure
ECC	Emergency Control Centre	PRO	Public Relation Officer
EMS	Emergency Medical Services	QRMT	Quick Response Medical Teams
EP Act	Environment Protection Act	RTO	Regional Transport Officer
Exe	Executive Officer	SAR	Search & Rescue
FA	The Factories Act-1948(1987)	SCG	State Crisis Group
GFR	The Gujarat Factories Rules-1963(1995)	SMC	Site Main Controller
GIDC	Gujarat Industrial Development Corpo.	SOP	Standard Operative Practices
GOI	Government of India	Temp	Temperature
GPCB	Gujarat Pollution Control Board	TREM CARD	Transport Emergency Card
HW	Hazardous Waste	UVCE	Unconfined Vapour Cloud Explosion
IAP	Incident Action Plan	VMSS	Vadodara Mahanagar Seva Sadan
IC	Incident Controller		

VADODARA DISTRICT OFF - SITE EMERGENCY PLAN 2025

DESCRIPTION SECTION

Part -I

Prepared by
**VADODARA DISTRICT CRISIS GROUP
VADODARA**

2025

CHAPTER 1 INTRODUCTION

1.1 OBJECTIVE

The objectives of present assignment is to prepare, revise and update an Offsite Emergency Plan-2025 for Vadodara District, to incorporate changes occurred in the Industrial set up, storage aspects, Key Manpower, Administrative Changes, etc. During updation of this offsite site emergency plan various guidelines referred, like guidelines issued by the Ministry of Environment & Forest (MoEF)-June-2011, National Disaster Management Guidelines (Chemical Disaster) and provisions under Schedule 12 of the MSIHC Rule -1989 (Amended in year 2000).

1.2 EMERGENCY MANAGEMENT

The Emergency Management includes proactive prevention, mitigation, and preparedness activities, organisational planning, training, and information management.

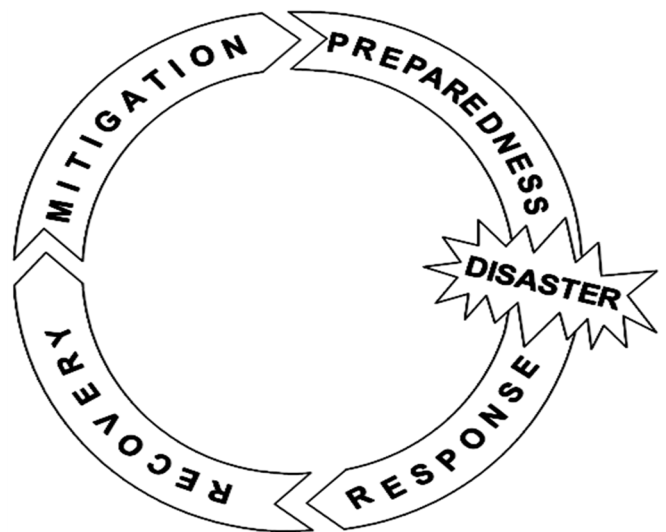
Further, Off-site Emergency Plan also needs to be managed in the systematic way by adopting and practicing an effective management tools. The system must be driven consistently till the situations are normalised without any threats. Further, Preparedness to deal with any industrial emergency, it depends on prompt response to any threatening disaster situation, assessing the severity or magnitude of effects of industrial disaster. The entire cycle of disaster management: Prevention and Mitigation, Preparedness, Response, Recovery, and Rehabilitation with a special focus on capacity building and preparedness to provide effective response. It is to say that to equip DCG with necessary & required resources, training and information for prompt implementation and the set of actions to be undertaken in the event of an industrial accident/emergency; posing hazards to the industries and the public in the vicinity.

The base of Off-site Emergency Plan is on those events, which could not be controlled by the management of the Unit, during On-site Emergency and affect people and the environment outside the Unit. Off-site Plan is largely a matter of ensuring co-ordination of existing emergency services and their readiness for specific Hazards and problems which may arise during the emergency incident.

Further, It also includes actions that are needed to learn from the experiences of previous emergency incidents and other unexpected events (follow-up) in order to reduce in future incidents (prevention). Emergency issues are not code issues and will be different for each situation.

1.3 EMERGENCY MANAGEMENT CYCLE

It is often difficult to clearly delineate, which issues and actions fall within each of these stages, and there is significant overlap among them. The system is based on the four major components of Management tools; which are in sequential form and strongly linked in one and all.



1.10.1 PREPAREDNESS:

Activities: prior to the emergency.

Examples: Preparedness Plans, Emergency Exercises/Training, Warning Systems, etc.

1.10.2 RESPONSE:

Activities: during the Emergency.

Examples: Public warning Systems, emergency operations, search and rescue, etc.

1.10.3 RECOVERY:

Activities: following the Emergency.

Examples: Cleanliness, Temporary housing, Shelters, Claims processing and grants, long term Medical Care & counselling, Public Announcement, Notifications, etc.

1.10.4 MITIGATION:

Activities: that reduces the effects of disaster.

Examples: Building codes and zoning, vulnerability Analysis, Public education, Analysis, Reports, etc.

1.4 AIMS OF EMERGENCY MANAGEMENT

Emergency Management need for effective pre, during and post Disaster Management Strategies and Policy for risk reduction in industrial Accidents/Transportation, which can be described in following.

- Immediate controlling response actions.
- Reduce (Avoid, if possible) the potential losses from hazards.
- Assure prompt and appropriate assistance to victims whenever necessary.
- Achieve rapid and durable recovery.

1.5 CHEMICAL INDUSTRY

The Chemical industry occupies pre-eminent position. A stretch of 400 KM from Ahmedabad to Vapi is known as the 'Golden Corridor'. Fertilisers, Power Industries, Chemical Industries, textile Industries, engineering industries etc. giant manufacturing plants with triggered the development of small and medium scale industries. In addition to

manufacturing industries, there are significant infrastructure for handling chemicals such as pipe lines, transportation (Rail and Road), isolated storages, Natural Gas, CNG, & LPG Gas cylinders depot, Oil installation and pump stations, etc. The Air-port is storing aviation fuel and handling hazardous chemical cargo. Further, defence and nuclear installation pose to the risk of chemical Emergency. Thus, list of chemical hazard is exhaustive. However, District is exposed to various chemical Crunches.

The inherent properties of chemicals are always potential threat of mishaps, if not properly taken care. Further, activities on storage, process, handling or transportation of large quantities of chemicals are increased, which may turn in to chemical accident or emergency, if not controlled properly or due to any other reasons.

1.6 INDUSTRIAL EMERGENCY

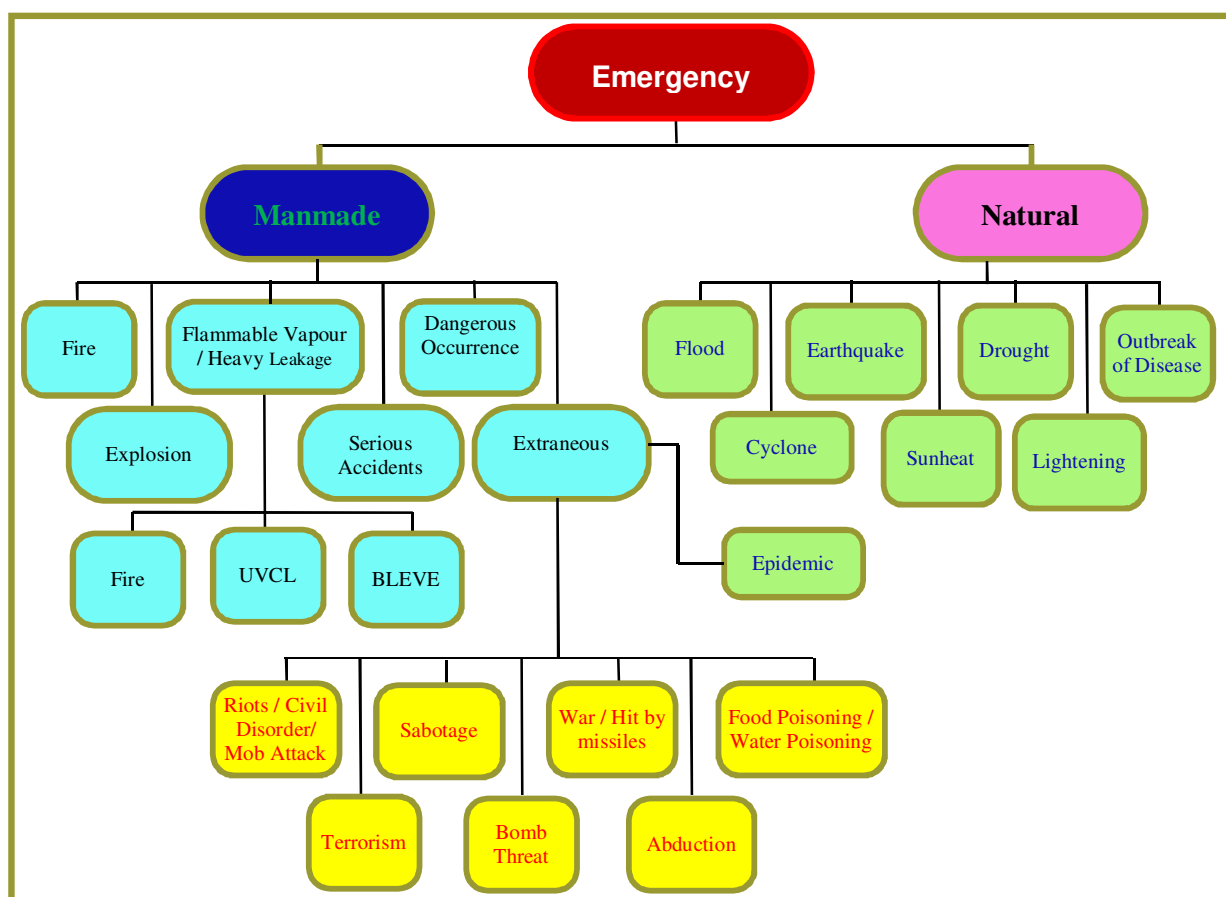
The occupier of the industry has to prepare the on-site emergency plan for their factory, Further, when the industrial emergency (On-site Emergency) is not controllable by the management of the Industrial Unit, and turn into Off-site Emergency situation, DCG have to respond and to control the such industrial emergency by use of District Emergency Services/Departments and other infrastructures. The Off-site Emergency Plan is action plan to handle and control such industrial emergency. Further, such plan is to revise and update periodically. We have followed different statutes in the preparation, planning & response of such off-site industrial emergency. e.g. Schedule-12 under 'Manufacture, Storage & Import of Hazardous Chemicals Rules-1989(2000)', Chemical Accidents (Emergency Planning, Preparedness & Response) Rules-1996, The Factories Act-1987 and Provisions under Rules 68-J of Gujarat Factories Rules-2004, The Disaster Management Act-2005 and Rules-2006, Gujarat State Disaster Management Act-2003 and Rules, etc. Further we have followed the instructions from 'Guidelines for preparation of Off-site Emergency Plans' as published by The Ministry of Environment and Forests, Govt. of India(June-2011),

National Disaster Management Guidelines- Chemical Disasters (Industrial) (April 2007) by National Disaster Management Authority, Government of India.

1.7 CLASSIFICATION OF EMERGENCY/DISASTER

Industrial units are vulnerable to various kinds of natural and man-made emergencies. Examples of Natural disasters are flood, Cyclone, earthquake, lightening etc. and man made disasters like major fire, explosion, sudden heavy leakage of toxic / flammable gases, civil work plant failure, human errors, vehicle crash, sabotage etc.

Thus, the emergency can be divided in the following types, depending upon the nature:



1.8 NATURE OF AN INDUSTRIAL EMERGENCY / DISASTER

Mode of emergency may depend upon the chemical property of the hazardous materials and maximum storage inventory. Fire emergency

may arise due to flammable property of the Hazardous material. While explosive materials may create explosion emergency. Toxic gas dispersion in atmosphere creates Toxic release Emergency. Further, uncontrollable chemical reaction or dangerous occurrence may result into emergency. However, chemical incident can be following types:

1. Toxic /flammable gas/vapour release as plume /puff from pipeline /fittings failures, tank ruptures etc. including flashing liquids stored above their atmospheric boiling point.
2. Spill of a toxic / flammable liquids.
3. Dispersal of toxic plumes and puffs. Fire:
4. Flash fire, Fire Ball, Pool Fire, Heavy Fire, Fire with Domino effect, etc.
5. Evaporation and dispersal of toxic vapours from liquid spill pools.
6. Ignition of flammable gases, vapours and liquids leading to fires.
7. Ignition of flammable gases and vapours leading to Unconfined Vapour Cloud Explosion (UVCE) on site and/or offsite.
8. Boiling Liquid Evaporating Vapour Explosions (BLEVE).
9. Mechanical / confined vapour explosion (CVE) including deflagrations (slow burning) and detonations (rapid burning).
10. Dust explosions.
11. Collapse of the structures / Buildings / Sheds.
12. Bursting of vessels/pressure plants/equipment, etc.
13. Natural Calamity or Manmade Disaster.

1.9 EMERGENCY PLAN

The chemical emergency control plans have two separate identities as per gravity of the incidence.

1. On-Site Emergency Plan
2. Off-Site Emergency Plan

The first is to be prepared by an industrial unit as per provisions under statute and under the guidance of government & local authorities, while second one is to be prepared by the District Crisis Group with the help of government machinery and other resources; as per Schedule 12 of Rule-14 under MSIHC Rules-1989(2004)

1.10 LEVEL OF EMERGENCY

Industrial Emergency can be categorised into following levels on the basis of seriousness, magnitude of probable severity, response requirements and level of control required.

1.10.1 Level – I :

- 1). This is an industrial emergency or an incidents, which can be effectively and safety managed and contained within the site, location or installation by the available resources.
- 2). Has no impact outside the site, location or installation.
- 3). Further, can be handled and controlled by the management with own available resources as per on site emergency plan prepared.
- 4). It is called on site or Level-I emergency.

1.10.2 Level – II :

- 1). This is an Industrial emergency or an incident, in which level – I is uncontrollable by the management, even after use of their own resources, then additional more support is required and mutual aided or local organisation will provide their resources to handle & control the emergency.
- 2). Is likely to be danger to life, the environment or to industrial assets or reputation.
- 3). The Industrial Emergency is handled & controlled by external support of mutual aid partners is termed as level-II, normally grouped as Off Site Emergency.

1.10.3 Level – III :

- 1). This is an industrial emergency or an incident with off site impact which could be catastrophic and is likely to affect the population, property and environment inside and outside the installation and control is done by District administration.
- 2). The industrial emergency is not controllable by the unit even after using mutual aid and local resources, then the said emergency falls under the purview of District Authority.
- 3). The industrial emergency shall normally be grouped as off site emergency.
- 4). The gravity & situation of off site industrial emergency that controlled by state crisis group or National Crisis Group will have to command, handled and control such crisis by utilizing all resources from Local, District, State or Nation, as prevailing circumstances.

1.11 STAGES OF EMERGENCY PLAN

There are three basic structures or stages to be considered in preparation of emergency planning, as per below.

1.11.1 STAGE - 1 : Pre-emergency Period

It is the normal working period or preparatory stage for preparation, planning, obtaining resources and facilities etc. The member secretary with consent from Chair Person will conduct meetings, collect details on chemical accidents, identify M.A.H. Units, collect on-site emergency plans, their details, M.S.D.S. of hazardous chemicals, assess type of emergency & responding actions, suggest the resources against probable risks and hazards, along with maintaining emergency facilities etc works are carried out by on-behalf of DCG. Further, Member Secretary with approval by Chair Person, is carried out the work of preparation of Off-site Emergency Plan;

review and modification of Off-site Emergency Plan time to time. Further, it includes preparedness, awareness, training parts and conduction of massive mock-drill/exercise during the normal working. Other members have to plan & prepare their readiness to mitigate chemical emergency at any time. Thus. it is the important stage, which can be evaluated during actual emergency.

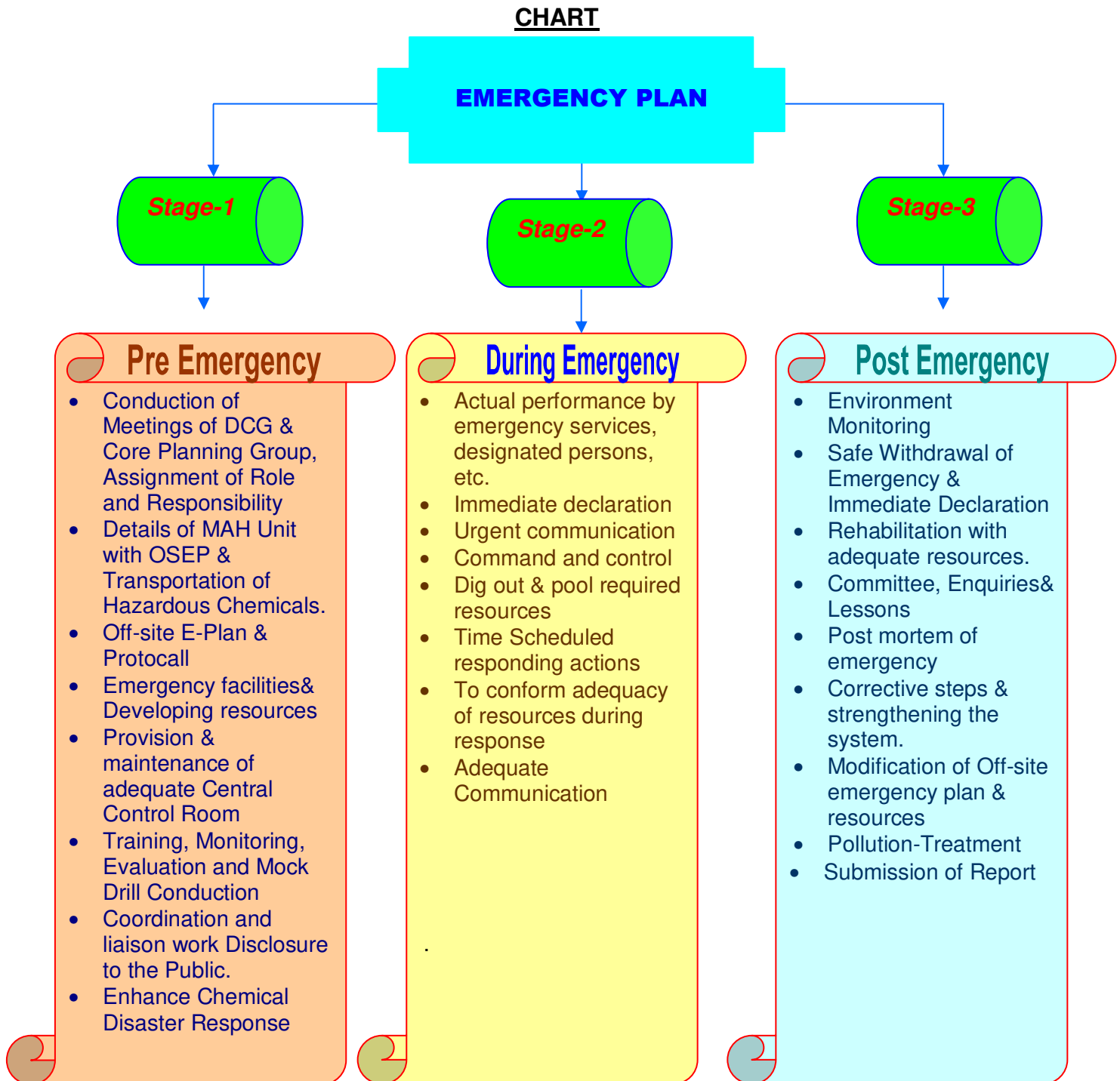
1.11.2 STAGE -2 : During Emergency

It is the actual emergency period, performance of the specific duties and responsibility of the emergency services and designated members of DCG, with use of planned resources in systematic ways. Various responding actions carried out by emergency services and other members of DCG to handle and control the industrial emergency in minimum period with coordinated way under command of chair person of DCG.

1.11.3 STAGE -3 : Post Emergency

On controlling the emergency, work on safe withdrawal of emergency, safe rehabilitation, the inquiry, investigation on cause of chemical accident, improvement of resources, modification of Off-site Emergency Plan, corrective steps, Treatment of Pollution etc are processed, the stage is called as post emergency period. A meeting of DCG will be called and discussed the issues. The report will be prepared on the chemical accident & submitted to State Crisis Group.

The above stages are indicated in chart as given below:



1.12 LEGAL BACK GROUND

The growth of chemical section has led to increase in manufacture, storage and use of hazardous chemicals resulting in enhanced threat to accident, unlike emergencies caused due to natural disasters, some of which are difficult to prevent. The chemical accidents can be prevented and impacts minimised by better planning, preparedness

and response. To achieve this objective, a document, the off site emergency plan for handling chemical disaster is considered essential.

The regulatory framework on chemical safety could be traced back to the Factories Act, 1948(1987) and chemical class specific regulation lies in the Explosive Act 1884(1963) and Petroleum Act-1934. Later on umbrella act, The Environment (Protection) Act – 1986 was enacted, which also deals with chemical management and safety. Further, Oil Industries Safety Directorate is also issued certain directives on industrial chemical emergency. Similarly, other concerned department/implementing authorities have given certain instructions/guidelines. Expert persons/institutes have published articles on this subject.

In view of the large losses of life and property, the central government has institutionalized the disaster management and focus on prevention, enhanced level of preparedness, prompt and effective responsibility and capacity building. The efforts are illustrated as below:

1.12.1 RESOLUTION OF 1986

After the ‘Bhopal Gas Tragedy’ (MIC release accident at Union Carbide, 1984) the government felt an immediate need to be more cautious about handling of hazardous chemicals. Immediately after the incident, different State Governments in started improving the emergency preparedness to combat and control the chemical disasters.

Gujarat is one of the highly industrialized states in India and has large numbers of small, medium and large chemical industries spread throughout the state. In response to the preparedness requirement for handling off-site chemical emergencies, Gujarat Government has passed a resolution in 1986, to constitute the District Contingency Plan Committees for Five Districts having large number of MAH installations, viz. Ahmedabad, Vadodara, Bharuch, Surat, & Valsad. Legal origin of Off- site Emergency Plan began with this movement.

1.12.2 Chemical Accidents (Emergency Planning, Preparedness and Response) Rules'1996 :

The Government of India published the “Chemical Accidents (Emergency Planning, Preparedness and Response) Rules-1996 (CA(EPPR) Rules)” under The environment (Protection) Act-1986. The main objectives of the rules are to provide administrative structure at different levels (central, state, district and local) for effective planning, preparedness and response to chemical accidents. Crisis groups at such levels have been defined with their composition and functions under these rules. Further, various definitions; like Hazardous Chemicals, Chemical Accident, MAH installations, Off-site emergency Plan, Transport etc. are explained. C.A. (EPPR) Rules-1996 are given at Annexure-25.

1.12.3 The Gujarat State Disaster Management Act, 2003:

In wake of the massive earthquake in Gujarat, the State Government passed The Gujarat State Disaster Management Act in 2003 (hereinafter referred to as ‘The Act’, for effective management of disasters. The Act covers all types of disasters (natural and man-made).

The Act identifies authorities for disaster management, functions of the state government and its various departments, establishment, constitution and functions of the Authority (Gujarat State Disaster Management Authority — GSDMA, has been formed under these provisions), etc. The functions include collection of data, repository of information, preparation of emergency plans and public awareness for disaster management, relief, rehabilitation and reconstruction, etc.

The Act also defines Powers and Duties of various functionaries in the disaster management activity such as CEO of GSDMA, State Relief Commissioner, District Collector, Local Authorities, Police, Fire, Civil Defence personnel, communities, private sector organizations, private agencies / persons, etc.

The act also defines the authority for declaration of disaster prone or disaster affected area and delegates powers to different authorities for disaster management activities such as power of entry, power to remove difficulties, etc.

1.12.4 The Disaster Management Act, 2005 & Rules 2006:

The Govt. of India has published the ACT and Rules to provide an institutional framework, for drawing up and monitoring the implementation of plans of the disaster management and facilitate the government machinery in mitigating the eventuality of the disaster. Further, it provides constitution, power, and functions of the National Authority, State Authority, and District Authority etc.

1.12.5 National Disaster Management Guidelines (Chemical Disasters) April 2007 (NDMG-CD):

The objectives of the guidelines are to formulate a single national plan integrating existing awareness, prevention, preparedness, response, relief and rehabilitation plans and follow a life cycle approach.

1.12.6 Guidelines for preparation of Off Site Emergency Plans- June – 2011 published by Ministry of Environment & Forest, Government of India

The Ministry of Environment and Forests, Government of India, have issued a guideline for preparation, content, management, control, use and implementation of the Offsite Emergency plan for the chemical accidents.

1.13 LIST OF RELEVANT STATUTES ON HAZARDOUS SUBSTANCES

List of relevant statutes on Hazardous Substances is given at Annexure-23.

1.14 CHEMICAL ACCIDENTS (EPPR) RULES-1996

Chemical Accidents (Emergency Planning Preparedness and Response) Rules-1996 is given at Annexure-25.

1.15 ABBREVIATION

Abbreviation used in the document are given at Page-10.

1.16 GLOSSARY OF TERMS & DEFINITIONS

Glossary of terms and definitions are given at Annexure-25.

CHAPTER 2

VADODARA DISTRICT CRISIS GROUP

2.1 INTRODUCTION

Off Site Emergency Plan is to be prepared by District Crisis Group with the details; as submitted by the management of M.A.H. Factories, and other industrial units. Further, it includes the emergency arise during chemical transportation on road also.

When management is unable to control on-site emergency/Industrial Emergency, as happened at their Unit & uncontrollable by them; then LCG/DCG will take over the charge of situation, according to the incident and as per the gravity of situations, the responding actions will be started by LCG/DCG to control the said emergency, as per C.A.(EPPR) Rules-1996. Thus, it is direct involvement of government's departments during off-site chemical accidents/emergency.

The said industrial emergency called as Off Site Emergency & it is to be controlled by either Local authority under Local Crisis Group (LCG) or District Crisis Group (DCG), as per situations.

The emergency location is not changed but the line of actions will be governed by respective crisis group, instead of unit's authorities. The unit's own authority has to extend facilities, liaison, and coordination to the Local Crisis Group or District Crisis Group, as per the requirement or situation.

2.2 CRISIS GROUPS

In order to respond off-site chemical emergency, various co-ordinated efforts are made by Government, constituting crisis groups at various level; i.e. local level, District level, State level or Central level.

The following Crisis Alert Systems are constituted as per 'Chemical Accidents (Emergency Planning, Preparedness and Response) Rules-1996 (2000) under the Environment (Protection) Act 1986.

- (1) Central Crisis Group : The Apex Body at the Central Level
- (2) State Crisis Group : The Apex Body at the State Level
- (3) District Crisis Group : The Apex Body at the District Level
- (4) Local Crisis Group: The Apex Body at the Local Level.

2.3 FUNCTIONS OF DISTRICT CRISIS GROUP

The major functions of District Crisis Group are as under:

- 2.3.1** To work as main coordinating body constituted of necessary district heads and other authorities with overall command, decision and doing all necessary things to control the Chemical/Industrial disaster/emergency arise in the district in the shortest time.
- 2.3.2** To take work from subordinate committees. If any committee is not functioning at any time, the chairman shall form a new committee.
- 2.3.3** To take in or relieve members to the DCG or other committee as per need or government's direction's directions. This will be done by the chairman of the DCG.
- 2.3.4** To prepare, review, alter, update or correct this plan and to keep it a complete document with all necessary details. Separate office and staff may be appointed by the chairman for co-ordination and well functioning of the plan.
- 2.3.5** To take advice and assistance from experts in this field to make the plan more successful.
- 2.3.6** To set in motion all machinery to this plan in the event of disaster causing or likely to cause severe, heavy or massive damage to public, property or government. The plan will be executed to control the situation, remove the hazards, save the lives, losses etc. and provide shelter, medical help etc. in the shortest possible time.

- 2.3.7** All members of the committee shall be reportable to the chairman and will act with high integrity, well discipline, quick response, sincerity and best coordinated efforts. They will attend meeting, prepare records and act in the direction of smoothening the work. The member secretary will act co-ordination work as a district head of all offices.
- 2.3.8** On receiving information of Chemical/Industrial disaster or emergency from any source, the member to the plan will inform the chairman or his subordinate in his absence.
- 2.3.9** On receiving such information the chairman shall take quick decision whether to operate this plan or not.
- 2.3.10** The chairman shall immediately inform all secretaries of different committee to be alert and ready and will give necessary order to concerned secretary/members to rush to the spot for their respective work. Only necessary part of the plan will be operated.
- 2.3.11** Public will also be informed about declaration of disaster and necessary instruction for them.
- 2.3.12** The incident control committee, traffic control committee and machinery to control committee, traffic control committee and press publicity committee will first be informed as they are needed first.
- 2.3.13** All committee shall work as per as per their function and duties and as per their best judgment, knowledge and machinery to control the situation within the shortest time and without creating new hazard.
- 2.3.14** The chairman shall form a communication committee (CC) consisting of his representative and members from telephone, information and railway departments to use their hot and fastest telephone lines ((actually the collector must have such hot lines) for speedy communication. The CC will carry out all communication with necessary agencies. The CC shall work continuously till the disaster is over and the chairman disperses it.

2.3.15 The DCG will continue the execution till the disaster is over and normalcy noticed. Evacuated, injured or badly affected people will be given necessary help even after the disaster is over. Public will be informed about restoration or resumption of normal situation and cessation of declared disaster. Then the DCG will stop its operation.

2.3.16 All committees will prepare and keep ready teams of necessary of necessary persons, equipment, instruments, vehicles etc. to carry out their functions speedily, efficiently and to work under their control, etc.

2.4 VADODARA DISTRICT CRISIS GROUP

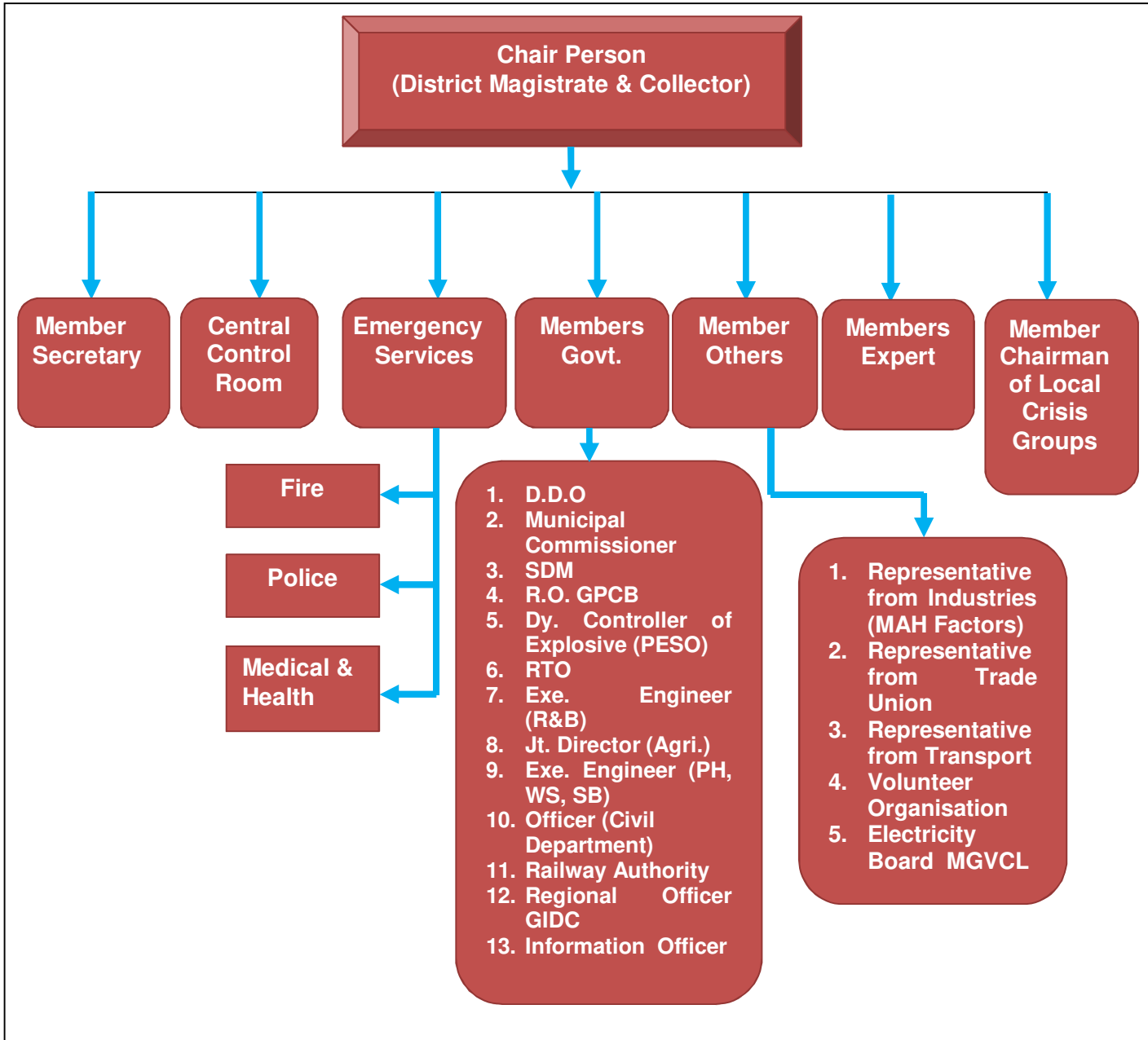
Vadodara District Crisis Group” is a committee constituted by Government of Gujarat as per Schedule-7 under Rule 8 of The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules-1986. It is an apex body to deal with the major chemical accidents and to provide expert guidance for handling chemical accidents in the District. The committee has coordination with Local crisis Group and State Crisis Group. The members of the crisis group are selected from high rank and experienced senior officers from various Government Departments, emergency services, non-govt. organisation and private sectors from the Vadodara District; and committee is re-constituted time to time.

The members have to perform the role and responsibilities under crisis group as additional and part of their duties. The members are identified as Designated Persons.

Further, the members have to well prepare for any type of chemical accidents during preparatory period and to maintain the adequate resources at their level to mitigate any industrial emergency at any time.

2.5 THE STRUCTURE

The Structure of Vadodra District Crisis Group is given; in chart; as below:



2.6 COMPOSITION

The composition of Vadodra District Crisis Group is appended at Annexure -3.

2.7 AID & ASSISTANCE FOR FUNCTIONING OF DISTRICT CRISIS GROUP

As per Rule 12.1 of the Chemical Accident (Emergency, Planning Preparedness and Response) Rule – 1996(2000) “The Major Accident Hazard installations” in the industrial pocket in the District shall aid, assist and facilitate functioning of the District Crisis Group.

2.8 ACTION PLAN

1. Assignment of specific Role and Responsibilities to various relevant Departments.
2. Core Planning Group
3. Emergency Preparedness Plan & Protocols
4. Training, Capacity Building, Equipment, Resources for Chemical Response and Strengthen of Response Mechanism.
5. Mock-Drill, Monitoring of Emergency
6. Enhance Chemical Disaster Response Capacity, etc.

2.9 EMERGENCY PREPAREDNESS EFFORTS

The components of pre-disaster phase are Preparedness and Mitigation.

2.9.1 PREPAREDNESS

Preparedness is in advance steps to ensure adequate response to the impact of hazards. In the preparedness phase, emergency organization members develop preparedness measures like the formulation of evacuation plan, communication plans, development of warning systems, proper maintenance of rescue equipment, and training of personnel for firefighting, rescue of man machinery, fighting inundation, first aid.

2.9.2 MITIGATION

Mitigation is structural and non-structural measures undertaken to lessen or eliminate the likelihood or consequence of

hazards. Effective mitigation requires an efficient mechanism for identification, assessment and monitoring of disaster risks. Identification of risks is a precursor to mitigation. Risk assessment includes identifying hazards, determining their probability of occurrences, estimating their impact, determining measures to reduce the risk.

2.10 GENERAL ROLE & RESPONSIBILITIES OF AUTHORITIES, OFFICERS & AGENCIES OF DCG

The essential Authorities, Officers, & agencies, whose participation is vital in the Off-site Emergency Plan process in preparation of plan, and its control, monitoring and execution, are collectively referred to as the Members/Responders, among the emergency services viz, the Fire & Rescue Department, Police and Medical & Hospitals.

The various actions are to be performed by designated persons to handle & control the chemical accidents timely, pre-decided and in coordinated way under the guidance of Chair Person, DCG.

Combating the emergency and minimizing the damage to people, property and environment; depends on the following factors;

1. Lapsed time between striking of emergency and communication to emergency services.
2. Effective, perfect, and immediate communication of emergency messages to the respective designated persons.
3. Response, time-activation & mobilization of resources at appropriate places.
4. Quality of decision making at site and at Central Control Room.
5. Deployment of resources in effective manner.

Generally Members of DCG are engaged in their own routing work and all of sudden getting message on chemical accident, they have to equip immediately and concentrate on emergency situation. In order to achieve higher order of controlling emergency on the site effectively, their roles and responsibilities shall be specifically defined. The

involved designated person are requested to prepare own action plan for their Task force with adequate & necessary resources /facilities, keeping in view of risk involve in the chemical accidents; as specified their role & responsibilities.

The guidelines for purpose of awareness, alertness & preparedness to tackle such emergency are indicated in forgoing Para

2.10.1 CHAIR PERSON / DISTRICT EMERGENCY AUTHORITY (DISTRICT MAGISTRATE & COLLECTOR)

Being Chair Person of District Crisis Group, he will be in over all charge & command of DCG & has to assist the members for responding emergency actions to control the chemical accidents effectively and urgently in the industrial pockets of the District; in case of chemical accident/ emergency Level-III. The Member Secretary will coordinate the work with the members during pre emergency period. Chair-Person has to ensure that participating members should have to perform their assigned roles effectively with adequate resources.

The role and responsibilities of the Chair person, includes:

- A). To call & conduct the meetings.
- B). To assist in preparation or updating of off-site emergency plan for the District by reviewing the on-site emergency plans of MAH Units.
- C). To ensure abilities to perform the role of each involved emergency services and designated members effectively.
- D). To activate and maintain the Central Control Room round the clock with essential facilities.
- E). If situation could not control even after utilising resources at his command, it should be reported to SCG immediately and then SCG will take charge of situation.
- F). To keep inform to the higher authority time to time.
- G). To declare the withdrawal or termination of emergency.

- H). To look after rehabilitation, restoration, cleanliness etc on post-emergency actions.
- I). To submit the reports on industrial emergency to SCG.
- J). To conduct the mock drill / exercise on industrial emergency.
- K). To take overall responsibility for combating the Off-site Emergency.

2.10.2 MEMBER SECRETARY: Dy. Director Industrial Safety & Health (Factory Inspector)

The major role of Member Secretary has to perform coordination with members of DCG & preparation of Off-site Emergency Plan for District during pre-emergency period, i.e. preparatory work. However, as Member Secretary of District Crisis Group, his role includes;

- A).To arrange & attend the meetings of District Crisis Group in consultation with Chair Person, as Member-Secretary of DCG.
- B). To identify Major Accident Hazardous Units in industrial area of each LCG & maintain up to date list and submission of details to DCG.
- C).To feed technical & chemical data & information in respect of MAH industrial units, situated in the District. To provide technical inputs to ensure safety, health & environment of workers, properties and population in vicinity.
- D).To prepare or update the “Off-site Emergency Plan” for District Crisis Group. The Off-site emergency plan should dovetail with the on-site emergency plan as prepared by the major accident hazardous units in the industrial Area of each LCG.
- E).To advice & guide the proper & effective handling actions as required by emergency services/designated persons during chemical emergency.
- F). To help to conduct the mock drills, post emergency inquiry etc.
- G).Other duties as specified by Chair Person of District Crisis Group.

2.10.3 MEMBER- FIRE SERVICES (FIRE COMMANDANT)

Most probably, the first information regarding any incidence / event / fire / gas leakage is received by the fire services. Thus, fire service, being first informant has to play the major role during the industrial emergency.

- A). To participate the meetings, Mock Drill / Rehearsal & training.
- B). Inspection, Survey & assess the situation during emergency & to report.
- C). Immediate response actions to control the industrial emergency, under intimation to Central Control Room or Chair Person.
- D). Proper training to fight against industrial hazards and knowledge of identification of such hazards.
- E). Rescue, Evacuation, Removal of debris, Pollution control and other emergency work as directed or instructed.
- F). To maintain the proper and adequate fire fighting, equipments, neutralizing media, self-breathing apparatus, emergency equipments, personnel protective equipments with maintaining in working order.
- G). The knowledge & information on different type of alternative resources, various types of extinguishing media, neutralizing media, chemical properties and their hazards with safe handling procedure.
- H). Liaison & coordination with Central Control Room and other emergency services.
- I). To prepare their own details action plan & to ensure the adequate facilities & provisions to handle the industrial emergency.
- J). Other duties as required during actual emergency.

2.10.4 MEMBER- POLICE DEPARTMENT (POLICE COMMANDANT)

Another authority who gets the first information on incident / accident is police department. The following actions are to be carried out by police department for industrial emergency purpose.

- A). To participate the meetings & Mock Drill / Rehearsal & Training.
- B). To assess the situation during emergency and report immediately.
- C). To maintain the law and order during the industrial emergency.
To control the traffic and control the affected area.
- D). To protect the life of people, inside, outside as well as road movers.
- E). To protect the property & environment. Announcement during emergency to public in the vicinity of the affected Unit.
- F). Evacuation, rehabilitation, shelter & transportation work & other arrangement during the industrial emergency as per prevailing situation.
- G). Help & assist to make area clean, removing of any structure and other similar work as required during actual emergency.
- H). Liaison & coordination with Central Control Room and other emergency services / organization / agencies.
- I). To prepare their own detailed action plan & to ensure the adequate facilities & provisions to handle the industrial emergency & train participating person for industrial emergency.
- J). Other duties as required during actual emergency.

2.10.5 MEMBER- MEDICAL & HEALTH (COMMANDANT)

The health and medical services have to play vital role following the emergency. One fold is proper & timely treatments to the victims, injured or affected persons. Other fold is to safe guard the public health.

The following actions are suggested for health & medical services.

- A). To participate the meetings & Mock Drill / Rehearsal & Training.
- B). To ensure the adequate arrangement & preparedness for special medical treatment with antidotes and trained doctors, Para-medical staff, as specified in toxicology at the time of industrial emergency in District.
- C). On declaration of emergency or on receiving the message or information, prompt medical facilities shall be set up e.g. first aid post, casualty receiving centre/ camp, as per gravity of situation at site. Similarly, arrangement for emergency operation or special treatment on chemical burn, injury, gas dispersion etc with adequate arrangement. To provide Base Hospital services.
- D). Identification of dead bodies and post mortem arrangement.
- E). To maintain upto-date list with telephone nos. of services of doctors, hospitals, ambulance, primary health center, Para-medical staff, vehicle to meet the emergency situation.
- F). Arrangement to inform the upto-date status time to time to Central Control Room, Chair Person, relatives of injured or admitted patients, emergency services etc.
- G). Arrangement to safe guard the public health in case of development of epidemic situation or pollution & announcement on specific safety measures to be taken by public at the time of industrial emergency situation.
- H). To advice & guide the District Crisis Group in respect of medical & health part, time to time.
- I). Provisions for proper and adequate medicines, life saving drugs, equipments, antidotes etc. related to chemical accidents.
- J). To prepare own detailed action plan to ensure the effective handling and response during industrial emergency.
- K). Liaison & coordination with Central Control Room, Chair Person, Emergency Services organization, agency and other related person.
- L). Other duties as required during actual emergency.

2.10.6 MEMBER- DISTRICT DEVELOPMENT OFFICER

Being a responsible person of District and member of DCG, he has to ensure all work related to industrial emergency shall be given prime importance and provide all helps within his command.

- A). To participate meeting, mock drill & training.
- B). Ensure the different authorities, agencies, organization, persons, as specified their role, should participate immediately during industrial emergency in District Pocket area.
- C). To advice & guidance to the District Crisis Group.
- D). Liaison & co-ordination with Chair Person, Central Control Room, emergency services, organization, agencies, person etc.
- E). Other duties as specified by District Crisis Group.

2.10.7 MEMBER- MUNICIPAL COMMISSIONER

Being highest authority of the Vadodara city & member of DCG, Vadodara Municipal Commissioner has to provide the facilities, helps & arrangements as required during industrial emergency. However, his role can be described as below;

- A). To participate meeting, mock drill and depute a responsible officer for the industrial emergency purpose.
- B). To arrange to receive casualties during an emergency in the Corporation run Hospitals.
- C). To arrange to mobilize the fire fighting equipments and facilities.
- D). To arrange to provide medical supplies and equipments to Civil Hospital / Municipal Hospitals.
- E). To arrange to check occupational health effects to the citizens and to take actions accordingly.
- F). To arrange to make schools and other premises available for shelters.
- G). To arrange to blow the city sirens for alarming the public.
- H). To arrange to inform the concerned department-heads to provide facilities such as water, sewage, electricity, medical

and health, education department etc. Convey them keep ready to provide available facilities during emergencies.

- I). To arrange to rehabilitate evacuated population affected during the emergency.
- J). To arrange other helps and facilities as required during actual emergency.

2.10.8 MEMBER- CHAIR PERSON (SDM- Local Crisis Group)

Being a chair person of the Local Crisis Group, he is the member of DCG, has to provide all the information of the units under his command as & when asked for. Further, he has to report, if any chemical accident occurs within his industrial pocket and development. Follow the instruction as directed by the Chair person Or DCG.

2.10.9 MEMBER -REGIONAL OFFICER- GPCB

The authority or officer from Gujarat Pollution Control Board is the member of District Crisis Group, who has to perform the role, as per below :

- A).To participate meeting, mock drills / exercises and training.
- B).To prepare own detailed action plan to ensure the effective control of industrial emergency & subsequent action.
- C).Liaison with Central Control Room, Chair Person, Emergency Services, Organization agencies & other related persons.
- D).Advice & guidance to the District Crisis Group in respect of environment protection in the industrial pocket.
- E).To provide the technical input regarding environment and evaluate the contamination or adverse health effect during industrial emergency.
- F).To provide the details & information on development of emergency situation and suggest regarding safe level area to the life and suggest area to be evacuated and other safety measures.
- G).To measure the safe level in atmosphere and suggest for

restoration & restarting of work before termination of emergency.

H). Liaison and co-ordination with emergency services & expert persons etc.

I). Other duties or work as directed by District Crisis Group or Chair person.

2.10.10 MEMBER- CONTROLLER OF EXPLOSIVE (PESO)

Dy. Controller of Explosive, Petroleum & Explosive Safety Organisation, has to attend the meeting, exercise/mock Drill and Training. He has to provide the details /information of the units with in their command. Follow the instruction as directed by the Chair person or DCG.

2.10.11 MEMBER- REGIONAL TRANSPORT OFFICER

- A). To participate meeting, mock drills & training
- B). Respond to collector and police instructions about emergency transport actions and to coordinate the work.
- C). Provide adequate transport facilities required for both persons and materials during chemical emergency.
- D). Arrange for deployment of vehicles with full fuel levels.
- E). Streamline traffic flow and parking yard movement.
- F). Co-ordinate deployment of private vehicles, if required.
- G). To prepare own detailed action plan to ensure effective handling on industrial emergency.

2.10.12 MEMBER- JT. DIRECTOR, INFORMATION, REGIONAL OFFICE

He has to attend the meeting, exercise/mock Drill and Training. He has to provide the details / information of the units with in their command. Follow the instruction as directed by the Chair person or DCG.

2.10.13 MEMBER- Jt. DIRECTOR (Agri.)

He has to attend the meeting, exercise/mock Drill and Training. He has to provide the details /information on agriculture with in their command. Follow the instruction as directed by the Chair person Or DCG.

2.10.14 MEMBER- DIVISIONAL MANAGER, WESTERN RAILWAY

On getting message at the time of disaster from Chairperson, Emergency Services or Central Control Room, the Divisional Manager, Western Railway, Vadodara will act as follows:

- A). To follow the standing instruction to all railway gates to take actions as asked by the Station Master.
- B). To decide authority level of railway staff to take actions.
- C). To carry out evacuation by railway, if required.
- D). To take care of floating population at railway stations and on board travellers.
- E). To issue the standing instruction to Station Masters on up and down railway stations, to stop the train as soon as emergency message is received from CCR or Authority.
- F). To attend the meeting, exercise/mock Drill and Training.
- G). Follow the instruction as directed by the Chair person or DCG.

2.10.15 MEMBER- CIVIL DEFENSE COMMANDENT

- A).To participate meeting, mock drills & training
- B). To prepare own detailed action plan to ensure effective handling on industrial emergency
- C).To assist police in rescue and evacuation work during emergency.
- D).To provide security, cordoning the area, and other services as required during the industrial emergency.
- E). Co-ordination with Central Control Room & Emergency Services.
- F). Follow the instruction as directed by the Chair person or DCG.

2.10.16 MEMBER- REGIONAL OFFICER,GIDC

He has to attend the meeting, exercise/mock Drill and Training. He has to provide necessary help and other details /information of the units with in their command. Follow the instruction as directed by the Chair person or DCG.

2.10.17 MEMBER- Representatives from MAH Units

The management of major accident hazardous unit has to maintain update on-site emergency plan with necessary details with accurate information and a correct assessment of the situation. The site main controller is responsible to provide report immediately on occurrence of chemical accident at his unit with specific details, development and needed help from District Crisis Group. He will arrange & provide all resources, equipments, manpower, and communication network from his own unit and co-ordinate with District Crisis Group to combat the industrial emergency. He will co-ordination with chairperson, Central Control Room, emergency services etc. He will participate meeting, mock drill etc. Follow the instruction as directed by the Chair person Or DCG.

2.10.18 MEMBER- ELECTRICAL ENGINEER, Electricity Board (MGVCL)

- A). Arrange for un-interrupted power supply, if needed.
- B). Arrange for lighting at temporary medical camps, rallying points and parking yards.
- C). Take care of electrical equipment within damage affected zone.
- D). Arrange for switching off power supply if requested by authority.
- E). To participate meeting, mock drills & training
- F). To prepare own detailed action plan to ensure effective handling on industrial emergency
- G). Follow the instruction as directed by the Chair person Or DCG.

2.10.19 MEMBER-TECHNICAL- EXPERTS

The chemical manufacturing activities along with large storages of various chemicals are day-to-day increasing. The chemical emergency often gives very short time to respond their containment. Therefore, it requires specific knowledge of hazards with special treatment and

their consequences. This needs chemical & technical expertise in handling of large-scale toxic and hazardous chemical emergency. They will provide careful evacuation of emergency and advise prompt responding actions to control the emergency if required. The planned responding resources will help to control such emergency.) Follow the instruction as directed by the Chair person Or DCG.

2.10.20 MEMBER- Volunteer Organizations (N.G.O.)

The volunteer organization / services can play vital role to convince the person / public to evacuate the residence / place and to shift to safe shelter timely, in case of such situation happen during Chemical emergency. To save the life of public is more important factor, which will be successfully carried out by the volunteer organization. Follow the instruction as directed by the Chair person Or DCG.

2.11 WORKING CRITERIA

The Working Criteria for Vadodara District Crisis Group are described as below:

- (1) Conducting Meeting, coordination and updating Off-site Emergency Plan periodically.
- (2) Creation of Appropriate Infrastructure with Core Planning Group.
- (3) Discussion of the Off site Plan in DCG Meetings.
- (4) The reporting procedure on chemical-accidents/emergency.
- (5) Role & Responsibility of members & Emergency Services.
- (6) Work-Coordination between Members & preparedness action plan.
- (7) Public Awareness, safe shelter, Rescue & Evacuation.
- (8) Communication, Alert & Warning System, Notify to Public, arrangement for dealing with the press and other media interests.
- (9) Central Control Room, Alarm system & emergency Response Protocols.
- (10) Adequacy of special medical treatment, medicines, instrument, staff, ambulance van, antidotes, Toxicological data, medical

emergency.

- (11) Adequate Resources and Mobilisation of Resources.
- (12) Responding Actions (Specific duties during emergency), Implementation, monitoring and Evacuation of Action Plan.
- (13) Procedure for Withdrawal of emergency and declaration.
- (14) Relief and Rehabilitation.
- (15) Education, Training & Mock-Drill/Exercise, To develop emergency Responder safety and Training Guidelines. Improving the capacity for and effectiveness of Off-site Mock-Drills. Developing specialized training course on integrated and coordinated emergency Response System.
- (16) Improvement in Chemical Emergency Management Planning and enhance chemical disaster response capacity.

2.12 EMERGENCY RESOURCES

Prompt availability of emergency resources is vital to mitigating an off-site emergency. The emergency resources required should be identified with the sources of their availability and means to call for them.

- (1) Emergency Response Vehicles.
- (2) Transport, Transport route, Assembly Points and Sheltering.
- (3) Emergency Communication Equipment & Media Resources.
- (4) Technical Resources, Technical Experts, Material Safety Data Sheets.
- (5) Availability of adequate quantity of neutralizing agent, type, use, precaution, transportation, etc.
- (6) Toxicological Information, Medical Aid, Special Medical Treatment & Antidotes and Suppliers.
- (7) Details on Emergency services, Fire, Police, Medical, etc.
- (8) Special Equipment including Fire Fighting materials, damages control, repair items, Evacuations arrangements.
- (9) Details on availability of Resources with MAH Units and Mutual Aiders, etc.

- (10) Trained Persons, in first Aid, Evacuation & Rescue, Emergency control system, specialized work (Welding/Cutting operations).
- (11) Storage and Supply resources, like water, Fire Fighting, rescue, emergency equipment, vehicles, materials, etc.
- (12) Longer Term Clean up.

2.13 SUB-COMMITTEE OF DCG FOR GRAVE INCIDENT

The separate sub-committee can be constituted as per large scale grave situation of chemical accident, as per suggested as below;

2.13.1 Management Group

- a. Unit Head / Chair Person;
- b. Members; consist of: Commandants from Police, Fire, Medical, Health; (Emergency services)
- c. Member Secretary,
- d. Expert persons,
- e. Site Main Controller of the affected unit,
- f. Information Officer,
- g. Municipal Commissioner,
- h. District Development Officer,
- i. I/Central Control Room,
- j. Chair Person of LCG, etc.

2.13.2 Working Group; consist of

Task Force - consisting of work-force from Police, Fire, Medical & Health Departments and other organisations.

- RTO
- GPCB- Officer
- Incident Controller from affected Unit
- Volunteers Group, etc.

2.14 DISTRICT EMERGENCY CONTROL CENTRE (DECC) & OFFSITE EMERGENCY CONTROL ROOM (OIECR)

The District Emergency Control Centre (DECC) of Off Site Emergency Plan is situated at Disaster Control Room at Collector Office. At the time of Emergency, emergency services are activated by the District Emergency Control Centre (DECC) and by its communication network.

2.15 PROMPT AUTHORISATION, & COMMUNICATION

Prompt declaration for Off-site Emergency, instantaneous communication to all the Responders in order and priority of their role in the emergency and implementation of the plan in letter and spirit can help to bring the benefit of the Off-site plan in mitigating the effect of a disaster.

The responsibility for prompt declaration of Off-site Emergency lies with the District Collector. The District Collector shall declare emergency. Simultaneously, he will communicate by telephone/other communication media to the emergency services/ members/responders such as Police, Fire, Medical, Hospital, Technical Experts, Transport Service providers among others so that they may initiate response actions.

2.16 EMERGENCY SCENARIOS AND VULNERABLE ZONES

Major industrial hazards are generally associated with the potential for toxic chemical release, fire, or explosion. The assessment of possible incidents for M.A.H. Units are indicated and Consequence Analysis is given at Appendix-B.

2.17 DISCHARGING & CO-ORDINATION BETWEEN DESIGNATED PERSONS

It is of utmost importance that all authorities and stakeholders involved in emergency mitigation discharge their roles and responsibilities in better and spirit.

2.18 NOTIFY TO PUBLIC

The type of emergency, its gravity, effect, duration, wind direction, etc details shall be announced to the surrounding public of the Unit on public address system; from the authorised person to reduce confusion, rumours, problems, etc. The following matters shall be considered;

- (1) Compile a list of Telephone Numbers/ Contact Numbers of local radio and television station personnel, who can initiate special “On Air” announcement on urgent basis.
- (2) Establish a firm policy among all local officers/members and responders as to who should or should not speak to media personnel or public in respect of emergency situation.

2.19 RESOURCES & COORDINATION

Resources both material and intellectual are required to mitigate the possible effect of an emergency scenario. It is therefore prudent to begin with emergency response planning for most critical emergency scenarios. The required resources are to be adequate, workable with knowledge, how to use and apply, availability of additional quantity, etc, at the time of emergency. Further, it shall be constant touch with providing developing situation and feedback to the authorities simultaneously. Response shall be followed co-ordination with other members and speedy.

CHAPTER 3 MAJOR ACCIDENT RESPONSE PROCEDURE

3.1 INTRODUCTION

It is observed that the response strategies for natural disasters and chemical disasters are essentially different. The Administrative authorities may be the same in some regards.

Chemical Emergency poses to the specific challenges to the management. Meticulous role playing and effective discharging of responsibilities are crucial to the management of Off-site Emergency. It is important that the concerned authorities, officers or agencies know, understand and accept their responsibilities over and above their regular responsibilities. Therefore, the authorities, officers or agencies should perform all such tasks as per demands of emergency situation on hand. Further; Chemical emergency management additionally requires participation from industrial units and technical expert agencies also. The role of authorities is more in scope, when it concerns chemical emergency.

The most important part of response is prompt and well prepared actions by emergency services & designated persons (Members) of the DCG/LCG, so that the incident can be control immediately and causalities or damages will be minimise or remain under control.

It is not possible to include and discuss every action, which should be taken first during emergency. It is also not possible to describe entire actions on emergency situation, because of the different situation in each chemical incident. The basic principle of handling emergency, that may be relied upon, who have the knowledge and experience to assess the situation and give direction as per the objectives as quickly as possible. Some times, it is a natural gift and it is an art by heart. However, the aim is to control the situation by safest way in a limited time within existing available resources.

Further, it should be handled with such a care that minimum loss of life, property and environment. In short, the objectives of the plan should successfully comply with.

Further, response time will differ for different chemical emergency of industries depending upon many affective factors, like; quantity, fatality, meteorology of the region, handling and controlling methods, etc.

No body should wait for others, immediate actions with available resources or if required call more specific resources with immediate effects, should have started without delay. Further, the working groups should report the development of incident time to time, to the authorities and keep them informed the actions completed or actions are on hand etc. The liaison and coordination with all working groups are important factors during response time.

3.2 TEAM COORDINATION & LIAISON

Designated persons/Members (Response teams including emergency services) of DCG have to workout detailed response procedures on their role & responsibilities with existing infrastructures, manpower, resources, prevailing practices etc.

Further, certain thumb practices shall be adopted during response period, as some of illustrated below:

- (1) A senior and expert person from each services is to be made responsible for inter/intra agency coordination.
- (2) First assess the situation/type of incident- scale for Grading of chemical grading(as per Annexure-19), then arrange minimum time taken for responding actions by physical presence and operation of the designated mobile hardware, equipments, manpower, resources etc.
- (3) Proper communication facilities between different designated persons for proper flow of information and review/improvement.

- (4) Police-officer will take overall charge at the site/off-site situation, until arrival of the District Collector or his representative at the scene.
- (5) RTO has to make promptly transport arrangement, if evacuation necessary.

3.3 INCIDENT REPORTING PROTOCOL

Generally, most chemical emergency may happened at the odd-time and the appropriate authorities get the authentic information vary late, so required helps could not reach in time. In this circumstance, first information reaching in time is important factor. The Site-Main Controller or responsible person from affected installation/MAH Unit or any other responsible person from neighbouring industries or Chair Person of LCG, OR lay-man will immediately inform to the DCG Authorities, either to Fire, Central Control Room, District Collector, Police, or Directorate of Industrial Safety & Health., with at least following details, if possible:

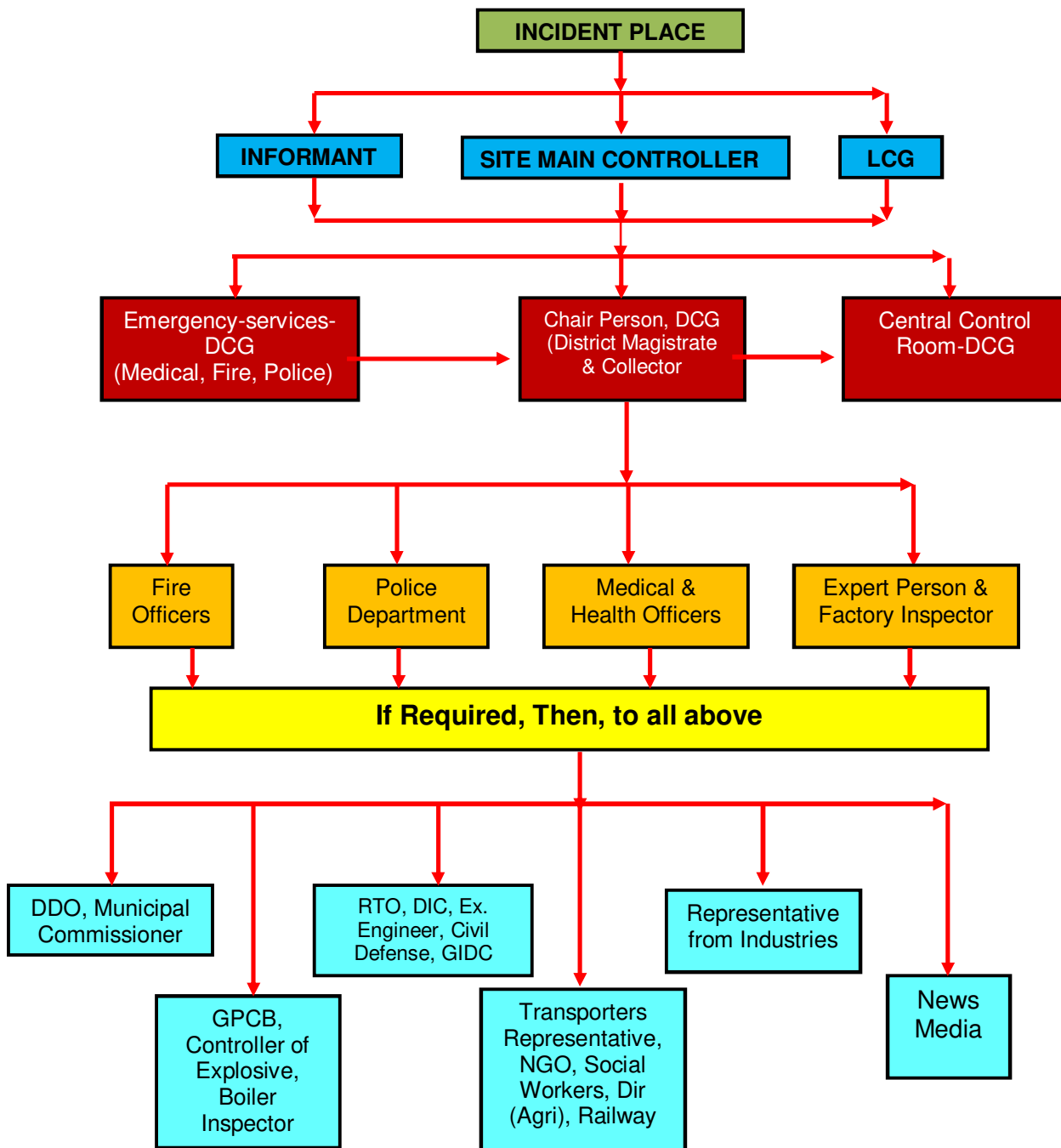
- a. Identify himself by name, designation & organization
- b. Location of incident (Plant, Section Department)
- c. Involvement of chemical(Name of probable chemical)
- d. Provide the type of chemical emergency (Fire, Gas leakage, Liquids spreading, Explosion, etc)
- e. The type of actual help & resources required.

The Format for communication during emergency is given at Annexure-20.

It is also possible that any other person who see/ hear the fire/ explosion incident and informs the police or fire, before they receive call from the affected unit.

If Local Crisis Group involved and if incident could not controlled by them, chairman/responsible persons from LCG will communicate immediately to the DCG-Authority.

The information receiving officer/person will confirm the said news and communicate to Chair Person-DCG & other emergency services and mobilise to the incident place. This part is said as message-protocol and it is the origin of the activating Off-site Emergency Plan.



3.4 APPROACHES TO CLASSIFYING CHEMICAL ACCIDENTS

When any chemical accident strikes at the industrial units or during transportation, the first step is to identify such incident in common terms, as given below:

1. Type of chemical involved and state (Liquid, Gas, Solid, Powder, Lump, Compressed substance).
2. Type of Incident (Fire, Gas Dispersion, Explosion, Liquid spreading, Collapse of structures, Falling, Bursting of vessel, inhalation of toxic/poisonous gas, etc.)
3. Source of release and maximum storage quantity.
4. Size of area contaminated or to be contaminated
5. Numbers of people exposed to at risk at the site.
6. Routes of exposure/dispersion
7. Medical Consequences
8. Contact person with phone or mobile numbers.

In chemical terms, type of groups means;

- (1) Flammable
- (2) Toxic
- (3) Corrosive
- (4) Poisonous
- (5) Explosive, etc.

3.5 ANATOMY OF EMERGENCY

Important elements of handling and controlling the chemical accident are recognition and gravity of incident and specific responding actions. Anatomy of emergency may vary depending upon the seriousness of the incident. However, the general phases of anatomy of chemical emergency can describe as below;

1. Reporting Protocol:
 - Recognition of type of chemical incident;

- Gravity of incident/quantum of chemical involved;
 - Place and location of incident;
2. Type of proposed responding actions and directed to emergency services
 3. Responding phase;
 4. Recovery, rehabilitation & reconstruction phase.
 5. Conveying and Reporting to higher Authority.

3.6 EMERGENCY RESPONSE ACTIVITIES

1. Warning,
2. Evacuation/Mitigation
3. Search and Rescue
4. Assessment,
5. Emergency Relief
6. Logistics and Supply
7. Communication & Information Management
8. Medical Camp Arrangement, Ambulance, etc
9. Survivor Response and coping
10. Security
11. Coordination
12. Expedite Rehabilitation & Reconstruction
13. Reporting
14. Declaration of all clear, after confirming situation under control, etc.

3.7 DECLARATION OF OFF-SITE EMERGENCY & ENFORCEMENT OF PLAN

On receiving information on chemical accident, the first respondent (Fire/Police) will immediately deploy first batch of response team to the location. On assessing situation and after discussing with SMC, Emergency Services, Expert persons, Dy. DISH, etc Chair person (District Collector) of DCG will declare EMERGENCY for particular area, accordingly announcement will follow.

On assessing situation, they will further reinforce their teams by deploying additional resources pooling from surrounding area so that effective first response can be redial at site. In the meantime, they will keep inform with details, to the District Collector; DCG, Central Control Room, and other authorities, and along with asking additional requirement of resources in terms of manpower and equipment etc. The responsibility and power of declaring the off-site emergency in the district vest with the District Collector.

3.8 WARNING SIREN

To establish a warning system for different level of emergencies, it is important to note that warning tones of siren for emergency purpose must be distinct from normal usage by the Industries for begin/end of shifts. Suggested modes for emergency purpose are:

- a) For accident scenarios having off-site consequences — short outbursts of 5 seconds for 2 minutes.



- b) For All-Clear signal: A long siren of 2 minute duration.



3.9 RESPONSE BY DESIGNATED MEMBERS OF DCG

On recognising the type of Chemical accident, the responding actions or line of actions follow by command structures according to the procedures as laid down. The major active parts on handling & controlling of emergency are soldier by emergency services with consent by Chair Person of DCG. The passive actions supported by various members of DCG as directed by Chair Person of DCG. The suggested responding actions by different key designated persons are explained as below.

3.9.1 Chair Person DCG, (District Magistrate & Collector)

On receipt of information on the chemical accident, the Chair Person get further details from CCR/Emergency Services on the incident. In grave serious incident he will rush to the site. The chair person will confirm the news with Chair Person of LCG / Dy. DISH and Officer of Jt. Director Office, Vadodara, then consulting Dy. DISH, emergency services, SMC of unit, experts person and others, after assessing situation, he will declare “industrial emergency” & put in operation Off-site Emergency plan, and order to start response actions to the emergency services/designated persons etc. Ask central control room to get details time to time & report immediately. As development of situation and based on the inputs from the Emergency Services, and opinion by experts, SMC, members identify the requirement of additional and more resources, then Chair person will arrange to pool and mobilize such resources.

- Take over all responsibility for combating the Off Site Emergency.
- Ensure the Police & fire personnel combat the emergency.
- Direct the team of doctors headed by the medical officer.
- Direct the electricity board (MGVCL) officials to disconnect the power supply or to provide uninterrupted power supply as per required.
- Direct the PWD or municipal authority to provide uninterrupted water supply as required.
- Direct railways to stop train if required.
- Direct the GSTC to arrange for transport of victims and evacuated person, trapped within the hazard zone, if required.
- Arrange, if necessary for warning and evacuating the public, through the police department.
- Communicate with media to disseminate vital information to the public.
- Arrange for dispensing vital information to public using

arrangement like public address system by using pre-recorded taps, mass SMS.

- If evacuation of population is necessary, direct the revenue officer and supply officer to provide safe shelters, food and other life sustaining requirement for the evacuees, if required.
- Coordinate with the media.
- Arrange for release and provide necessary funds at various stages of disaster mitigation.
- Further, if evacuation required, then order to emergency services & transport and evacuation coordinators to carry out accordingly.
- Chair person will report to higher authority asking more resources to control such emergency if required.

Please refer the chart at Annexure-5.

3.9.2 Police Department: EMERGENCY SERVICES

On getting information from responsible person/lay man/Fire/CCR/LCG on the chemical accident, and as a first respondent and as part of emergency services, the Police officer will get confirm and deploy first team to start initial responding actions & assess the situation and report to the DC, CCR, Other Emergency Services.

- Communicate and coordinate with MAH unit, District collector, fire services, Medical Department, Civil defence and home guards etc.
- Regulate and divert the traffic.
- Maintain law and order in the area.
- Arrange for evacuation.
- Ensure protection of life and property of evacuees.
- Deal sternly with people exploiting opportunism in wake of a Disaster.
- Arrangement for emergency vehicles to move without obstruction to the incident site at the earliest.
- Report the situation, time to time to the authorities, DC, CCR, etc.

- The duty/ work as directed by Chair Person / CCR.
- List of Police Stations is given at Annexure-10.

Please refer the chart at Annexure-7.

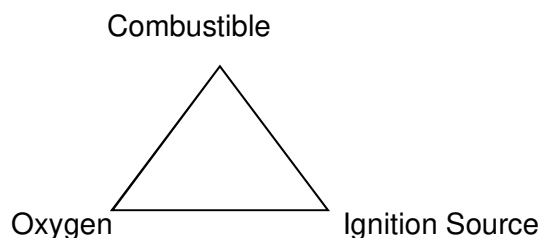
3.9.3 Fire Department: EMERGENCY SERVICES

As getting information from responsible person/lay man/ Police/ CCR/ LCG on the chemical accident/ Emergency and as first respondent as part of emergency services, the Fire service commandant will reach the site & assess the situation and report to the DC, CCR, Other Emergency Services and simultaneously start the necessary responding actions immediately under intimation to DCG/CCR.

However, the following general points on chemical accident are illustrated which shall be carefully considered before starting actions.

3.9.3.1 Fire Components

For a fire to happen, three components are required as depicted below :-



Cutting off the supply of any one of the above three components can help in getting the fire under control. Therefore the major activities that the fire team will undertake will be directed towards cutting off the supply of one of more of these components.

3.9.3.2 Removing the Source of Ignition

Water is the far most reliable source for extinguishing fires. However, it may not be applicable on substances, which are

lighter than water, insoluble in water or incompatible with water.

During the entire operations, the Leading Fire Men (LFM) would keep the fire service coordinator informed of the development so as to enable him to plan and deploy additional resources at the incident location.

- 3.9.3.3** Perform fire fighting operations by deploying adequate men and appliances.
- 3.9.3.4** Communicate and coordinate with police medical and district collector for intimating the situations.
- 3.9.3.5** Perform rescue operation in affected area.
- 3.9.3.6** Keep knowledge on appropriate response to deferent chemical emergency scenarios.
- 3.9.3.7** Keep adequate stock and recourse information on necessary means, material, appliances, etc. as required to deal with particular chemical emergency situation with updated details of suppliers and stockist.
- 3.9.3.8** List of Fire Stations is given at Annexure-9.

Please refer the chart at Annexure-6.

3.9.4 Medical & Health Services : EMERGENCY SERVICES

On receipt of information from the DCG (District Collector) or Central Control Room (CCR), the District Medical Commandant shall dispatch medical teams to the incident site under intimation to DCG, CCR, and other authorities. On reaching the emergency site, the medical teams will start the emergency activities, as per gravity of incident like:

a) Establishment of Triage Stations

Mass casualty situations will require establishment of field hospitals to take care for the injured and to identify, stabilize, and transport more serious cases to the base hospitals. Medical team will categorize the victims in the following manner at triage station:-

- **Red** for critical, such victims should to be sent to the hospital in the first available ambulance. Medical Officer manning the triage station will maintain a checklist for the number of victims sent to a particular hospital. Further, he can give status of the victims to their relatives.
- **Yellow** for stable, such victims need to be sent to the hospital when there is room available in an ambulance after all the critical victims have been sent.
- **Green** for walking wounded, to be provided with first aid and treatment for shock and trauma.

The registers shall be maintained separately for each type.

b) Medical Support for Response Personnel

It is presumed necessary, properly equipped medical personnel with one or more ambulances shall be made available to treat injured personnel as necessary. A register shall be maintained separately for such persons. Formation of quick response Medical Team (QRMS)

c) Base Hospital

Treatment, operation etc to the seriously injured person shall be carried out at the base hospital, as declared. Post mortem of dead body will be conducted at this hospital. Further, the arrangement of proper treatment on occupational disease as per toxicology shall be made. The register shall be maintained separately for such treated persons.

d) Medical Support at Temporary Shelters

Once the evacuees are at the shelter, it is the responsibility of local Medical coordinator to ensure their well-being. For this, the medical coordinator will assign team(s) to take care of people who become ill during evacuation or later. The doctors assigned this work should be aware of the signs and symptoms of

exposure to flammable/explosive material and smoke so that they can easily identify victims and provide them with necessary treatment & care. Facilities should also be available for care of the handicapped and elderly.

- e) Arrange for preparing casualties to be sent to Government / Private Hospitals.
- f) Keep knowledge on appropriate medical treatment with antidotes to different medical cases of toxic consumption and injuries, indoor and outdoor patient, casualties, etc.
- g) Set up temporary mortuary, identification of dead bodies and post- mortems.
- h) Management of Dead, Mass Care, creation of stationary and mobile Decontamination Facilities, Establish a chemical specify Medical Management Process, Creation of Trained Medical First Aid Responder(MFR)
- i) List of Hospitals, Ambulance, etc is given at Annexure-12.
- j) To maintain the Register of all patients, with timing, type of injury, reporting time, Address, contact number, etc.
- k) Electronic System for tracking EMS Units during major Disasters.
- l) Stocking for Antidotes and Chemical Causulty Treatment Kit.

Please refer the chart at Annexure-8.

3.9.5 D.D.O.-MEMBER

- Co-ordinate, extend help and requisite resources as needs to the District Collector.
- Mobilise necessary resources in emergency mitigation.
- Provide for community halls, shelters, other alternative arrangements for evacuees.

3.9.6 MUNICIPAL COMMISSIONER: MEMBER

- Co-ordinate, extend help and requisite resources as needs to the District Collector.
- Mobilise necessary resources in emergency mitigation.
- Provide for water supply, Town halls, Schools, shelters, other alternative arrangements in emergency mitigation.

3.9.7 MEMBER SECRETARY : Dy. DISH (FACTORY INSPECTOR)

- Provide necessary direction to MAH units and assistance to District Collector, Fire Department, Police Department, Medical Department among others.
- Seek help from and involve assistance of Technical Experts of relevant and appropriate expertise and specialization.
- Initiate, facilitate and provide for investigation into the industrial accident/emergency.

3.9.8 OCCUPIER OF EACH MAH UNIT

- Communicate promptly, any incident/disaster with complete details; to the District Collector, Police, Fire Services and Inspector of Factories in-charge of the District.
- Cooperate, Co-ordinate & provide necessary helps and facilities to the emergency services, DCG Authorities and other persons to handle and control the situation.
- Arrange and provide the necessary information on rescue and evacuation to surrounding public; if required, hospitalization to injured persons, information to the relatives of injured/death persons.
- Provision of clean up and rehabilitation, intimation to authorities, medical treatment, compensation, etc works shall be completed and report shall be submitted to the authorities.
- Any other details, information, facilities, equipment or PPE, other requirement, etc during the emergency will be provided by the management of The Unit.

3.9.9 Technical Expert Persons/Group

- Promptly respond to provide the necessary technical advice to MAH unit, District Collector, Dy. DISH (Factory Inspectors), Fire Department, Medical Department, among others.
- Provide on-phone help after properly understanding and assessing the situation.
- Make visit to the site in co-ordination with District Collector,

Dy. DISH (Factory Inspector) to provide for appropriate technical assistance.

3.9.10 CIVIL DEFENCE & HOME GUARDS

- Co-ordinate with Police authorities.
- Extend help in evacuation.
- Arrange for round the clock security arrangements in the affected and evacuation areas.
- Safeguard the properties and belongings of evacuees

3.9.11 MUTUAL AID GROUPS

- To quickly mobilize the resources by mutual aiders as required during emergency to mitigate at the site or wherever required.

3.9.12 Transport, CIVIL SUPPLY, Coordinator

- Act on the direction of District Collector or Police.
- Ascertain the extent of transport required with pick-points, routes and destinations to transport people.
- Promptly arrange for dispatch of vehicles with sufficient fuel for evacuation purposes. Arrange vehicles to transport water and the provision to camps set up.
- Communicate promptly, any foreseeable disaster during transportation to the District Collector, Police, Fire services and Inspector of Factories in-charge of the District.
- Communicate new assignments, newly added routes or other changes that may require inclusion or suitable modification in the off site plan to the District Collector (Maintenance Officer) of the plan.
- He will also be responsible for ensuring that any needed response equipment, material and personnel, are arranged promptly to the scene of an accident and for ensuring an adequate state of operational readiness, thus consolidating the management of all transport related activities.
- Arrange for the fleet of vehicles at a pre-designated location

so that they can shift the affected population to safer areas (Shelter/Rehabilitation Centres),

- Make coordinating efforts with vulnerable areas such as schools, hospitals, nursing homes, cinema halls, shopping malls, etc. for evacuation of people to safer places.
- He shall also be responsible for arranging the protective equipment, clothing, devices, and any decontamination and/or treatment supplies that may be required by ambulance personnel in an actual emergency.

3.9.13 MGVCL –(ELECTRICAL POWER) - MEMBER

- Arrange for uninterrupted power supply to the plant as required.
- Arrange for lighting; at temporary medical camps etc.
- Arrange for switching off power supply on request from District Authorities.
- Take care of electrical equipment within the damaged zone.

3.9.14 G.P.C.B. - MEMBER

- Project likely areas to be polluted.
- Carry out pollution assessment at suspected locations including soil, river and air assessment.
- Ensure controlling of long-term pollution damage.
- Identify unidentified substances, chemical releases, if any.
- To survey the entire area on declaration of emergency over, weather area is safe or not for re-entry/rehabilitation.

3.9.15 PESO (Petroleum & Explosive Safety Organisation)- MEMBER

- Promptly respond to provide the necessary technical advice to MAH unit, District Collector, Police Department, Fire Department, Medical Department, among others.
- Provide on-phone help after properly understanding and assessing the situation.

- Make visit to the site in co-ordination with District Collector, Technical Expert, Dy. DISH (Factory Inspector) to provide for appropriate technical assistance.

3.9.16 NGO Coordinator - MEMBER

- Act as per the direction of DEA, Police and other District Authorities
- Aid and assist the district authorities in emergency mitigation.

3.9.17 MEDIA Coordinator

- Disseminate vital information to public on direction of DEA, Police and other Authorities.
- Act responsibly in disseminating vital information and dispel rumours, if any.

3.9.18 OTHER MEMBERS

- The other members have to perform their duties, as on need base or as order by Chair Person or DCG.
- Assist and act as per directions of the District Collector.

3.10 GENERAL INSTRUCTION TO THE PUBLIC

3.10.1 In case of a major chemical emergency may affect areas outside the works/factory-premises, the surrounding public will be alerted with public address system/ otherway by Police or Government Authorities or nearby industrial concerns. The siren / hooter will blow, to indicate arising the emergency situation.

3.10.2 Announcement will indicate type of emergency arise, if possible to hear or start the Radio / TV for further instruction & act accordingly. the public have to take prompt actions to protect them-selves and rush to the safe shelter as instructed by the authority.

3.10.3 Public warning can be done by:

- Clarion bell (Domed Brass bell) mounted on Jeep

- Public address system mounted Jeeps; Pre-recorded cassettes/CD can also be used. It should address the type of emergency, what they should do and where they should reach (Safe location).
- Siren installed in the city area should be blown.

1. SIREN CODE

1.	Continuous wailing high-pitched blow for "2 minutes"	Emergency
2.	Continuous blow for "2 minutes"	All Clear

3.10.4 First of all to ascertain/confirm which type of emergency arise:

- Fire
- Explosion
- Gas Leakage / Release
- Collapse of Building, Bursting of Vessel etc.
- Natural Calamities

In case of Gas Leakage/dispersion type chemical incidence, then to know the type of gas, whether flammable, toxic or poisonous?

3.10.5 The following actions are suggested as per prevailing situation: Otherwise follow the instruction as issued by the authority;

3.10.5.1 Flammable Gas

1. Be calm, don't get panicky.
2. Do not light Bidi / Cigarette / Lighter etc.
3. Shut down open flame, gas, and electrical instruments or any source of ignition.
4. Do not move any vehicle in the area.
5. Do not go near the incident & don't allow any others.
6. Shut down the windows, doors etc & seat open ground or terrace.
7. Follow the instruction as directed by the authority.

3.10.5.2 Toxic or Poisonous Gas

1. Cover your nose with wet hand kerchief / cloth and breathe through it.
2. Come out in open, check the wind direction and move away quickly in perpendicular direction of wind. (cross wind direction)
3. Immediately go & try to get to a higher elevation, if gas is heavier than air (like chlorine, as it settle in low lying area).
4. Follow the instruction and reach safe shelter as instructed notified by Government Authority or Public authority.

3.10.5.3 General Instruction

(A) DO'S

- a. Listen radio, T.V. or Public Addressing System.
- b. Emergency will be communicated by public addressing system /TV/ Radio or siren (Siren-code wailing sound for one minute).
- c. Follow the instruction & convey to others accordingly.
- d. On announcement of withdrawal of emergency or clearance Siren, start your routine work.
- e. On enquiry, deposit your statement as required by authority at the time of investigating the incident.
- f. Co-operate, Help and Assist the person(s) / authority handling the emergency and rescue operation.

(B) DON'T

1. Do not get panicky, be calm.
2. Do not approach the site of incident as a spectator.
3. Do not approach unnecessarily for information or more enquiries.

4. Do not allow unnecessarily crowd nearby incident place.

5. Do not believe in rumours unnecessarily.

3.11 GUIDE LINES ON RESPONSE

3.11.1 SCALE OF RESPONSE

Scale of Response depends on following:

1. Lead Time Available.
2. Intensity of Hazard.
3. Duration
4. Special Extent.
5. Density of Population & Assets,
6. Time of Occurrence,
7. Vulnerabilities existing in the Elements at Risk,
8. Hazard X Vulnerability =Emergency, etc.

3.11.2 Following Elements at Risk

1. People
2. Live Stock,
3. Rural Housing Stock,
4. Houses Vulnerable
5. Crops, Trees, Telephones, Electric Poles, Cables, etc.
6. Boats, Looms, Working Implements,
7. Personal Property.
8. Electricity, Water, food, etc Supplies,etc.

3.12 PROFILE OF INFORMATIONS

Different details are most useful during emergency period and these are collected during pre-emergency period and updated time to time. Further, it is suggested to ensure the correctness of the information given at the stage.

3.12.1 MAP:

Map of Vadodara District, indicating industrial pockets is given at Annexure-1.

3.12.2 EMERGENCY CONTACT NUMBERS:

Emergency telephone, mobile, contact numbers of various departments, emergency services, etc are given at Annexure-2.

3.12.3 METEOROLOGICAL INFORMATION:

General prevailing weather details are given at Annexure-14.

3.12.4 LIST OF M.A.H. UNITS:

The registered factories, and identified as M.A.H. Units as listed according to industrial pockets and the major chemicals stored by the units; are given at Annexure-4.

3.12.5 M.S.D.S. & SALIENT PROPERTIES OF CERTAIN MAJOR CHEMICALS:

M.S.D.S. of certain typical selected hazardous chemicals are given. Further, salient properties of certain most hazardous chemicals are provided as reference purpose.

3.12.6 CHARTS -COMMAND AND CONTROL

Charts indicating process of information, messages, command and control for each emergency responsible designated persons are given at Annexure-5,6,7,8, for reference purpose.

3.12.7 LISTS:

The list of fire stations, police stations and offices of different emergency services as well as other related persons are given as per following:

1. Fire-Stations – Annexure-9.
2. Police stations- Annexure-10.

3. Hospitals/Dispensary, Ambulance, Blood-Bank-Annexure-12.

3.12.8 OTHER DETAILS

The details required during handling of emergency to control the hazardous chemicals included as per following.

1. Care for safe handling of certain chemicals-Annexure-15.
2. Details on specific neutralising Agent and required P.P.E./Safety Equipment, Environment monitoring Equipment.
3. Standby arrangement of Tanks/vessels/containers with required type of transferring equipment/machineries/ pump-sets, access ladders, pipe lines, etc.
4. Special medical & burns treatments and antidotes-Annexure-16.
5. Management of Dead and mass care
6. Response Actions in case of Chlorine Leakage. Annexure-17.
7. Colour code system of pipelines-Annexure-18.
8. Survey of probable chemical accidents at M.A.H. Units located in industrial pockets.
9. Glossary of terms and Definitions- Annexure-24.
10. Some major accidents in India is given in Annexure-19.

3.13 CALLING OFF EMERGENCY

When industrial emergency is controlled and all clear signal received, District Collector shall declare the call off the emergency.

3.14 INVESTIGATION STUDIES AND REPORTING

District Collector will appoint a committee constituting the members, who may be carryout thorough investigation into the emergency as well as introspection of the response actions and measures.

3.15 MOCK DRILL

Mock Drill is exercise to test the effectiveness of plan. The lessons drawn from Mock Drill must be used to improve the plan. The list of conducted mock drill is given at Annexure-22.

3.16 REVIEW & AMENDMENT OF PLAN

The Off-site Emergency Plan is a dynamic document and must at all times reflect the ground realities by changing when these change. The members of the plan under going change in positions or having changed their phone numbers or mobile numbers shall be intimated the same to the District Collector.

3.17 GUIDELINES ON PREPAREDNESS AND RESPONSE (GENERAL CHECK LIST)

1. Vulnerability Assessment
2. Dissemination of Warning
3. Emergency Response Activities
4. Coordination
5. Rapid Damage Assessment
6. Maintenance of essential Services
7. Stocking of essential Commodities
8. Medicines
9. Drinking Water
10. Shelter/Camps
11. Community Participation
12. Evacuation Plan
13. Activating EOCs
14. Search & Rescue Teams
15. Identification of Nodal Officer
16. Status of SDRF
17. Preparedness Drill, etc.

CHAPTER 4

VADODARA DISTRICT

4.1 VADODARA DISTRICT

Vadodara District is situated on middle part of Gujarat State. Vadodara is oldest city famous for educational institutions. Giant Industries, like; Reliance Industries Ltd., Gujarat Refinery (IOCL), GSFC, GACL, etc. are situated in the District. Vadodara is one of India's foremost industrial centre; as contributing several factors like; availability raw materials, products demand, skillful mobilisation of human, financial and material resources by the Government and private entrepreneurs. Further, the establishment of large industrial units in the region automatically brings into existence of number of smaller enterprises. Vadodara City is located on the banks of the Vishwamitri river. Mahi and Narmada Rivers are located at the boundary of the District. The District consists of 8 Talukas, as Desai is new Taluka bifurcated from Savli Taluka. Vadodara is capital of District and is centrally located in the District. Vadodara also has an airport which is very well connected with the other major airports of the India. Vadodara has modern type ST Bus Station.

The surroundings of the District are given below;

<i>North Side</i>	:	<i>Kheda District, Panchmahals District, Dohad District</i>
<i>East Side</i>	:	<i>Chhotaudepur Dist., & Jhabua of Madhya Pradesh State.</i>
<i>South Side</i>	:	<i>Bharuch & Narmada Districts and Dhule of Maharastra State</i>
<i>West side</i>	:	<i>Anand District, Bharuch District, Khambhat- slit</i>

Vadodara is connected by following Railway Broad Gauge lines.

1. Western Railway – Ahmedabad –Mumbai line.
2. Central Railway – Godhara- Delhi line.

Vadodara is connected by Railway Stations, like - Ranoli, Bajwa, Vishvamitri, Samalaya, Varnama, Miyagam- Karajan etc.

Most of cities and Villages of the District are connected by National Highways, State highway, Village roads, local roads, Railways,& air. Vadodara is connected different parts of India by major roads, as per below:

- Golden corridor-No.1 - Express Highway No-1 - Ahmedabad-Vadodara.
- National Highway No.8 - Ahmedabad to Mumbai
- Vadodara to Halol Expresss way .

The several Industrial Estates are located in the District, as major are as below;

Sr. No.	Name of Industrial Estate	Place / Area
1.	Petrochemicals Notified Area	P.C.C. Area
2.	GIDC Industrial Estate- Makarpura	Makarpura
3.	GIDC Industrial Estate- Nandesari	Nandesari
4.	BIDC Industrial Estate, Gorwa	Gorwa
5.	GIDC Industrial Estate- Ranoli	Ranoli
6.	GIDC Industrial Estate- Savli	Savli
7.	GIDC Industrial Estate- Dabhoi	Dabhoi
8.	GIDC Industrial Estate – Por-Ramangamdi	Por
9.	GIDC Industrial Estate- Waghodia	Waghodia
10.	Sardar Industrial Estate	Ajwa Road
11.	Horizon Industrial Park	Por-Ramangamdi
12.	Shiv Industrial Estate	Lamdapura
13.	Shah Industrial Park	Manjusr
14.	Shah Industrial Park	Kotambi
15.	Siddhi Industrial Park	Waghodia

Further, varoius manufacturing activities/processing are developed in the following areas:

- (1) Padra- Jambusar Road Area.
- (2) Vadodara Savli Road Area
- (3) Vadodara- Halol Road area.
- (4) Dabhoi, Bodeli area.
- (5) Waghodia road area.

(6) National Highway No.8 towards Karjan area.

(7) Maneja, Kalali, Atladara area, etc.

The various types of manufacturing units are working in the District, like; Refinery, Engineering, Petrochemicals, Pharmaceuticals, Fertilizers, Dyes Intermediates, Chemicals, Electrical, Plastics, Pesticides, etc.

4.2 **GENERAL DETAILS OF THE DISTRICT-VADODARA**

1.	Total Population	30,94,959 (As per Census , 2011)				
2.	North Latitude	21° - 49’ and 22° - 49’				
3.	East Longitude	72° 51’ and 74° 17’				
4.	Altitude	35.5 Mts. Above Mean Sea Level				
5.	Demography	Sr. No.	Name of Taluka	No of Villages	Population (Census 2011)	Distance from Vadodara In K.M.
		1.	Vadodara	94	20,09,434	-
		2.	Padra	82	2,65,901	15
		3.	Waghodia	94	1,49,914	18
		4.	Savli	91	1,83,570	26
		5.	Dabhoi	118	1,80,518	29
		6.	Karjan	93	1,67,579	32
		7.	Shinor	40	65,440	41
		8.	Desar	45	72,603	53
			Total			30,94,959
6.	Mahagagar Palika and Nagarpalika	i. Vadodara Maha Nagar Seva Sadan ii. Savli Nagar Seve Sadan iii. Padra Nagar Seva Sadan iv. Karjan Nagar Seva sadan v. Dabhoi Nagar Seva sadan				
7.	Major Rivers	Mahi, Hirang, Mini, Vishwamitri, Narmada, etc.				
8.	Average Annual Rain Fall	40 Inch				
9.	Weather Condition	The Weather details are given at Annexure – 14.				
10.	Distances to Vadodara	From Delhi=1014 Km, Mumbai=415 Km, Ahmedabad=110 Km, Gandhinagar = 139 Km				

4.2.1 MAP OF THE DISTRICT

The map of the Vadodara District is given at Annexure -1.

4.3 WEATHER DATA

Meteorological detail of Vadodara District is given at Annexure-14.

4.4 MAH INDUSTRIES IN VADODARA DISTRICT

There are 67 M.A.H. Units in the District; as identified by the DISH-Office. The following different LCG are located in the Vadodara District according to industrial growth and location of M.A.H. Installations/Units;

Sr. No.	LCG Group	No. of MAH Units
1.	Vadodara – Nandesari - PCC	34
2.	Padra	18
3.	Savli	15
	Total	67

Total Nos of LCG in Vadodara District : 3

Total Nos of M.A.H. Units in Vadodara District : 67.

Working Nos of M.A.H. Units : 64.

Closed Nos of M.A.H. Units : 3

4.5 OTHER HAZARD PRONE AREA IN THE DISTRICT

Further various chemical/Hazardous industries/units other than above identified as M.A.H. are working in the District, which are identified as Chemical Hazardous category; A. B. & C Types factories. Further, Fuel Pump Station, LPG Cylinders Depot, Pipe lines U/G, Railway Wagons & sidings, storage godowns of hazardous chemicals, Restorants/Hotels, etc are most fire prone area. Further, road transportation of hazardous chemicals by Tankers/Trucks/Containers; etc may pose to fire or toxic hazard during moving on road.

CHAPTER 5 CHEMICAL CRUNCH

5.1 GENERAL

Chemical means a basic structure that used in chemistry or produced by chemistry. Hazard means something that is dangerous

- (1) Fire Hazard,
- (2) Toxic Hazard
- (3) Explosion Hazard
- (4) Health Hazard,
- (5) Occupational Hazard

Further, Chemicals have different properties like; Fire, Explosion, Toxic, Corrosion, Poisonous, Reactive, etc. Hazard is the existence of a situation that can potentially lead to Emergency/Disaster.

The large numbers of industrial units are engaged in manufacturing various chemical-products and they are storing, handling, & using large & bulk quantities of different hazardous chemicals. It has also resulted into the heavy transportation & movement of hazardous chemicals by vehicles; like; tankers, trucks, carriers, Lorries, etc. on road/rail. Further, different gases or certain liquids are transferred by pipe lines also.

Chemical accidents/disasters may occur due to process deviations concerning the chemistry of the process, pressure, temperature or other identified parameters with regard to the state of substance i.e. solid, liquid or gas; proximity to other toxic substances and probability of runaway reaction due to the incidental mixing of two or more hazardous chemicals with dissimilar properties.

In addition, it may be due to hardware failure, resulting in large-scale spills of toxic substances (in any form) due to loss of containment, or an explosion. Further, Boiling Liquid Expanding Vapour Explosion may occur due to any source of ignition (like any type of spark, shock, frictional force etc) on the chemicals during transportation.

The effect can be further compounded by micro-meteorology of the area, wind speed and direction, rate of precipitation, toxicity/quantity of chemical released, population in the reach of release, probability of formation of lethal mixtures and other industrial activities being performed in closure vicinity.

It is very important to understand that the state of the chemical substance (solid, liquid or gas) contributes substantially to the gravity of the accident and affects control measures.

The Off-site Emergency Plan identifies the hazards that can lead to a chemical Emergency/Disaster. The hazards identified are primarily the MAH Installations including isolated storages. However, hazards are not restricted to MAH Installation alone.

The release of compressed gas gives rise to thermal and cryogenic stresses, which may also impact the surrounding structures or building, compounding the damage.

Any human/mechanical failure may cause large scale spills of liquids or of compressed gases like Chlorine or Liquefied Petroleum Gas (LPG), which can directly affect human lives and the environment.

5.2 PROPERTIES OF CHEMICALS

General Chemical Hazards of the chemical substances are

1. Combustible
2. Flammable
3. Explosive
4. Toxic

5. Corrosive
6. Poisonous
7. Reactive
8. Radio Active
9. Oxidising, Reducing, Decomposing, Incompatible, Carcinogens, and other Hidden hazards.

Chemical Substances pose to material or property hazards. In process, chemical and physical change, chemical Reaction, Pressure, temperature, level, flow, quantity and other parameters create process hazards. The vessels and equipment in which the chemicals are stored, handled or processed, pose vessel hazards. The inadequate, defective, under designed or wrongly modified control devices or failure thereof cause control hazards. Fire and Explosion causes fire hazards. Effluent disposal and gaseous emissions bring pollution and toxic/fire hazards. Leaks, spills and splashes cause handling hazards. Absence, non-use of or failure of Fire Equipment, Personal Protective Equipment, Emergency Control Devices reveal accident and emergency hazards. All other unsafe working conditions and unsafe actions pose a variety of hazards, that all need to be prevented and controlled.

5.3 HAZARDOUS CHEMICALS

The total nos. of Hazardous Chemicals by name are 684 in part-II, and Part –I provides as Indicative Criteria of chemicals by properties of Toxic, Flammable, Explosives; as provided in the “Manufacturer, Storage or Import of Hazardous Chemicals- Rules-1989(2000)”. Similarly, The list of Hazardous Chemicals by name are 432 by name Part –II, and Part-I provides similar indicative criteria of chemicals by properties of Toxic, Flammable, Explosives as provided in the “Gujarat Factories Rules-1963 (2004)”, and “Chemical Accidents (Emergency Planning, Preparedness & Response) - Rules- 1996”. Thus, certain hazardous chemicals; as identified by names as per above Rules, alongwith United Nations’ Numbers, C.A.S. Nos.; and

Hazardous Classification are given in the Table below;

TABLE

Sr. No.	Major Hazardous Chemical	UN No.	CAS No.	Schedule-I of Rule 68-J of GFR1963 (2004)	Schedule-I of MSIHC Rules 1989 (2000)	Schedule-I of CA (EPPR) Rules - 1996	Hazard Classification
1	2	3	4	5	6	7	8
1.	Acetic Acid	2789	64-19-7	-	2	-	Combustible & Corrosive
2.	Acrylonitrile	1093	107-13-1	6	12	6	Flammable & Poison
3.	Ammonia	1005	7664-41-7	16	31	16	Toxic
4.	Aniline	1547	62-53-3	21	37	21	Combustible & Toxic
5.	Benzene	1114	71-43-2	32	56	32	Flammable & Carcinogen
6.	Bromine	1744	7726-95-6	51	84	51	Toxic
7.	Chlorine	1017	7782-50-5	88	119	84	Toxic
8.	Chloro Methane	1063	74-87-3	105	132	101	Flammable
9.	Chloro Sulphonic Acid	1754	7790-94-5	110	136	106	Poison & Corrosive
10.	Cyclohexane	1145	100-82-7	125	161	121	Flammable
11.	Ethylene Dichloride	1184	107-06-2	198	271	194	Flammable & Poison
12.	Ethylene Oxide	1040	75-21-8	200	267	196	Flammable & Poison
13.	Formaldehyde	1198	50-00-0	209	285	205	Flammable & Corrosive
14.	Hydrogen	1049	1333-74-0	224	314	223	Flammable Gas
15.	Hydrogen Peroxide	2015	7722-84-1	-	318	-	Corrosive & Oxidizer
16.	Isopropyl alcohol	1219	67-63-0	-	334	-	Flammable
17.	Liquified Petroleum Gas (LPG)	1075	68476-85-7	243	347	242	Flammable Gas
18.	Methyl alcohol (Methanol)	1230	67-56-1	259	377	258	Flammable & Poison
19.	Mono Chloro Benzene	1134	108-90-7	97	128	93	Flammable & Toxic
20.	Nitric acid	2031	7697-37-2	-	423	-	Corrosive & Oxidizer
21.	Oleum	1831	8014-95-7	301	444	301	Corrosive
22.	Parathion	2783	56-38-2	315	466	315	Poison
23.	Sodium Cyanide	1689	143-33-9	363	569	362	Poison
24.	Sulphuric acid	1830	7664-93-9	371	591	370	Toxic & Corrosive
25.	Thionyl Chloride	1836	7719-09-7	387	620	386	Corrosive
26.	Toluene	1294	108-88-3	389	628	388	Flammable
27.	Vinyl Chloride	1086-	75-01-4	425	672	424	Flammable
28.	Xylene	1307	1330-20-7	429	-	428	Flammable

5.4 M.S.D.S.

The information on different properties of chemicals along with accurate and scientific hazard determination are provided in the Material Safety Data Sheet, as prescribed under Schedule- 5 under Rule- 68-J(2)(3) of Gujarat Factories Rules-2004. M.S.D.S. of Hazardous Chemicals shall be made available with all M.A.H. Units and made available with On-site Emergency Plan and at the time of emergency situation also. Material Safety Data Sheets of major chemicals stored, handled, processed or used by the chemical units in the District. The salient chemical properties of certain hazardous chemicals, used in the industrial Areas are indicated at the Annexure-4.

5.5 TYPE OF CHEMICAL ACCIDENT / INCIDENT

1. Toxic /flammable gas/vapour release as plume /puff from pipeline /fittings failures, tank ruptures, process vessels, etc. including flashing liquids stored above their atmospheric boiling point.
2. Dispersion/Spill of a toxic / flammable liquids.
3. Dispersion of toxic plumes and puffs. Fire:
4. Flash fire, Fire Ball, Pool Fire, Heavy Fire, Fire with Domino effect, etc.
5. Evaporation and dispersion of toxic vapours from liquid spill pools.
6. Ignition of flammable gases, vapours and liquids leading to fires.
7. Ignition of flammable gases and vapours leading to Unconfined Vapour Cloud Explosion (UVCE) on site and/or offsite.
8. Boiling Liquid Evaporating Vapour Explosions (BLEVE).
9. Mechanical / confined vapour explosion (CVE) including deflagrations (slow burning) and detonations (rapid burning).
10. Dust explosions.
11. Collapse of the structures / Buildings / Sheds.
12. Bursting of vessels/pressure plants/equipment, etc.

5.6 MAJOR CHEMICAL ACCIDENT (DEFINITION)

The definitions of word “Major Chemical Accident” or “Major Accident” are expressed as below:

5.6.1 MAJOR CHEMICAL ACCIDENT

An occurrence including any particular major emission, fire or explosion involving one or more hazardous chemicals and resulting from uncontrolled developments in the course of industrial activity or transportation or due to natural events leading to serious effects both immediate or delay, inside or outside the installation likely to cause substantial loss of life and property including adverse effects on the environment. -- Rule 2(f) of C.A.(EPPR) Rules -1996.

5.6.2 MAJOR ACCIDENT

“MAJOR ACCIDENT” means an incident involving loss of life or outside the site or ten or more injuries inside and /or one or more injuries outside or release of toxic chemical or explosion or fire or spillage of hazardous chemical resulting in “on-site” or “off-site” emergencies or damage to equipment leading to stoppage of process or adverse effects to the environment.

- Rule 68-J (1) (d) of Gujarat Factories Rules-1963 (2004).
- Rule 2(j) of M.S. & I. of H.C. Rules-1989(2000).

5.7 MAH CRITERIA

The industrial unit; where the quantity of hazardous chemical used for manufacture, process, store, handle is more than threshold quantity as specified in Schedule 2 or 3 of C.A.(EPPR) Rules-1996, is identified as Major Accident Hazards (MAH) Installation/Unit. Further, it is provided that each MAH Unit has to prepare on-site emergency Plan as prescribed under Schedule 8-A of Rule-68-J of Gujarat Factories Rules-1963(2004). Some of the chemicals indicating their threshold quantity are listed in table given below;

Threshold Quantity
Schedule 3 under Rule 68-J of GFR-1963(2004) and MSIHC –
1989 (2000)

Sr. No.	Group	No.	Chemicals	CAS No.	Threshold Quantity
1.	I	73	Parathion	56-38-2	100 Kg
2.	II	102	Acrylonitrile	107-13-1	20 Ton
3.	II	105	Ammonia	7664-41-7	50 Ton
4.	II	106	Bromine	7726-95-0	40 Ton
5.	II	108	Chlorine	7782-50-5	10 Ton
6.	II	120	Sulphur Dioxide	7446-09-5	20 Ton
7.	II	121	Sulphur Trioxide	7446-11-9	15 Ton
8.	III	140	Ethylene Oxide	75-21-8	5 Ton
9.	III	143	Hydrogen	1333-74-0	2 Ton
10.	III	144	Liquid Oxygen	7782-44-7	200 Ton
1.	V	1	Flammable Gases (LPG, Propane, etc)	-	15 Ton
12.	V	2	Highly Flammable Liquids F. P <23°C, BP>20°C	-	1000 Ton

5.8 TYPES OF CHEMICAL ACCIDENT/EMERGENCY SCENARIOS

Emergency preparedness is structured on maximum credible chemical accidents on chemical properties and maximum storage or process of the chemicals. However, it is pertinent to discuss the type and escalation of chemical emergency situation, which may arise from Liquid Flammable Material release or Toxic Material release. Major industrial hazards are generally associated with the potential for Fire, explosion, or toxic chemical release.

5.8.1 Flammable Substance Release/Spill

The following examples show how events involving flammable materials may need different planned responses:

- **A major fire but with no danger of an explosion, e.g. fire in oil storage tank:**

The hazards would be prolonged high levels of thermal radiation and smoke. It is unlikely that anyone outside the site would be affected immediately. Only houses close to and directly exposed to severe thermal radiation would need to be evacuated. In some cases, it might be desirable to evacuate those areas severely affected by smoke. Example of Fire: Pool Fire, Flash Fire, Jet Fire. Subsequent it may turn into Explosion.

- **A fire threatening a major item of plant or a storage tank containing hazardous materials:**

As a part of the on site assessment, the consequences of such an event should have been estimated and the area that it might be necessary to evacuate determined. Hence, the appropriate response might be to evacuate those potentially at risk.

- **A fire similar to (ii) above, but developing too quickly to allowing no time for evacuation:**

The best possible response might be to advise people to remain indoors away from windows and shielded from line of sight of fire. Evacuation should NOT be attempted if there is a significant risk that fireball or BLEVE could occur while the people were in the open.

- **Catastrophic**

For some major catastrophic events that occur without warning, it may not be possible to take prior emergency action. However, most such events are of very short duration. The role of emergency services would be to rescue and do medical treatment of the victims, extinguishing secondary fires etc. on emergency basis.

5.8.2 Explosion

Explosions may be variously classed as.

1. Chemical Explosions/Thermal Explosion,
2. Physical Explosions,
3. Mechanical Explosion,
4. Dust Explosions,
5. Electrical Explosions,
6. Nuclear Explosions, etc.

Explosions are frequently accompanied by fires with smoke/dusting and occur under similar circumstances. They may be sub-divided in to:-

1. Confined explosions in buildings, boilers, process plants, storages, Godowns etc.
2. Unconfined vapour cloud explosions.

Both confined and unconfined vapour cloud explosions usually originate in a leak of gas or vapour or vaporising liquid into the atmosphere.

Flammable gas-air mixtures have limits of detonability which have in many cases been determined and which lie within the flammability limits. On their sudden release to atmosphere through vents, leaks etc, they form clouds which will depend upon the released quantity, physical properties, wind velocity, readily spread over the site. As most of the hydrocarbons gases are heavier than air, they fill up pits, pipes, trenches and other low lying areas. An explosion will occur if such a mixture of hydrocarbon and air within certain concentrations come in contact with a source of ignition. The leakage shall be quickly isolated and shall be allowed to disperse.

5.8.3 Toxic Substance Release/Spill

The following examples show how events involving toxic materials may need different planned responses.

- **Slow or intermittent release/spill of toxic substance Through a leaking valve:**

It would be unlikely that any one outside the site would be severely affected immediately, although many of the notifiable substances have irritant properties or an unusual smell. If there were reason to foresee that the release would not be controlled quickly or would grow with time, it might be desirable to evacuate those people nearest to the site or release and most closely downwind of it, provided that this evacuation would, increase their safety.

- **A fire or mechanical damage that threatened an installation containing toxic materials:**

If the fire could not be controlled and there will likely to be a reasonable period before over pressurisation or plant failure can occur, evacuation might be appropriate. Once again priority should be given to those nearest the plant (in full directions) and those in an appropriate sector. (30°, downwind)

- **Rapid event with a limited duration e.g. The fracture of a component that could be isolated within a reasonable time:**

Incident that grow and are immediately controlled should warrant evacuation. Any toxic cloud formed would be limited in size and would be likely to drift past a particular spot relatively quickly. The best place for people in the area would be indoors, upstairs with windows and doors closed.

- **Massive release of toxic substance due to failure of large storage or process vessel or uncontrolled chemical reaction/Run away reaction.**
- **Loss of containment for a plant threatened by fire.**

5.9 **SOME FAILURE CASES AND CONSEQUENCES**

Some failure cases and consequences are given in the following table:

Sr. No.	Failure Cause	Consequences
1.	Flammable storage tank e.g. Hydrocarbon, HSD, Petrol, Acrylonitrile, Toluene & Benzene, Xylene, Solvent, Methanol, etc.	Fire, Smoke, Radiation Heat
2.	Toxic gas storage container/ tonner /tank- e.g. Chlorine, Phosgene, Ammonia	Toxic Gas Dispersion
3.	Toxic liquid storage Tank e.g. Sulphuric Acid, Oleum, etc.	Toxic Fumes or liquid spreading
4.	Flammable Gas Tank/ Tanker e.g. LPG, E.O. Propane, Propylene, etc.	Explosion, Blast, UVCE, BLEVE, Fire, Smoke
5.	Toxic Poisonous liquid Tank Acetic Acid, Sodium Cyanide, Carbon di sulphide, Hydrogen Fluoride, Aniline, Bromine, Sulphur Dioxide, Sulphur Trioxide	Poisonous gas Dispersion, Vapour, Fume, Cloud
6.	Tank Explosion containing gas like CO ₂ , N ₂	Deficiency of Oxygen or Asphyxiation.

NOTE: UVCE: Unconfined Vapour Cloud Explosion.

BLEVE: Boiling Liquid Expanding Vapour Explosion.

5.10 **LEVEL OF EFFECTS**

5.10.1 **TOXIC EXPOSURE**

The IDLH (Immediately Dangerous to Life and Health) concentration value is taken as the criterion for identifying vulnerability zone. Accidents giving rise to toxic clouds from each of MAH Units in the area need to be considered.

The calculation for consequence distances should be done for weather stability class D with wind speed of 3 m/s and also for class F with wind speed of 1 to 2 m/s. The circles with radii equal to the consequence distances should be drawn on the maps to indicate vulnerable zones for planning and preparedness purpose. The Toxic cloud arrival and departure time should also be indicated on the map of each circle.

5.10.2 Radiation & Burn(Pool Fire, Flare, BLEVE)

LPG or Hydrocarbon Vapour released accidentally will normally spread out in the direction of the wind. If it finds an ignition source before being dispersed below Lower Explosive Limit, a flash fire is likely to occur and the flame may travel back to the source of the leak. Any other flammable substances within flash fire are likely to catch fire and a secondary fire may cause various degrees of burn.

The following tables indicate the damage effect due to radiation.

Table – 1 - Damage Due to Radiation Heat Intensity

Radiation intensity (kW/m²)	Observed effect
1.2	Solar heat at noon
1.6	Minimum level of pain threshold
2.0	PVC insulated cables damaged
4.0	Sufficient to cause pain to personnel if unable to reach cover within 20 Seconds. however blistering of the skin (second degree burns) is likely; 0% lethality
6.4	Pain threshold reached after 8 Seconds Second degree burns after 20 Seconds
12.5	Minimum energy to ignite wood with a flame; Melts plastic tubing. 1% lethality in one minute. First degree burns in 10 Seconds
16.0	Severe burns after 5 Seconds
25.0	Minimum energy to ignite wood at identifying long exposure without a flame. 100% lethality in 1 minute. Significant injury in 10 Seconds
37.5	Sufficient to cause damage to process equipment, Severe damage to plant 100% lethality in 1 minute. 50% lethality in 20 Seconds 1% lethality in 10 Seconds.

5.10.3 **EXPLOSION**

It is assumed that everyone inside an area in which the peak over-pressure is greater than 0.1 bar will be wounded. This area is and will be represented by a circle drawn around the explosion centre and having radius equal to the (calculated) distance from explosion centre at which peak over-pressure =0.1 bar is expected.

Table -2-EFFECT OF OVER PRESSURE ON BUILDING/ STRUCTURE

Over Pressure	Effect
Psi.	
0.04	Loud noise (143 db); sonic boom glass failure.
0.15	Typical pressure for glass failure.
0.40	Limited minor structural damage.
0.50-1.0	Windows usually shattered; some window frame damage.
0.70	Minor damage to house structures.
1.0	Partial demolition of houses; made uninhabitable.
2.0	Partial collapse of walls and roofs of houses.
2.5	50% destruction of home brickwork.
3.0	Steel frame buildings distorted and pulled away from foundation.
5.0	Wooden utility poles snapped.
5.0-7.0	Nearly complete destruction of houses.
7.0	Loaded train cars overturned.
9.0	Loaded train box cars demolished.
10.0	Probable total building destruction.
14.5-29.0	Range for 1-99% fatalities among exposed populations due to direct blast effects.
Ref :	* These are peak pressures formed in excess of normal atmospheric pressure by blast and shock waves.
	Lees, Frank P. 1980. Loss Prevention in the Process Industries, Vol. 1. London and Boston: Butterworths.

5.11 **TYPICAL GAS DISPERSION**

The most adverse impacts are due to the toxic / flammable gas releases at ground level and in down-wind direction. Further, the basic dispersion equation for concentration from ground level release can be calculated from Gaussian Formula also

As per down-wind scaling law, the following tables give the gas dispersion for Ammonia, Chlorine & LPG.

Table – 1: Ammonia Gas Dispersion

Considering Wind Velocity V = 2.3 Meter / Second			
Sr. No.	Mass Release in Tons	Range of Evacuation in Meters	Time required for contaminated air to reach in minutes
1	1	230	1.7
2	3	360	2.6
3	5	450	3.3
4	10	600	4.3
5	20	810	5.9
6	30	960	7.0
7	40	1080	7.8
8	50	1190	8.6

Table – 2 : Chlorine Gas Dispersion

Considering Wind Velocity V = 2.3 Meter / Second			
Sr. No.	Mass Release in Tons	Range of Evacuation in Meters	Time required for contaminated air to reach in minutes
1	1	360	2.4
2	3	570	3.8
3	5	710	4.7
4	10	950	6.3
5	20	1270	8.5
6	30	1500	10.0
7	40	1690	11.3
8	50	1860	12.4

Table – 3 : Liquefied Petroleum Gas (LPG)

Considering Wind Velocity V = 2.3 Meter / Second			
Sr. No.	Mass Release in Tons	Range of Evacuation in Meters	Time required for contaminated air to reach in minutes
1	1	150	1.0
2	3	240	1.7
3	5	290	2.0
4	10	390	2.7
5	20	530	3.7
6	30	630	4.4
7	40	710	4.9
8	50	780	5.4

Table – 4: Gas Dispersion Concentration

The basic dispersion equation for concentration from ground level release can be calculated from Gaussian Formula.

Assuming leak rate (Q) = 3 kg./Sec i.e. 3×10^6 mg/sec and velocity (u) = 2 & 5 m/sec., downwind concentration of some gases at various distances are calculated and tabulated as follows:					
Product	Maximum concentration (PPM) in downwind direction at distance X wind velocity = 2 m/sec				
	1KM	2KM	3KM	4KM	5KM
(A) (2 M / Sec)					
Chlorine	4.11	1.03	0.45	0.26	0.16
SO ₃	3.65	0.91	0.41	0.23	0.15
Phosgene	2.95	0.74	0.33	0.18	0.12
Ammonia	0.68	0.17	0.08	---	---
(B) (5 M / Sec)					
Chlorine	1.64	0.41	0.18	0.18	0.06
SO ₃	1.46	0.36	0.16	0.09	0.05
Phosgene	1.18	0.30	0.13	0.07	0.05
Ammonia	1.5	0.3	0.15	0.07	---

5.12 CARE FOR SAFE HANDLING OF SOME CHEMICALS

Procedure for Safe handling of chemical is essential as each chemical has different properties. The said matters are explained in Annexure-15.

5.13 COLOUR CODE SYSTEM FOR PIPE LINES

The colour code system for pipe lines for different substances as per Indian Standard-, IS-2379:1990 is given at Annexure-18.

5.14 PROBABLE TYPE OF CHEMICAL ACCIDENTS IN DISTRICT

The Survey on probable type chemical accidents based on the existing storages, which may likely to happen in the industrial Areas are indicated.

5.15 CHLORINE DISPERSION/LEAK

The response actions in case of Chlorine dispersion/leakage are suggested at Annexure-17.

5.16 SPECIAL MEDICAL TREATMENT & ANTIDOTS

Details on special medical treatments & antidotes for some chemicals are given at Annexure-16. The details on burns and their treatments are included in the said Annexure -16.

5.17 LIST OF EXPERT PERSONS

List of Industrial expert persons from the District in given at Annexure-3.

5.18 SOME MAJOR ACCIDENT IN INDIA

Some typical major chemical accidents occurred in INDIA in the are given at Annexure-19.

5.19 LIST OF RELEVANT STATUTE ON HAZARDOUS SUBSTANCES

The List of Relevant Statute on Hazardous Substances is given at Annexure-23.

5.20 GLOSSARY OF TERMS AND DEFINATION

The words on chemical accidents and technical terms generally used are explained at the Annexure-24.

5.21 C. A. (EPPR) RULES-1996

The Rules on chemical accidents (Emergency Planning, Preparedness and respond) Rules-1996 is given at Annexure-25.

CHAPTER 6

ROAD TRANSPORTATION EMERGENCY

6.1 MAJOR CORRIDORS FOR TRANSPORTATION OF HAZARDOUS CHEMICALS

The major routes of transport-vehicles by roads in Vadodara District are considered as below;

- (1) Express Highway No. 1 (Ahmedabad to Vadodara)
- (2) National Highway No. 8 (Ahmedabad to Mumbai)
- (3) Model Express Highway (Vadodara to Halol)
- (4) State Highways
- (5) Approach Roads/village Roads, etc.

6.1.1 Express Highway No-1, National Highway No- 8 and Model Express Highway

Express Highway(Golden corridor) No-1, Four-lanes; is newly constructed, first in India; from Ahmedabad to Vadodara, having total length 98 KM. Vehicle can move non-stop with speed of 125 KM. National Highway No- 8 is 47 Km stretch enters the District at Rayaka and exits near Haldarwa after passing through the city. Vadodara bypass has also been constructed which passes through Channi, Vemali, Sukhipur, Sama, Sayajipur, Danteshwar and Maneja.

The ‘Ahmedabad — Vapi” chemical corridor of the State, which is a large concentration of chemical industries. It also caters to the interstate transit traffic of hazchem and other goods. From an independent study conducted on behalf of MOEF, It is noted that one chemical carrier passes Aslali crossing every five minutes, which shows that the movement of hazchem transportation and also the potential for accidents involving them in the District is very high.

6.1.2 Rail Transportation

In addition to the hazchem transportation by road trucks/tankers, some of such materials, particularly petroleum products, are also transported by rail tankers. The largest refinery of Indian Oil Corporation Ltd. is located in Vadodara. Bulk transportation of refinery products, such as Motor Spirit, Diesel, Kerosene, Aviation Turbine Fuel, Furnace Oil, Mineral Turpentine Oil, LPG, etc to different parts of the country is also undertaken by rail tankers. The typical capacities for different petroleum products along with the damage distances under worst case scenario are tabulated below:

Sr. No.	Product	Rail Tank Wagon Capacity (MT)	Scenario	Damage Distance (m)
1.	Motor Spirit	47	Pool Fire	142
2.	Diesel/LSHS	53	Pool Fire	112
3.	Kerosene	51	Pool Fire	121
4.	Naphtha	47	Pool Fire	142
5.	Aviation Turbine Fuel	51	Pool Fire	121
6.	Mineral Turpentine Oil	52	Pool Fire	105
7.	Furnace Oil	52	Spill	--
8.	Liquefied Petroleum Gas	35	Flammable Gas Dispersion BLEVE	515
9.	Ammonia	45	Toxic Gas Dispersion	Downwind Direction

BLEVE : Boiling Liquid Expanding Vapour Explosion.

Damage Distance Is calculated for Injury zone radius corresponding to first degree burns. Furnace oil needs an initiator to burn, will not catch in presence of spark.

6.1.3 PIPE LINES

The different underground pipe lines, transporting various petroleum products are installed and passing through Vadodara District. External

interference, corrosion and poor maintenance are among the most common causes of pipe line accidents. The safety of pipe line shall be considered such as design, stress factors, quality of material, wall thickness, depth of burial, external impact protection, marking, route selection, monitoring, etc.

6.2 POTENTIAL HAZARD IN TRANSPORTATION

As mentioned above, various hazardous chemicals are transported through out the District. With heavy transportation activity within the District, the potential for accidents also increases correspondingly. Accidents scenarios have been visualized for major hazardous chemicals passing through the District as per the details given at above Table. The purposes of transport of the different chemicals are derived as below;

1. Dispatching the hazardous chemicals by manufactures' units within or outside the District.
2. Receiving the hazardous chemicals to Units/Factories from manufactures located within or outside the District.
3. Receiving hazardous chemicals in Bulk from Bulk- storage terminals through pipelines or dispatching to the users within or outside the District.
4. Transit traffic of hazardous chemicals lorry/ tankers/truck/containers/ carrier passing through the major corridors of the District.
5. Receiving, storing, or dispatching hazardous chemicals by stockist, godown, pump-station, depot, etc for purpose of selling, reselling, repacking, transit-stay, stocking etc.

Thus, transport emergency can happen anywhere in the District, and area and population likely to get affected will depend on the location and prevalent meteorological conditions in the area.

Transport & Accident Scenarios

Sr. No.	Transport Accident Scenario	Area Likely to be Affected
1.	Toxic gas Dispersion in case of Failure of Chlorine Tonner	1 to 1.4 km downwind
2	Toxic Liquid spreading in case of Failure of Acid/Alkali tanker	Immediate surroundings and burns to persons coming in direct contact with the substance
3.	Toxic gas Dispersion in case of Ammonia leak from cylinder	Varying, depending on the capacity of the cylinder but not more than 1 km
4.	Toxic gas Dispersion in case of Ammonia leak from a tanker	Up to 3 km downwind
5.	Escape of explosive gases(LPG) from cylinder followed by explosion	Explosion may cause over pressure upto 50 m for a short duration. However, pieces of damaged cylinder may travel upto 100 m from the accident site
6.	LPG leak from tanker followed by fire/explosion	Thermal radiation and overpressure effects will be upto 200m for short duration. BLEVE may result first degree burns up to 150m and also cause secondary fires depending on the location of occurrence.
7.	Spill/leak of flammable petroleum products followed by fire	Thermal radiation effects of unconfined pool fire will be felt upto 25 m from the pool edge for the duration of fire
8	Spill leak of CS ₂ followed by fire in a road tanker	Thermal radiation effects of unconfined pool fire will be felt upto 30 m from the pool edge. For the duration of fire. Burning of CS ₂ results in formation of toxic sulphur dioxide, effects of which may be felt upto a distance of 2 km from the accident site.
9.	Spill/leak of solvents and other flammable chemicals such as Toluene, Methanol, Benzene and Xylene followed by fire	Thermal radiation effects of unconfined pool fire will be felt upto 15 m from the pool edge. For the duration of fire.

Other factors that will have bearing on the extent of damage are:

- Rate of chemical release –As per the guidelines of the MoEF, we have considered catastrophic failure of container. However, it seldom happens in actual incidents and the material escapes from the container at a much lesser rate. Lower rates pose lesser risks.–Unfavourable
- Location : high population density – Unfavourable
- First response by the driver, if possible – Favourable
- Prompt action by response agencies – Favourable

6.3 **MOTOR VEHICLE ACT- 1988 & RULES**

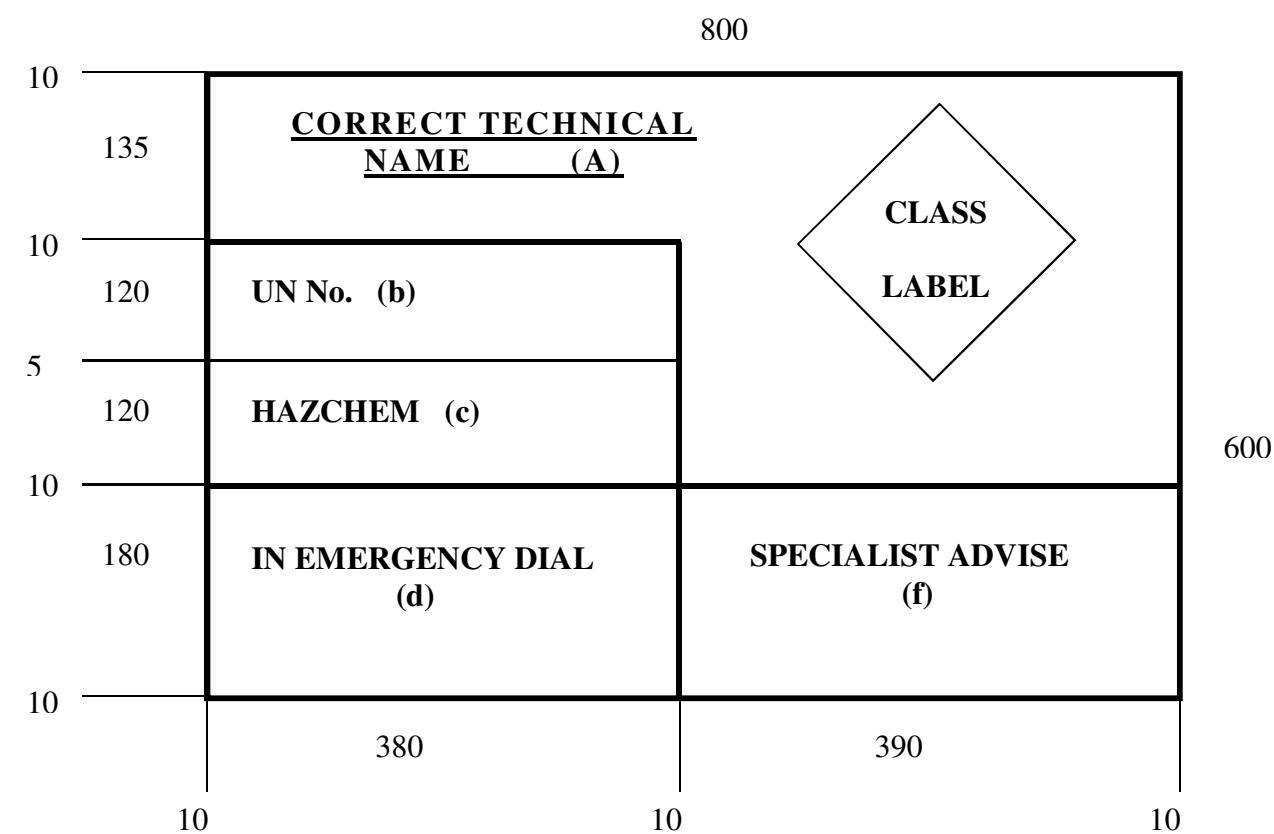
Under the provisions of the Central Motor Vehicles Rules-1989(2000), every Motor Vehicle carrying hazardous substances should comply with certain regulations. Such as,

1. Emergency Information Panel,
2. Trem Card,
3. Emergency Kit,
4. Trained Driver,
5. Spark Arrester.

6.3.1 **EMERGENCY INFORMATION PANEL**

The emergency information panel provides details in the event of emergency. It indicates the correct Technical Name of the substance being transported, its UN No., Hazchem Code and UN Hazard Class Label (Diamond Shaped). The panel also provides emergency telephone no., specialist advice in case of emergency. The vehicle should have emergency information panel on both sides and on the rear.

The size (600 MM x 800 MM) and shape of the panel is shown below:



(a) Correct Technical Name

The correct Technical name of contain / substance should be indicated at this corner.

(b) UN Number

The relevant UN Hazard Class Label (UN Symbol) has to be displayed on the front part of the vehicle (Central Motor Vehicle Rules 129, 134).

The UN Committee has classified various hazardous substances according to the risk involved. Each hazardous substances included in the list has been allocated a unique four-digit number, which is the substance's UN Number. Since the Numbers are in Arabic Letters, it helps in ready identification of the chemical being transported e.g.

Ammonia	=	1005	Petrol (MS)	=	1203
Chlorine	=	1017	Ethylene Oxide	=	1040
LPG	=	1075	Sulphuric Acid	=	1830
Methanol	=	1230	Benzene		1114
Oleum		1831	Toluene		1294

(c) Hazchem Code

The Hazchem Code is an emergency action code designed by the London Fire Brigade. It enables the fire brigade to know at once the action to be taken in case of fire or spillage e.g.

Ammonia	=	2PE	Petrol (MS)	=	3YE
Chlorine	=	2XE	Ethylene Oxide	=	2PE
LPG	=	2WE	Sulphuric Acid	=	2RE
Methanol	=	2PE	Benzene		3WE
Oleum		4WE	Toluene		3YE

Hezchem Code

- 1 : Jet**
2 : FOG
3 : Foam
4 : Dry Agent

P	V	Full Body Protective Clothing with BA	Dilute
R			
S	V	SBA	
S		SBA for FIRE Only	
T		SBA	
T		SBA for FIRE Only	
W	V	FULL	Contain
X			
Y	V	SBA	
Y		SBA for FIRE Only	
Z		SBA	
Z		SBA for FIRE Only	
E	Consider Evacuation		

- V** : Can be Violently or even explosively reactive
- Full** : Full Body Protective Clothing with BA
- SBA** : Self Breathing Apparatus Plus Protective Gloves
- Dilute** : May be used Plenty of Water.
- Contain** : Prevent, by any means, available, Spillage from entering drains or water courses.
- P : R** : Use Water than Drain into gutter. Use pressured Air suit
- S : T** : Use SBA Set. Use Water & Drain into gutter
- W : X** : Use Pressured Suit
- Y : Z** : Use SBA Set Don't allow effluent water into gutter.

(d) **In Emergency Dial**

The Telephone No. of the contact person in case of emergency.

(e) **Special Advice**

The fire extinguishing media, special protection system etc. can be given briefly.

6.3.2 Class Label

Chemicals have been grouped into nine basic classes depending on the nature of the hazard. Shaped label bearing a pictogram for quick hazard recognition classes. It is hazard-warning sign by different Diamond represented numerically from 1 to 9 which are given below:

Class-1	: Explosives
Class-2	: Gases, Compressed, Liquefied, Dissolved under pressure or deeply refrigerated
Class-3	: Flammable Liquids
Class-4	: Flammable Solids, Substances liable to Spontaneous Combustion, Substance which on contact with water emit flammable gases.
Class-4.1	: Flammable Solids
Class-4.2	: Substances liable to spontaneous combustion
Class-4.3	: Substances which in contact with water emit flammable gases
Class-5	: Oxidizing Substances, Organic Peroxides
Class-5.1	: Oxidizing Substances
Class-5.2	: Organic Peroxides
Class-6	: Poisonous (Toxic) & infections substance
Class-6.1	: Poisonous (Toxic) Substance
Class-7	: Radioactive Substances
Class-8	: Corrosives
Class-9	: Miscellaneous Dangerous Substances

Each United Nations Hazard Class Label has a distinctive diamond. Each label also has a characteristics background colours.

Colour	Hazard Type
Orange	Explosives
Red	Flammable
Blue	Water Reactive
Yellow	Oxidizing Substance
White	Toxic / Infections
Yellow & White	Radio Active
Black & White	Corrosive

6.4 TREM CARD

6.4.1 Written information in Trem Card

As a precaution against any accident or emergency that may occur during carriage, the driver shall be supplied with instructions in writing specifying concisely;

- a. The nature of the danger presented by the dangerous substances carried and the necessary safety measures that must be taken to avert that danger
- b. The action to be taken and treatment to be given in the event of persons coming into contact with the dangerous substances being carried or with any substances which might escape there from;
- c. The measures to be taken in case of fire and, in particular, the extinguishing methods and/or agents or groups of extinguishing methods and / or agents not to be used.
- d. The measures to be taken in case of breakage or deterioration of packing or of the dangerous substances being carried, particularly where such dangerous substances have spilled over the road.

These instructions shall be supplied to the carrier at the latest when the transport order is given, so as to enable him to take all necessary steps to ensure that the employees concerned are aware of these instructions and are capable of carrying them out efficiently.

6.5 EMERGENCY KIT

The Emergency Kit consists of Personal Protective Equipment, Self Breathing Apparatus, Fire Extinguishers, Safety Equipment, etc. as per statutory requirements, which should keep with the vehicle during transportation of hazardous chemicals.

6.6 TRAINED DRIVER

It is necessary to train the drivers, police and fire brigade people in handling of hazardous chemicals and meeting the emergencies arising out of leakages and spillages of chemicals. The lead and initiative should be taken by the manufacturer for training.

Driver has to maintain vehicle, accessories, protective clothing, safety equipments, and Emergency kit in good condition and he should be trained to handle all these equipments effectively. The drivers must be fully conversant with the product they carry. They must be conversant with the Trem Card and get accordingly in an emergency. They should keep the Trem Card in a safe place. Driver should maintain the emergency information panel in position on carriers as specified and prescribed manner. In case of mishap, driver should be reported immediately to the nearest Police Station.

6.7 TRANSPORTATION SIGNALS

Following Systems adopted for hazardous goods transportation to identify quickly the degree of hazards; adopted from National Fire Prevention Association (NFPA) Standard – 704.

	IDENTIFICATION OF HEALTH HAZARD	IDENTIFICATION OF FLAMMABILITY	IDENTIFICATION OF REACTIVITY
Signal	Type of Possible Injury	Susceptibility to burning	Susceptibility to Release of Energy
4	Materials, which on very short exposure could cause death or major residual injury even though prompt medical treatment, were given.	Materials which will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature and which will burn.	Materials, which are readily capable of detonation or of explosive decomposition or reaction at normal temperatures and pressures.
3	Materials, which on short exposure could cause serious temporary or residual injury even through prompt medical treatment, were given.	Liquids and solids that can be ignited under almost all ambient temperature conditions.	Materials that are capable or detonation or explosive reaction but require a strong initiating source or that must be heated under confinement before initiation, or react explosively with water.
2	Materials, which on intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical treatment is given.	Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur.	Materials that are normally unstable and readily undergo violent chemical changes but do not detonate also materials that may react with water violently, or that may form potentially explosive mixtures with water.
1	Materials, which on exposure would cause irritation but only, minor residual injury even if no treatment is given.	Materials that must be pre-heated before ignition can occur.	Materials that are normally stable, but that can become unstable at elevated temperatures and pressures, or that may react with water with some release of energy, but / not violently.
0	Materials which on exposure under fire conditions would offer no hazard beyond that of ordinary combustible	Materials that will not burn.	Materials that are normally stable even under fire explosive conditions and that are not reactive with water.



6.8 ROAD TRANSPORTATION INCIDENTS

As transportation accidents/emergency can occur away from the city limits or from the MAH units, where response facilities are not available. Major incident involved highly inflammable gases/liquids, or highly toxic substances, which pose serious threats to public safety and damage to the property.

The major incident can be described as:

- a. Dropping/toppling during loading/ discharging/ stacking/ handling operations.
- b. Collisions during transportation.
- c. Being hit by other vehicles
- d. Prolonged undetected leakage.
- e. Lack of proper communication to the fire, police, emergency control room, medical services, etc.
- f. Narrow Roads increase the traffic density, etc.

6.9 OPERATION SEQUENCE

6.9.1 ANALYSIS OF ACCIDENT SCENARIO

If the vehicle carrying the hazardous chemical meets with a scenario accident, there is likelihood of release of chemical to the atmosphere. Such chemicals may also get released during transportation due to damaged container; however, such possibility is rather remote. In both the events, consequences and extent of damage will vary considerably with location. Typical damage distance, In case of catastrophic Failure of container of hazardous chemical during transportation would vary with the type of chemical being transported. If it happens in thickly populated area, it could seriously affect population in surrounding area. However, a quick emergency response can reduce the damage to a large extent.

Immediate emergency response would be required to contain the damage, rescue the trapped / injured people, provide medical help to the affected population, evacuate the affected / threatened areas, control of traffic and curious on lookers etc.

6.9.2 CHAIN OF EVENTS

If the driver of the vehicle is safe and is trained to handle transport emergency (he is supposed to received basic training and carry TREMCARD- Transport Emergency card., which gives do's and don'ts during such situation specifically for the chemical being transported), he can be instrumental in providing immediate initial response. He can help in :-

- Conveying the accurate information to the authorities.
- Keeping the onlookers away by shouting at them (that this is a hazardous chemical and they should not come near the truck). Further, he can try and keep away all they sources of ignition.
- Communicating with people in downwind direction so that they move away from gas cloud.

6.9.3 INTIMATION OF INFORMATION

The following information is needed to make the initial decision to handle the situation by police, fire and expert person.

A. The hazardous chemicals / goods involved

1. Chemical Name of hazardous chemicals.
2. Degree of health hazard.
3. Quantity involved & type of container
4. Release, type of containment or Control
5. Vapour/ liquid release. Movement, spread, dispersion.

B. Likely The Public in Vicinity

1. Location / mile stone
2. No of Hutments, Shops, residential area with maximum Number of people, who get/ may get affected.

3. Probable Evacuation Area
4. Arrangement for evacuation / protection
5. Safe shelter or other building etc
6. Authority, Hospitals, Medical treatment, etc.

C. Weather Condition

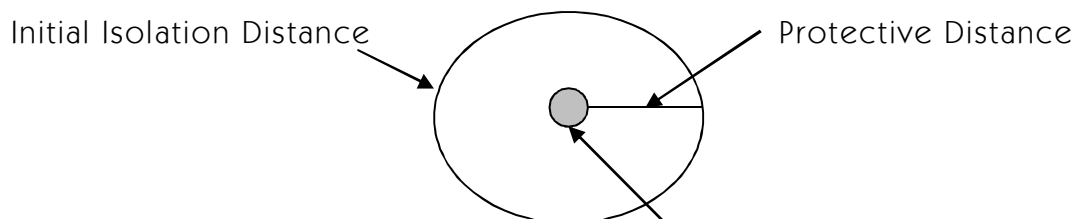
1. General condition of wind & Direction or rain, cold, sun heat etc.
2. Effect of vapour / Liquid.
3. Potential to change.
4. Effect of production / evacuation, etc.

6.10 DISTANCES FOR INITIAL ISOLATION OR PROTECTIVE ACTIONS

Sr. No	Chemical Name	SMALL SPILLS (From a small package of small leak from a large package)			LARGE SPILL (From a large package or from many small packages)		
		First Isolate in all Directions (Mts.)	Then Protect persons in Downwind during (Mtr.)		First Isolate in all Directions (Mts.)	Then Protect persons in Downwind during (Mtr.)	
		Day	Day	Night	Day	Day	Night
1.	Bromine	60	500	1800	330	3300	7300
2.	Chlorine	30	200	1200	240	2400	7400
3.	Ethylene Oxide	30	100	200	90	800	2400
4.	Hydrogen Chloride	30	100	400	360	3600	10400
5.	Liquid Ammonia, Anhydrous Ammonia	30	100	100	60	600	2200
6.	LPG	30	100	200	90	800	2400
7.	Methyl Mercaptan	30	100	200	150	1300	4500
8.	Nitric Oxide	30	200	800	60	600	2700
9.	Sulphur Dioxide	30	300	1200	210	2000	6300
10.	Sulphur Trioxide (Oleum)	60	400	1000	330	2500	6500
11.	Hydrogen Chloride	30	100	400	360	3600	10400
12.	Hydrogen Bromide	30	100	500	180	1800	5700
13.	Hydrogen Fluoride	30	100	500	210	1900	4300
14.	Hydrogen Cyanide	30	100	400	150	1300	3700

6.11 HOW TO USE ABOVE TABLE

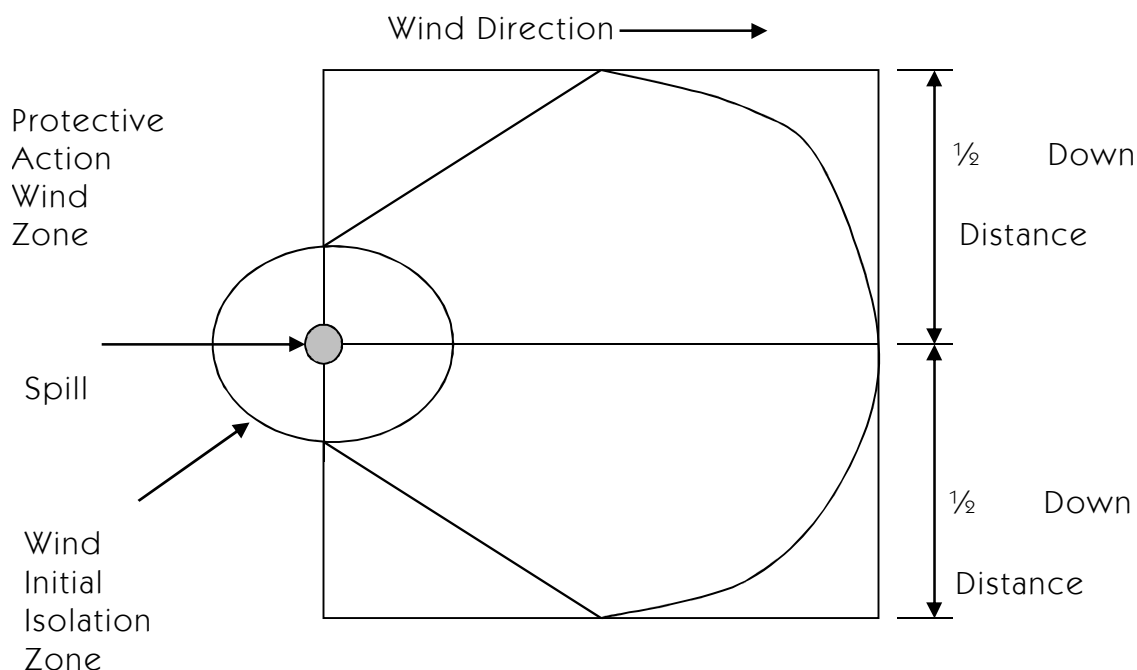
1. The responder should always have:
 - Identified the material by its name
 - Read the guide for that material and taken the emergency actions recommended
 - Noted the wind direction
2. Look in this table, use the entry with the largest protective action distances
3. Determine if the incident involves a SMALL or LARGE spill and if DAY or NIGHT. Generally a SMALL SPILL is one which involves a single, small package (i.e. up to a 208 litre drum), a small cylinder, or a small leak from a large package. A LARGE SPILL is one, which involves a spill from a large package, or multiple spills from many small packages. DAY is any time after sunrise and before sunset. NIGHT is any time between sunset and sunrise.
4. Look up the initial ISOLATION distance. Direct all persons to move, in a cross wind direction, away from the spill to the distance specified.
5. Next, look up the initial PROTECTIVE ACTION DISTANCE shown in the table. For a given dangerous goods, spill size, and whether day or night, the table gives the downwind distance-in kilometres for which protective action should be considered. For practical purposes, the Protective Action Zone (i.e. the area in which people are at risk of harmful exposure) is a square, whose length and width are the same as the downwind distance shown in the table.



6. Initial Protective Actions to the extent possible, beginning with those closest to the spill site and working away from the site in

the downwind direction. When a water reactive which producing material is spilled in to a river or stream, the source of the toxic gas may move with the current or stretch from the spill point downstream for a substantial distance. The shape of the area in which protective actions should be taken (the Protective Action Zone) is shown in this figure. The spill is located at the centre of the small circle. The larger circle represents the INITIAL ISOLATION ZONE around the spill.

7. Call the emergency response telephone number on the TREMCARD as soon as possible for additional information on the material, safety precautions and imitation procedures.



6.12 **EMERGENCY ACTIONS**

In addition to the normal Off-site Emergency Plan, the following elements shall be considered.

- a. Level of transport disaster shall be categorised, as level 1 to level 4.
- b. Preparation and circulation of emergency guides for each cluster of chemical plants and M.A.H. Units.
- c. The precautions and response actions to be taken by the first responders reaching the incident site.

- d. The role of different emergency function units shall be clearly specified.
- e. The potential environmental emergency that may occur and GPCB has to evaluate the situation and to take necessary actions.
- f. Complete mop-up operation after a spill or a chemical accident/emergency shall be ensured.
- g. The police, fire and medical persons have to obtain technical guidance involving hazardous goods transportation and response actions accordingly.

4.12.1 In case of Flammable Chemicals:

- a. Park vehicle on the safe road side immediately.
- b. Stop the engine, do not smoke and put away from any source of ignition.
- c. Try to stop leak by closing the valve or shut off the source; to stop the further leak.
- d. Cordon off the area, stop traffic and keep people away from the vehicle.
- e. Inform Police, Fire Brigade, Manufacturer/ owner.
- f. Provide the Trem-Card, M.S.D.S., etc to Police, if asked.
- g. In case of fire, try to extinguish it with fire extinguisher.
- h. Keep the tank cool by water sprays to prevent further fire or explosion.
- i. Surrounding area shall be checked for extending fire incident or possibility of explosion. If so, then advice or request for evacuation.
- j. Coordinate and help to the team deputed by occupier/manufacture; arrived for handling & controlling the road emergency.

4.12.2 In case of Toxic Release

- 2. Driver of hazardous cargo should be properly trained to handle& control small emergency on road.
- 3. Cordon the area of leak.
- 4. Stop traffic and keep people away from the vehicle.
- 5. Leaking liquid can be contained in bunds of sand/earth.

6. Small leak can be plugged by wooden peg. If a leak is from cylinder valve, it can be capped by yoke clamp.
7. Inform the police, fire brigade, Manufacturer/occupier, and others.
8. Provide Trem-Card, M.S.D.S. etc to the police, when ask. and coordinate and cooperate with them.
9. If permits, use water sprays, fogs to absorb leaking vapour/liquid, considering the property of the chemical, otherwise, do not use water at all and use neutralising agent as suggested in M.S.D.S./Trem-Card.
10. Advise to evacuate the downwin area in case of large toxic leakage.
11. Coordinate, follow and help to the team deputed by occupier/manufacture; arrived for handling & controlling the road emergency.

6.13 **SAMPLE :PANEL BOARD & TREM CARD**

6.13.1 **Panel Board Sample (Chlorine) : Emergency Information Panel**

1.	Name of Chemical	CHLORINE (CL ₂)
2.	UN Nos.	1017
3.	HAZChem Code	2 X E
4.	Emergency Contact Nos.	100
5.	NFPA Hazards	H:3, F:0, R:0, SP: -
6.	Class Label	
7.	Special Advise	Chlorine is greenish yellow Colour, irritating, bleach like chocking odour, non flammable, but corrosive liquefied gas. Avoid contact use self contained breathing apparatus neutralise spillages with soda and drain with abundant water. Run away from the gas clouds, in the direction perpendicular to wind direction.

6.13.2 Panel Board Sample (LPG) : Emergency Information Panel

1.	Name of Chemical	LPG
2.	UN Nos.	1275
3.	HAZChem Code	3WE
4.	Emergency Contact Nos.	100
5.	NFPA Hazards	H:1, F:4, R:0, SP: -
6.	Class Label	
7.	Special Advise	Skin : Liquid on skin causes frostbite. Inhalation : Concentration in air greater than 10% causes dizziness in few minutes. 1% conc. Gives the same symptoms in 10mtr. High concentration causes asphyxiation.

6.13.3 TRANSPORT EMERGENCY CARD (ROAD)-Sample

MATERIAL	CHLORINE
	Pale green toxic liquefied gas with characteristic odour
Nature of Hazard	➤ The gas is highly toxic through inhalation or by absorption through skin ➤ Heating will cause pressure rise, severe risk of bursting and subsequent explosion ➤ The gas is corrosive in the presence of water, and can thus cause injury to the eyes and skin ➤ The gas is heavier than air, and will spread along the ground ➤ Increases fire risk. Combustible material (e.g. clothing) ignites more readily and burns fiercely ➤ Reacts with oils, fats or highly combustible substances generating heat, and may cause spontaneous fire or explosion
Protective Devices	➤ Suitable respiratory protective device ➤ Suitable eye protection ➤ Eyewash bottle with clean water ➤ For loose cylinders ➤ Leather or thick textile gloves ➤ Protective boots ➤ Move vehicle to open ground where practical ➤ Stop engine, isolate electrics ➤ Keep public away from danger ➤ Keep upwind ➤ Put on protective clothing before entering danger area ➤ Ventilate clothing exposed to product ➤ Advise and assist Emergency Services ➤ Do not Allow naked lights ➤ Smoke ➤ Attempt to deal with any fire involving the load, but ➤ minor vehicle fires should be tackled with the vehicle ➤ fire extinguishers, if safe to do so ➤ Enter pits, hollows or troughs
Fire	➤ Keep load cool by spraying with water - significant risk of catastrophic failure due to increasing pressure when exposed to fire ➤ Keep personnel away and upwind
First Aid	First Aid • If substance has got into eyes, immediately wash out with plenty of water for atleast 15 minutes Remove contaminated clothing immediately and drench affected skin with plenty of water Don not apply artificial respiration if patient is breathing • Seek medical treatment when anyone has symptoms apparently due to inhalation or contact with skin or eyes Emergency Services Information PPE • Emergency Services as per vehicle crew. Emergency Action Code requires full protection
Name & Address of Manufacturer	
Contact Nos.	

CHAPTER 7

POST EMERGENCY ACTIONS

7.1 INTRODUCTION

Once the situation at the site is under control, the spill/leak has been plugged, fire has been extinguished, the emission of vapour to the atmosphere has been effectively checked and a SAFE signal has been passed its time for the follow up exercise. Details of post-emergency activities are given below in order of priority.

7.2 INSPECTION AFTER FIRE OR EXPLOSION

The large fires can have major effects over a vast area. Similarly major explosion could damage or destroy numerous buildings and any nearby bridges or tunnels. In either case, residents of partially damaged buildings will want to know, if the structures are safe to occupy or they await repairs. Questions pertaining to the safety of highway or railway bridges must be resolved quickly to avoid traffic complications.

It is important to note that inspection personnel may require special precautions (i.e., chemical protective gear) in addition to normal safety equipment and in those cases where the structure may still be contaminated by hazardous residues.

Technical coordinators shall be responsible for coordinating inspection of the structural integrity of damaged buildings, bridges, or other structures in the aftermath of a fire or explosion through expert agencies.

7.3 CALLING OFF EMERGENCY

When all clear signals received from GPCB, Fire, Police and chair person satisfied himself that emergency is over, the Chair- Person/District Collector will declare call off the emergency and all clear siren will follow.

7.4 POST-INCIDENT TESTING FOR CONTAMINATION

To some extent, this item overlaps with monitoring of concentrations. However, activity in “Action Plan” covers sampling and analysis during the initial phases of a response action while this one is concerned with the potential for persistent after effects.

Personnel of the Gujarat Pollution Control Board shall undertake to check homes, stored foods, crops, water (ground & surface) and animals that may become part of the human food chain for possible chemical contamination. Help may be sought from the industries having capabilities for monitoring/ testing of contaminant in the target items.

7.5 WASTE GENERATION & DISPOSAL

Different hazards are evaluated as describe above. It is also necessary to lay down of waste generated due to chemical emergency related to transport accidents or industrial events, Further, it should be evaluated associated risks and evolved mechanisms to handle such hazardous wastes. The proper procedures and adequate equipment shall be considered during actual chemical emergency.

After a major accident, it may become necessary for public authorities to undertake disposal of hazardous wastes. This requires knowledge of Hazardous Waste (Management & Handling) Rules, 1989 (as amended in 2000 and 2003) of the Ministry of Environment & Forests, Govt. of India. The location of approved and authorized disposal sites and the proper procedures for transporting and transferring wastes to these sites have also to be taken care of. Local authorities should seek

assistance from the state department of environment. The items unfit for human consumption will also form part of the Hazardous waste, which needs to be disposed off in accordance with the above mentioned Rules.

7.6 CONTROLLING LONG- TERM DAMAGE

The Industrial emergency may affect natural resources of soil, water and air. GPCB will make assessment of the areas adjoining the emergency scene, where such damage may take place. GPCB will submit the report and recommendations to Chair Person/District Collector and he will act on the information and recommendation.

7.7 CLEANUP OF DEAD OR CONTAMINATED LIVESTOCK OR WILDLIFE

Contaminated animals must be sent to veterinary hospital for decontamination & treatment. A large number of animal carcasses, hundreds of cows or chickens or thousands of fish, can pose a variety of health hazards. Emergency response plans do not typically address this topic, possibly because it is somewhat distasteful, but the topic is worthy of consideration during the planning process where applicable. Where oil spills may contaminate waterfowl, consideration might be given to the formation of work crews to collect, clean, and care for the animals under the direction of experienced personnel. State and local public works agencies can provide assistance in planning for this activity. Local veterinarians and animal conservation groups may also be helpful, but in all cases, it is the responsibility of medical coordinator to ensure that personnel will not be placed at risk of adverse safety or health impacts by their actions.

7.8 PROVISION OF ALTERNATE WATER SUPPLY

There are a number of circumstances under which a potable water supply may become unfit for human consumption for a time and require replacement. This is most commonly accomplished by bringing

in supplies of bottled water and/or tankers/trailers capable of carrying water. The later are available from local Municipal Corporation. Tankers carrying milk are another possibility for consideration once thoroughly cleaned. It is the responsibility of transport coordinator in association with the social workers for arranging potable water for consumption of personnel engaged at the incident site. The potential sources of potable water are wells of water intake point of River, and ground water from neighbouring villages/towns/agricultural areas where possibility of ground water pollution due to spillage of contaminants is minimum.

7.9 RE-ENTRY INTO EVACUATED AREAS

Based on the assessment of the situation at the site, the DCG would take decision on the termination of emergency. Before this, however, several issues need to be resolved by the members of DCG. Re-entry being again as complex as the evacuation operation, would require the respective coordinators to perform their functions such as transportation of evacuees back to their respective residential areas, restoration of electricity, gas, water supplies, post-accident monitoring of concentration, etc.

7.10 CHECK LIST FOR POST EMERGENCY

The issues/activities thus required are listed at Table Below in order of priority. However, as some of these are parallel activities, the decision should be taken based on actual site conditions.

The activities listed below are as illustration and only those, which are essential for return of the normalcy. However, as the last item suggests, regular training to all sections of the society is also of equal importance.

Table : Post Emergency Activities

Activity	Responsibility
Check the industrial unit for possible secondary effect of delayed relapse.	GPCB; Technical experts
Environmental Clearance, Checking, examining, sampling & declaration of "No Harmful Contamination"	GPCB- Officer
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 DCG
Hold press conference	Public Relations Coordinator
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	DCG
Provide training to community and staff	DCG

7.11 CAPACITY BUILDING

Creation of proper infrastructure for Off-site E. Plan will serve as a strong back-up for management of chemical accidents. Latest safety hardware, software & instrument, dedicated transportation services, HAZCHEM van, information networking system, proper chemical casualty treatment kits, poison control centre, prompt and effective mechanisms with dedicated operatives, Critical detection system, Protection PPE, monitoring instruments, Adequate resources & neutralising agents etc are major influence factors for management of chemical accidents.

7.12 MEETING & REPORT

Organising the meeting of District Contingency Plan Committee, after the incident and discussion on the reports as submitted from all members on the emergency and finalised the consolidated Report for submission to state crisis group. Further, implementation on various suggestions will be considered with time bound.

CHAPTER 8

REHEARSAL / EXERCISE / MOCK DRILL

8.1 SUBJECT

Exercise / Rehearsal / Simulation on Off-Site Emergency Plan, considering any one of the event related with hazardous chemical which may create maximum credible scenario; as per blue print; at the M.A.H. Unit or at place of the road transportation, participating all emergency services, involving all designated persons of DCG, surrounding public.

8.2 OBJECTIVES

It is an integral part of emergency preparedness.

- 8.2.1** Provide assessment of effectiveness of the plan and response capability and identifying proper elements in the plan.
- 8.2.2** Test knowledge and skill of participating designated persons and their team and provide opportunity to practice skill under realistic condition.
- 8.2.3** Test and evaluate the interaction of various agencies / authorities involved and ensure that all components are properly coordinated.
- 8.2.4** Test the communication network and co-operative responses skills.
- 8.2.5** Evaluate the available resources, equipments, its effectiveness, accuracy etc.
- 8.2.6** Gain experience to create the confidence to handle & control the emergency amongst the participating persons, members and others. These serve as continuing training tool for response personnel.
- 8.2.7** Educate the plant personnel, general public in vicinity & other concerned.

8.3 AUTHORITY OF EXERCISE / REHEARSAL

The Chair Person of DCG is hold to assume responsibilities & make decisions as per legitimate. The member-secretary will work as co-ordinator for mock drill purpose.

8.4 TYPES

- (1) Table –Top Exercise
- (2) Functional Exercise
- (3) Full Scale Emergency Drill/ Rehearsal

8.5 TABLE TOP

The first part of exercise is 'Table Top' exercises to test that emergency plan do not interrupt the day-to-day running of their concerns. This will identify the difficulties involved and practical approaches. The scenarios will be decided and consideration shall be given to live practical involving all concerned at suitable intervals, in addition to those of a theoretical nature. Care should be taken as the mock drill shall not create any panicky to any person or injury to any person.

8.6 FUNCTIONAL EXERCISE

- To prepare operating procedures.
- To decide type of chemical Involved, Scenarios, involvement of out-side persons, specialised equipment, tools, vehicles, etc. for different scenarios, Indoor or outdoor Work.
- Participants- response elements team, Dummy Persons for Injured, dead, evacuates, runners, messengers, specialised operatives, and functional experts as evaluators.
- Test functional operations, operating procedures.
- Preparedness on out-off control scenarios.

8.7 FULL-SCALED EMERGENCY DRILL

- After establishment and confirmation of operating procedures, testing all elements through Table top Exercise/Functional Exercise.

- Conduction at M.A.H. Unit or multiple activity centres.
- To arrange multiple resources, teams, work-forces, and evaluators.
- To test response skills and simultaneous operations
- To prepare the report with photographs and videography.

8.8 DETAILS ON FULL-SCALED EMERGENCY DRILL:

8.8.1 BLUE PRINT

The scenario will be selected as per Major FIRE/ Toxic Gas Dispersion/Explosion, etc; involving one or more hazardous chemicals and more than 5 persons affected during such scenario at one of M.A.H.Unit.The scenario is to be considered as major accident occurred at major chemical Factory,which is not controlled by the Unit and calling the DCG, involving certain major chemicals with certain serious injuries to the dummy persons and participating all members of DCG. A blue print will be prepared as guideline to act for a selected scenario. The details, maps, affected areas, role & responsibility of the persons, with specific name of persons, designation/role, contact numbers, etc. are prepared. The scenario will be explained by co-ordinator/members/ secretary, etc.. The Off Site Emergency Plan will be helpful. Information will be supplied to all concerned.

8.8.2 CODE-NAME FOR REHEARSAL

The code name shall be give to identify the case of rehearsal not real incident. So that, on getting message there will be no panicky amongst the operative person. If real emergency arise, then there will be no code-name. Further, the code name will be announced to conveying the message to authority, operative persons, etc.

8.8.3 NATURE

Origin, type of scenario, Date, time, location, Duration of exercise, etc. are to be pre-decided in specific manner.

8.8.4 AFFECTED AREA

It is the indication of the spread of emergency. It will be reflected in Blue print & provide details of origin place, units, surrounding identities, villages, roads, locations, type of incident, affected persons, rescue arrangement, controlling measures, etc.

8.8.5 EMERGENCY CONTROL CENTRE

An Emergency Control Centre will be established for exercise purpose where communication & other activities can be performed. The control center will have emergency facilities. The required documents like Off-Site Emergency Plan, details on weather conditions, list of persons to participate, emergency scenario, maps, affected areas, emergency telephone numbers, list of hospitals, list of emergency vehicle & equipment will be kept ready. An experienced & expert person will be posted in Control Room.

8.8.6 PREPARATION STAGE

The responsibilities & duties will be allotted to each group, services and involving all personnel. Educative meeting will be arranged to explain the role of each participant. Blue print, scenarios and arrangements will be discussed at large. Charts, maps, Posters, Banners etc. will be prepared for good performance.

8.8.7 RESOURCES AND FACILITIES

Certain essential facilities shall be provided to the participants as required during actual emergency period. Further, adequate resources shall be made available to handle the situation. The some dummy-person have to select as to play and act as dead, serious injured, minor injury for purpose of realization of scenario, and they will be identified by colour badges like, RED indicates as dead, GREEN indicates as

immediate admission to the hospital for operation, YELLOW indicates first aid treatment, WHITE indicates no physical injury. The Experienced person shall be invited as OBSERVERS and separate identity cards shall be issued to them.

8.8.8 SEQUENTIAL ACTIONS

The whole exercise /rehearsal will be arranged in sequential actions as per off-site emergency plan. Thus rehearsal will be conducted, as actual performance.

8.8.9 OBSERVATIONS

The outsiders / third party will perform the role of observers and they will submit their reports on various site-observations with shortcomings & good features.

8.8.10 DE-BRIEF MEETING

On completion of exercise, a de-brief meeting will convene to discuss the conducted exercise, give views on performance of each areas; explain difficulties, resources, limitation, planning etc. All these observations, with corrective steps will be noted & reports will be prepared.

8.8.11 PHOTOGRAPHS, VIDEO & PRESS COVERAGE

Photography, videography will be carried out for the work performed. The reports of such exercise will be sent to press for coverage. Leaflets and Pamphlets will be issued to the public to educate them for the emergency.

8.9 FORMAT FOR REHEARSAL / EXERCISE / MOCK DRILL

A format for rehearsal / exercise / mock drill is given in Annexure-21.

8.10 CONDUCTED EXERCISE / MOCK DRILL

The detail on conducted exercise / mock drill by DCG is given at in Annexure-22.

VADODARA DISTRICT OFF - SITE EMERGENCY PLAN 2025

MAH UNITS SECTION *Part -2*

Prepared by
**VADODARA DISTRICT CRISIS GROUP
VADODARA**
2025

CHAPTER 9 PROFILE OF MAH UNITS

9.1 INDUSTRIAL PROFILE

Vadodara is capital of Vadodara District, which is located central part of Gujarat State. The total area occupied by the District is 3912.9 Sq. miles, distributed in 8 talukas. The gient industries like GSFC, RIL, GACL, GR (IOCL), GAIL, HPCL, BPCL, Nirma, Thermax, Schaeffler, Styrenix, etc. are proud of Vadodara District. The Different Industrial Areas like, PCC Area, Nandesari GIDC Industrial Estate, Savli GIDC Industrial Estate, Makarpura GIDC Industrial Estate, Gorwa BIDC, Sardar Industrial Estate, Padra to Jambusar Industrial Belt, Maneja Industrial Estate, Variuos Private Industrial Estate, and different scatted industries are located in the District.

It is noted that Vadodara District had prepared “Off-site Action Plan for Handling Emergency in Chemical Units”, FIRST TIME in the year 1988; there after conducted massive industrial exercises with code names, “BAZZ”-in the year-1988, “SAVDHAN”- in the year–March-1990 and “Sanket”in the year March 2015.

Vadodara District is the first in India, where the first full scale industrial mock-drill, with code name “CRAVE” was conducted in 1991 and there after a Emergency Control Room is established in Vadodara District; as its first for Industrial emergency purpose only. Thus, Vadodara is pioneer in the process of industrial emergency.

9.2 MAH UNITS LOCATED IN DIFFERENT LOCAL CRISIS GROUPS

The Local Crisis Groups are identified as per following:

Sr. No.	LCG	M.A.H. Units		
		Working	Closed	Total
1.	LCG-1: - Vadodara – Nandesari - PCC	31	3	34
2	LCG-2: Padra	18	-	18
3	LCG-3: - Savli	15	-	15
	Total	64	3	67

The major hazardous chemicals; used, stored, processed and handled by the above said M.A.H. Units (Sr. No of Sch-III of R 68-J of GFR2004) are listed as,

1. Acetone	14. Ethyl Alcohol	28. Motor Spirit
2. Acetic Acid	15. Ethylene Dichloride	29. Naphtha
3. Acrylonitrile	16. Ethylene Oxide	30. Natural Gas
4. Ammonia	17. Formadehyde	31. Nitric Acid
5. Benzene	18. HSD	32. Oleum
6. Bromine	19. Hexane	33. Sulphur Dioxide
7. Butadiene	20. Hydrogen	34. Sulphuric Acid
8. Caustic Soda Lye	21. Hydrogen Peroxide	35. Sulphure Trioxide
9. Chloroform	22. Hydrochloric Acid	36. Thyonyl Chloride
10. Chlorine	23. Sodium Cyanide	37. Toluene
11. Chloro Sulphonic Acid	24. Iso Propyl Alcohol	38. TEAL
12. Ethanol	25. LPG	39. TnBAI
13. Ethylene	26. Methanol	40. Vinyl Chloride,etc.
	27. Propane	

All working MAH Units have submitted their On Site Emergency Plan to Office of Jt. Director of Industrial Safety & Health, Vadodara. Further, they have submitted details of their Units in prescribed format with latest details, which are given in form of FACTSHEETS.

Approximate locations of The MAH Units are indicated at the map, as per Appendix—A-1 & A-3.

9.3 LCG WISE LIST OF MAH UNITS

LCG-1: Vadodara – Nandesari - PCC

Sr. No	Factory Name	Address	Major Hazardous Chemical	Contact Person	Contact No.
1.	Bharat Petroleum Corporation Ltd.	Koyali Installation, Village : Karachiya, PO : Jawaharnagar Dist: Vadodara	Motor Spirit Ethanol HSD Bio Diesel MTO	Mr. Ram Kumar Plant Manager	9453042457
				Mr. Tajeshwar, HSSE	9478823709
2.	Chemtech Intermediates Pvt. Ltd.	C1/128/14-15-16, GIDC Industrial Estate, Nandesari, Dist. Vadodara	Sodium Cyanide Chlorine	Mr. Ripal N Patel, Occupier	9099061784
				Mr. Rajesh B. Gajjar, Factory Manager	9099061784
3.	Chloritech Industries	Plot No.122/3,4 & 5, GIDC Estate, Nandesari, Dist. Vadodara	Chlorine	Mr. Nilay P. Shah, Occupier	9227422660
				Mr..Nikunj S Bhatt, Factory Manager	9227140316
4.	Deep Darshan LLP	48/2/A, GIDC Nandesari, Dist. Vadodara	Chlorine	Mr. Bhaveshbhai P. Patni, Occupier	9974747471
				Mr. Harshad K. Patel, Factory Manager	9426546823
5.	Deepak Nitrite Ltd.	4 - 12, GIDC Chemical Industrial Estate, Nandesari, Dist. Vadodara	Ammonia Chlorine SO2 Toluene Nitro Toluene M-Xylen	Mr. Sanjay Chovatiya, Factory Manager	6358874860
				Mr. Viral Pastagia, DGM, Health & Safety	9825107212
6.	Dhiren Chemical Industries	124/36 B, GIDC Estate, Nandesari, Dist. Vadodara	Ethylene Oxide	Mr. R. R. Shah, Proprietor	9376219675
				Mr. Manish K. Shah, Factory Manager	9427320533
7.	Farmson Basic Drugs Pvt Ltd. (Unit-I)	Plot No. 28-35, 40/2, G.I.D.C., Nandesari, Vadodara - 391 340. Gujarat, India	Chlorine	Mr.Prasad Sarode, DGM-EHS	6358927014
				Mr.Himanshu Chauhan , Sr.Manager-HR	8511182529
8.	Farmson Basic Drugs Private Limited (Unit-II)	Plot No. 14, GIDC, Nandesari Industrial Estate, Dist. Vadodara	Chlorine	Mr.Narshibhai K Patel, Occupier	9327229107
				Dr. Prashant Shihora, Factory Manager	8758268663
9.	GAIL (India) Limited	GIDC Industrial Estate, Waghodia, Dist.Vadodara	LPG Naphtha HSD	Mr. Abhay Kumar Gupta, Factory Manager	9756700947
				Mr. S. S. Dharne, DGM (F&S)	8954892747

9.3 LCG WISE LIST OF MAH UNITS (CONTINUE...)**LCG-1: Vadodara – Nandesari - PCC (Continue...)**

Sr. No	Factory Name	Address	Major Hazardous Chemical	Contact Person	Contact No.
10.	GSP Crop Science Pvt Limitd, Unit 3	Plot. No.1,2, GIDC Industrial Estate, Opp. SBI Bank, Nandesari, Dist. Vadodara	Acrylonitrile Hexane Ethanol Xylene Bromine Methanol	Dr. Dhirajlal D. Chauhan, GM - Operation	9016135054
				Mr. Aniruddha Deshpande, Sr. Manager-HR	9875147422
11.	Gujarat Alkalies & Chemicals Ltd.	P.O. Ranoli, Dist. Vadodara	Chlorine Methanol H2O2	Mr. V. H. Patel, Occupier (Complex Head)	7574805310
				Mr. N. R. Bhargava Factory Manager	9909029496
12.	Gujarat Refinery (Indian Oil Corporation Limited)	P.O.: Jawahar Nagar, Dist: Vadodara	LPG Naphtha Gasolene Benzene Toluene	Mr. Anil Kumar, Chief General Manager (HR)	9999799670
				Mr. Prabhakar Kumar, DGM (F&S)	7573019360
13.	Gujarat State Fertilizers & Chemicals Ltd	P. O. Fertilizernagar, Dist. Vadodara	Ammonia Methanol Naphtha Cyclohexane	Mr. V. S. Bhatt, VP (P-A-IV & Methanol, SA-III & IV), S & FS	9909965858
				Mr. V. B. Mishra, VP (Safety & Fire Services)	9979853450
14.	Hari Orgo Chem Pvt.Ltd.	A/237-238, GIDC Industrial Estate, Nandesari, Dist. Vadodara	Chlorine	Mr. Bhavesh P. Shah, Director	9227140314
				Mr. Vijay S. Shah, GM Technical	9227140320
15.	INOX Air Products Pvt. Ltd.	Block No :102,106-P, Village:-Juni Jithardi, Vemardi Road, Taluka:Karjan, Dist : Vadodara	Liquid Oxygen	Mr.Paresh Patel, Factory Manager	9879101457
				Mr.Sandip Padhiyar Dy. Manager-P&A	7490001769
16.	Link Pharma Chem Ltd.	161/1, 162, GIDC Nandesari, Dist. Vadodara	Chlorine	Mr. Satish Ganpatrao Thakur, Chairman	86907 77711
				Mr.Vijay B. Patel, General Manager	9426570233
17.	Munjali Auto Industries Ltd.	187, GIDC Industrial Estate, Tal: Wagodia, Dist.Vadodara	Propane (LPG)	Mr. Virendrasinh Gohil, HR- Head	9925028593
				Mr. Yogendra Rana, Safety Officer	6354120839
18.	Nandesari Industries Association Secondary Treatment Plant	Plot No. 153/A, GIDC Industrial Estate, Nandesari, Dist. Vadodara	Chlorine	Mr. Babubhai C. Patel, Chairman	9824001925
				Mr. Devendra D. Patel, Factory Manager	9427382619

9.3 LCG WISE LIST OF MAH UNITS (CONTINUE...)**LCG-1: Vadodara – Nandesari - PCC (Continue...)**

Sr. No	Factory Name	Address	Major Hazardous Chemical	Contact Person	Contact No.
19.	Narayan Organics Pvt. Ltd.- Unit-III	Plot No. 53/B, C/B, GIDC Industrial Estate, Opp. HPCL Petrol Pump, Nandesari, Dist. Vadodara	Chlorine	Mr. Purav Dahyabhai Patel, Occupier	9723278937
				Mr. Surendrasingh Hazarisingh Solanki Factory Manager	9925591692
20.	Oriental Aromatics Limited	Plot No. 3, GIDC Estate, Nandesari, Dist. Vadodara	Propylene Oxide	Mr. Satish Kumar Ray (Occupier)	9897600477
				Mr. Jigar K. Patel, Factory Manager	6357072318
21.	Panoli Intermediates (I) Pvt. Ltd.	Plot No. 11 & 18, Petrochemical Complex Industrial Estate. Ranoli, Dist. Vadodara	Sulphur Dioxide Sulfuric Acid Thionyl Chloride	Mr. Surendra P. Goyal, Director	9327226698
				Mr. Virendra Nirwan, Unit Head	9687772335
22.	Panoli Intermediates (I) Pvt. Ltd, Unit-III	156-A & B /157, GIDC, Nandesari, Dist. Vadodara	Ethylene Oxide	Mr. Surendra P. Goyal, Director	0265-2398555
				Mr. Shankarbhai Patel, Factory Manager	9377237128
23.	Panoli Intermediates (I) Pvt. Ltd. (Unit – IV)	Plot No. 122 & 128, GIDC Industrial Estate, Nandesari, Dist: Vadodara.	Ethylene Oxide	Mr. Surendra P. Goyal, Director	0265-2398555
				Mr. Shankarbhai Patel, Factory Manager	9377237128
24.	Rasayan Enterprise	Plot Nso. 36/37, GIDC Nandesari, Dist. Vadodara	Ethylene Oxide	Mr. Saiprasad Samant, Partner	9824033005
				Mr. Kaushik K. Shah Prod. Manager	9904001751
25.	Ratna Nicochem. Pvt Ltd.	C-1/41/B-4, GIDC, Nandesari, Dist. Vadodara	Chlorine	Mr. Mayur Jadeja, Director	9824068117
				Mr. Jignesh Patel, Factory Manager	9879133773
26.	Reliance Industries Ltd.	P.O. Petrochemicals, Dist. Vadodara	Ammonia Ethylene Oxide Ethylene Propylene Vinyl Chloride Monomer (VCM) Butadiene Hydrogen Fluoride LPG Naphtha	Mr. Rajiv Agrawal, Factory Manager	9662048260
				Mr. Jay Shah, Head Operations	7574822348

9.3 LCG WISE LIST OF MAH UNITS (CONTINUE...)**LCG-1: - Vadodara – Nandesari - PCC (Continue...)**

Sr. No	Factory Name	Address	Major Hazardous Chemical	Contact Person	Contact No.
27.	Schaeffler India Limited	Plot No. 498,468, 487, Maneja, Vadodara	LPG Propane	Mr. Kuljit Pal Singh, Sr. Manager	6359011293
				Mr. Shital Shah, Sr. Manager	9879633819
28.	Silox India Private Limited- Atladra	Kalali Road, Atladara, Vadodara	Sulphur Dioxide Oleum (Sulphur Trioxide) Methanol Formaldehyde	Mr. Prakash Raman, Managing Director	9702995995
				Mr. Manoj M. Gupta, AVP- Operations & Factory Manager	9099939041
29.	Simalin Chemical Industries Pvt. Ltd	Plot No. 13, GIDC, Nandesari, Dist. Vadodara	Formaldehyde Methanol Ammonia	Mr. Ashokbhai V. Patel (MD)	9712906569
				Mr. Avinash Joshi, V. P. (Opr.)	9979872488
30.	Styrenix Performance materials limited	51, GIDC, Nandesari, Dist: Vadodara	Acrylonitrile	Mr. Ravishankar Kompalli, Occupier	9825033214
				Mr. Divyang Madhusudan Chokshi, Plant Manager	9979890248
31.	Swati Chloride Pvt. Ltd.	Plot No. 99/1 B, GIDC Nandesari, Dist. Vaddoara	Chlorine	Mr. Om Parkash Jain (MD)	9824036177
				Mr. Rahul Jain, Director	9898003678
32.	Akshar Organics Pvt. Ltd.	47-1-6, GIDC Nandesari, Dist. Vadodara	Closed		
33.	Chemstar Organics (I) Ltd.	Plot No. 108, GIDC, Nandesari, Dist. Vadodara	Closed		
34.	Gujarat Dyestuff Industries	Plot No. 158, GIDC Nandesari, Dist. Vadodara	Closed		

9.3 LCG WISE LIST OF MAH UNITS (CONTINUE...)**LCG-2: PADRA**

Sr. No	Factory Name	Address	Major Hazardous Chemical	Contact Person	Contact No.
1.	Adar Chemicals Pvt. Ltd.	Plot No.383 , Village Luna, Taluka Padra, Dist. Vaddoara	Chlorine	Mr. M. J. Patel, Director	9879106137
				Mr. Pravin M. Baria, Works Manager	9879106136
2.	Aroma De France	Block No. 324, Nr. Ipca Laboratories, Village-Ranu, Ta-Padra, Dist. Vadodara	LPG, Ethyl Alcohol	Mr. Minesh M. Patel, Occupier	8141444944
				Mr. Ketan J. Brahmbhatt, Factory Manager	9662529776
3.	Bodal Chemicals Ltd. (Unit - VII)	Block No. 795 to 804, Village : Dudhwada, ECP channel Road, Tal. Padra, Dist. Vaddoara	Ethylene Oxide Oleum	Mr. Rajarshi Ghosh, Occupier	9909950907
				Mr. Vijaybhai Joshi, Safety Manager	9712922425
4.	Bodal Chemicals Ltd. (Unit - VIII)	106-108, Village: Ekalbara, Taluka: Padra, Dist. Vaddoara	Oleum (SO3)	Mr. Rajarshi Ghosh, Occupier	9909950907
				Mr. Vijaybhai Joshi, Safety Manager	9712922425
5.	Greenovat Organics Pvt. Ltd.	Block No. 231, Village: Ekalbara, Taluka: Padra, Dist. Vaddoara	Chlorine	Mr. Pravin B. Rabadia, Managing Director	9898027373
				Mr. Mayank Patel, Manager	9898677466
6.	Grindly Gasses & Petro. Pvt. Ltd.	Plot No. 570 - 573, Mobha - Gavasad Road, Village Mobha, Taluka Padra, Dist. Vaddoara	LPG Propane	Mr. Maulik Vyas, Director	9925028368
				Mr. Vihagbhai Jokhakar, Factory Manager	9924924947
7.	Gulbrandsen Chemical Pvt. Ltd.	On Coastal Highway, P. O. Mujpur, Taluka: Padra, Dist. Vaddoara	Chlorine	Mr. Narendra Varma, Director	9099001023
				Mr. Chinmay Shah, Factory Manager	9909023503
8.	Kadillac Chemicals Pvt. Ltd.	Block No. 853/854, Village: Chokari, Tal.: Padra, Dist. Vaddoara	Chlorine	Mr. Kantibhai D. Patel, Managing Director	9909929977
				Mr. Vishnubhai Patel, Factory Manager	9909929969
9.	Kiri Industries Limited Unit – III	Plot No. 396-399, ECP Channel Road, Village : Dudhwada, Tal. Padra, Dist. Vaddoara	Ethylene Oxide	Mr. Jayeshkumar G. Vyas, C.E.O	9687681058
				Mr. Rajesh Kothari, General Manager	9825400166
10.	Kiri Industries Limited - Unit 5	Plot No. 552 A, 566, 567, 569, 571 Ecp Canal Road Village: Dudhwada, Taluka: Padra, Dist: Vadodara	Oleum 65%, Oleum 23% Liquid So3	Mr. Bhasker Joshi, VP-Manufacture	9687681202
				Mr. Rajesh Kothari, General Manager	9825400166

9.3 LCG WISE LIST OF MAH UNITS (CONTINUE...)**LCG-2: PADRA (Continue...)**

Sr. No	Factory Name	Address	Major Hazardous Chemical	Contact Person	Contact No.
11.	Mayur Dyechem Intermediates LLP (Unit - III)	Survye No. 327 To 334 A, Vill: Karakhadi, Taluka Padra, Dist. Vaddoara	Oleum (Sulphar Trioxide)	Mr. Mayurbhai B. Patel (CMD)	9825008407
				Mr. Shirishbhai M. Shah, General Manager	9825048585
12.	Neogen Chemicals Limited	At & Po : Village Karakhadi – 391 450, Tal. Padra, Dist. Vadodara	Bromine Methanol EDC Toluene N-Propanol	Mr. Shyamsundar Upadhyay, Occupier	9833567877
				Mr. Kamlesh Hariyani, Factory Manager	9909956059
13.	Prime Organic	Block No. 565/B, ECP Road, Village Luna, Tal. Padra, Dist. Vadodara	Chlorine	Mr. Kalpesh J. Amin, Occupier & Factory Manager	9825028386
14.	Shimmer Chemicals Pvt. Ltd.	Block No. 336/338, Borsad State Highway, Muppur, Tal.: Padra, Dist. Vadodara	Chloine	Mr. Ramanbhai C. Patel, Director	9879776612
				Mr. Jayeshbhai R. Patel, Director	9825095336
15.	Shiva Pharmachem Ltd.	ECP Chanal Road, Plot No. 588, Village Luna, Tal. Padra, Dist: Vadodara	Sulphur Dioxide	Mr. Jagmohan Zalani, Director	9825040747
				Mr. Amresh Kumar Verma, Factory Manager	7490008032
16.	Silox India Pvt. Ltd.	At & Po: Ekalbara, Tal: Padra, Dist: Vadodara	Sulphar Dioxide	Mr. Prakash Raman, Managing Director	9702995995
				Mr. Bhushan Shinde, GM (Operation)	6359914851
17.	TML Industries Ltd.	79,1896,1902 & 1903, Village: Karakhadi Ta: Padra Dist: Vadodara	Chlorine	Mr. Alpesh Patel, Factory Manager	9601151017
				Mr. Vipul Dabhi, Safety Officer	9099027287
18.	Transpek Industry Ltd.	At & Post : Ekalbara, Tal: Padra, Dist: Vadodara	Chlorine Sulphur Dioxide Sulphur Dichloride	Shri Avtar Singh, Director	9872600005
				Mr. Dharmesh Pancholi, Manager - Safety	7574801006

9.3 LCG WISE LIST OF MAH UNITS (CONTINUE...)**LCG-3: SAVLI**

Sr. No	Factory Name	Address	Major Hazardous Chemical	Contact Person	Contact No.
1.	Anugrah In-Org (P) Limited	1088/B, Lamdapura Road, At & Post Manjusar, Tal. Savli, Dist. Vadodara	Chlorine	Mr. Kashyap Shah, Occupier	9825007278
				Mr. Janak Shah, V P Operation	9825988988
2.	Base Metal Chemicals	Plot No. 2, RS. No. 1089/B, Lamadapura Road, Manjusar, Taluka: Savli, Dist. Vadodara	Chlorine	Mr. Himanshu K. Mehta, Factory Manager	9825303215
				Mr. R. N. Pandey, Sr. Manager- HR & Administration	9978901869
3.	Chemcon Speciality Chemicals Limited	Plot No. 336, 355 Manjusar Kunpad Road, Vill : Manjusar, Taluka Savli, Dist. Vadodara	Ammonia Chlorine Bromine Benzene Toluene	Mr. Kamal Aggarwal Chairman & MD	9825008195
				Mr. Himanshu Purohit, Director	9879204812
4.	Gurunanak Chemical Industries	663, Lamdapura Road, Savli, Majusar, Dist. Vadodara	Chlorine	Mr. Sameer Bhaskaran	9824115950
				Mr. Vinod Nair	9427784232
5.	Hari Orgo Chem Pvt.Ltd.	579, At & Po Manjusar, Ta. Savli, Dist. Vadodara	Chlorine	Mr. Nilaybhai P. Shah, Occupier	9227422660
				Mr. Divyang C. Upadhyay, Factory Manager	9227140325
6.	Hindustan Petroleum Corporation Limited	Village- Asoj, Pilol, GIDC Manjusar, Dist. Vadodara	Motor Spirit HSD Kerosene Ethanol	Rajendra Niraanjan, DGM –Installation	9820134807
				Girish Kumar Yadav, Sr. Manager	9078681566
7.	IndianOil Adani Ventures Limited	Indian Oil Corporation Limited, Vadodara Savli Road –Dumad, Dist. Vadodara	Motor Spirit HSD Kerosene Ethanol Bio-Deseal	Mr. Anubhav Jain, Occupier	7995444047
				Mr. Deeepak Naik, Terminal Manager	9630451155
8.	Indo Amines Ltd	Plot No.1723,1724 & 174 6,Vill-Tundav, Tal-Savli, Dist. Vadodara	Ethylene Oxide Ammonia Acrylonitrile	Mr.Keyur Chitre, Director Operation	9913687791
				Mr. Deepak Parmar, Sr.Manager HR, IR & Admin	7203040201
9.	Jubilant Ingrevia Limited	Block – 133, Village: Samlaya, Jarod – Savli Road, Tal.: Savli, Dist. Vadodara	Ethylene Oxide Butadiene, Trimethyl Amine	Mr Gurish Khosla, Unit Head	9428520198
				Mr. Amrish Sharma, Deputy Manager-EHS	9909476480

9.3 LCG WISE LIST OF MAH UNITS (CONTINUE...)**LCG-3: SAVLI (Continue...)**

Sr. No	Factory Name	Address	Hazardous Chemical	Contact Person	Contact No.
10.	LUBI GEL LLP	Savli – Vadodara Road, Block / Survey No : 513/B, At & Post : Manjusar, Taluka : Savli , Dist.: Vadodara	LPG IPA	Mr. Rajeev Hissaria, Factory Manager	8003004555
				Mr. Narendra Patel, Manager -HSE	9512880010
11.	National Engineering Industries Limited	Plot No.2-7/3, Alindra Estate, GIDC Manjusar, Savli, Dist.Vadodara	LPG Methanol	Mr. Manohar Lal Pachisia, Director	9830026351
				Mr. Manish Pandey	9726579972
12.	Nirma Ltd.	Detergent Complex,Village: Alindra, Taluka: Savli, Dist. Vadodara	LPG Naphtha Benzene n-Pentane Kerosene ISO-octane Hydrogen	Dr. Navin Kishor, Unit Head	9879618697
				Mr. Yogesh K. Pandya, Safety Officer	9879618637
13.	Schaeffler India Limited	Plot No.1, Alindra, Savli GIDC, Tal: Savli, Dist.: Vadodara	Propane Methanol	Mr. Yogesh Sawarkar, Factory Manager	9712976048
				Mr. Mallikharjuna Evani, Plant Head	9727787521
14.	Thermax Limited	Plot No.21/1,2,3, Manjusar Savli GIDC, Vadodara – 391774	Propane	Mr. Kiran Shaligram Factory Manager	9881057833
				Mr. Hari Pratap Singh, Safety Officer	8543977715
15.	Vadodara LPG Terminal (IOCL)	Indian Oil Corporation Limited (MD), Vadodara LPG Terminal, Village: Dumad, Dist. Vadodara	LPG	Mr. Vijay Bhatkar, Deputy General Manager (P), VLT	9448286697
				Mr. P. C. Pawar, Chief Manager (Plant), VLT	9706075357

9.4 FACT SHEETS

The details in respect of name, address, manufacturing process, storage of major hazardous chemicals, work force, emergency contact persons' Name, Telephone Numbers, etc. of each working MAH unit is given in form of Fact Sheet, as follows;

9.4.1 FACT SHEET of M/s. Bharat Petroleum Corporation Ltd.**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 1**

1.	Name of the Factory		:		Bharat Petroleum Corporation Limited					
	Address		:		BPCL Koyali Installation, Village Karachiya, Post Bajwa, Vadodara, Gujrat-391310					
	Phone no.		:		6358751402					
	E-mail		:		z_koyali_planning@bharatpetroleum.in					
	Longitude/Latitude of Company		:		22.48985,73.14909					
2.	Name of Occupier		:		Mr. Raja M.					
	Residence Address		:		Bharat Niwas, Gotri, Vadodara, Gujrat-390021					
	Mobile No.		:		7506733030					
3.	Name of Factory Manager		:		Mr. Ram Kumar					
	Residence Address		:		Bharat Niwas, Gotri, Vadodara, Gujrat-390021					
	Mobile No		:		9453042457					
4.	Name of Safety Officer		:		-					
	Residence Address		:		-					
	Mobile No		:		-					
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Ram Kumar	Plant Manager	-				9453042457		
	2.	Tajeshwar	HSSE	-				9478823709		
6.	Nature of Manufacturing/ Product		:		Receipt, Storage, and dispatch of Petroleum Products					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	8:30 To 17:30	9	-	23	-	-	1	33	1
	1 st	06:00 to 14:00	-	-	-	-	3	-	3	-
	2 nd	14:00 to 22:00	-	-	-	-	3	-	3	-
	3 rd	22:00 to 06:00	-	-	-	-	3	-	3	-
		Total	9	-	23	-	9	1	42	1

FACT SHEET of M/s. Bharat Petroleum Corporation Ltd. (Continue...)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 1**

8. Hazardous Chemical Storage details								
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	MS	Floating roof tank	-	3	7237.6	Ambient	Ambient
	2.	HSD	Coned roof tank	-	4	14392	Ambient	Ambient
	3.	ETHANOL	Floating roof tank	-	4	2707.2	Ambient	Ambient
	4.	MTO	Under Ground Tank	-	1	149.6	Ambient	Ambient
	5.	BIO-DIESEL	Coned roof tank	-	2	1110.4	Ambient	Ambient

9.4.2 FACT SHEET of M/s. Chemtech Intermediates Pvt. Ltd.**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT-2**

1.	Name of the Factory			:	Chemtech Intermediates Pvt Ltd					
	Address			:	C-1/128/13-14-15-16, GIDC Nandesari, Dist.Vadodara – 391 340					
	Phone no.			:	0265- 2840463					
	E-mail			:	chemtechintermediates@gmail.com					
	Longitude/Latitude of Company			:						
2.	Name of Occupier			:	Mr. Ripalbhai N. Patel					
	Residence Address			:	9, Kailashpark, Opp. T. B. Hospital, Gotri Road, Vadodara-390 007					
	Mobile No.			:	9825021759					
3.	Name of Factory Manager			:	Mr. Rajeshbhai Gajjar					
	Residence Address			:	101, Saheli Park Apartment, Behind Seven Seas Mall, Fatehgunj, Vadodara-390002					
	Mobile No			:	9099061784					
4.	Name of Safety Officer			:	-					
	Residence Address			:	-					
	Mobile No			:	-					
5.	Contact Person			:						
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
1.	Mr. Mahesh Patel	Plant Manager	0265- 2840463				9173587304			
2.	Mr. Rajesh Gajjar	Factory Manager	0265- 2840463				9099061784			
6.	Nature of Manufacturing/ Product			:	Cyanation & Acids					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9.00 to 6.00	12	0	0	0	0	0	12	0
	1 st	7.00 to 3.00	12	0	15	0	0	0	27	0
	2 nd	3.00 to 11.00	10	0	10	0	0	0	20	0
	3 rd	11.00 to 7.00	10	0	10	0	0	0	20	0
		Total	44	0	35	0	0	0	79	0
8.	Hazardous Chemical Storage details									
Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters				
						Pressure Kg/cm2		Temperature °C		
1.	Sodium Cyanide	MS Drum	50 Kgs	700 Nos	35 MT	Atmospheric		Ambient		
2.	Benzyl Chloride	Tank	Storage tank	2 Nos	50 MT	Atmospheric		Ambient		
3.	Sulphuric Acid	Tank	Storage tank	1 Nos	25 MT	Atmospheric		Ambient		
4.	Tri Ethyl Amine (TEA)	Barrels	210 Ltr	5 Nos	1.1 KL	Atmospheric		Ambient		
5.	Chlorine	Tonner	900 Kgs	3 Nos	2.7 MT	3-4 Kg/cm2		Ambient		

9.4.3 FACT SHEET of M/s. Chloritech Industries**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 3**

1.	Name of the Factory		:		Chloritech Industries						
	Address		:		Plot No. 122/3,4 & 5 GIDC Estate At & Post. Nandesari Ta:- Vadodara Dist. Vadodara- Pin code 391340						
	Phone no.		:		0265-2841454, 2840367, 2840003, 7227049703						
	E-mail		:		nbhatt@chloritech.com, nilay@chloritech.com						
	Longitude/Latitude of Company		:								
2.	Name of Occupier		:		Mr. Bhavesh P. Shah, Mr. Nilay P. Shah						
	Residence Address		:		Harikunj, Opp. C. N. Vidhyalaya, Ambawadi, Ahmedabad						
	Mobile No.		:		9227140314, 9227422660						
3.	Name of Factory Manager		:		Mr. Nikunj S. Bhatt						
	Residence Address		:		7, Harikrupa Society, B/h. GEB Sub Station, Gotri Road, VTC, Vadodara-390021						
	Mobile No		:		9227140316						
4.	Name of Safety Officer		:		Mr. Narendra G. Chauhan						
	Residence Address		:		46, Laxmi Nagar, Opp, Dharti Tenaments, Sama, Vadodara						
	Mobile No		:		7621991475						
5.	Contact Person		:								
	Sr. No.	Name	Designation	Telephone Number							
				Factory / Office					Mobile		
	1.	Mr. Bhavesh P. Shah	Director	0265-2841454, 2840367, 2840003, 7227049703					9227140314		
	2.	Mr. Nilay P. Shah	Director	0265-2841454, 2840367, 2840003, 7227049703					9227422660		
	3.	Mr..Nikunj S Bhatt	Managar (Expert Person)	0265-2841454, 2840367, 2840003, 7227049703					92271 40316		
6.	Nature of Manufacturing/ Product			:		Chemical					
7.	Man Power & Timing										
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total		
			M	F	M	F	M	F	M	F	
	General	09.00 am - 17.30 pm	21	--	20	--	01	--	42	--	
	1 st	07.00 am - 15.00 pm	22	--	05	--	02	--	29	--	
	2 nd	15.00 pm - 23.00 pm	21	--	05	--	-	--	26	--	
	3 rd	23.00 pm - 07.00 am	17	--	05	--	02	--	24	--	
		Total	81	--	35	--	05	--	121	--	
8.	Hazardous Chemical Storage details										
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters				
							Pressure Kg/cm²	Temperature °C			
	1.	Chlorine	Toner	900 Kg	23	20.7 MT	7 Kg/Cm ²	Ambient			

9.4.4 FACT SHEET of M/s. Deep Darshan Chemicals LLP**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 4**

1.	Name of the Factory		:		Deep Darshan Chemicals LLP					
	Address		:		48/2/A, GIDC Industrial Estate, Nandesari, Dist. Vadodara -391 340					
	Phone no.		:		9974747471, 9904222456					
	E-mail		:		deepdarshanchemicalsllp@gmail.com					
	Longitude/Latitude of Company		:		23.0401, 72.0510					
2.	Name of Occupier		:		Mr. Bhaveshbhai P. Patni					
	Residence Address		:		18, Narayan Green Soc., Opp. Sky mark, Sama savli Road, Vemali					
	Mobile No.		:		9974747471					
3.	Name of Factory Manager		:		Mr. Harshad K. Patel					
	Residence Address		:		B- 130, Ambika Park, Near Kenal, Panchvati, Gorwa, Vadodara - 391345					
	Mobile No		:		9426546823					
4.	Name of Safety Officer		:		-					
	Residence Address		:		-					
	Mobile No		:		-					
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Bhavesh Patni	Partner	9974747471, 9904222456				9974747471		
	2.	Harshad Patel		9974747471, 9904222456				9426546823		
	3.	Jaynesh Goswami		9974747471, 9904222456				9904222456		
6.	Nature of Manufacturing/ Product		:		Batch process to manufacturing Mono Chloro Acetic Acid (MCA)					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09.00 to 06.00	2	-	4	2	1	-	7	2
	1 st	06.00 to 02.00	-	-	6	-	1	-	7	-
	2 nd	02.00 to 10.00	-	-	6	-	1	-	7	-
	3 rd	10.00 to 06.00	-	-	6	-	1	-	7	-
		Total	2	-	22	-	4	-	28	2
8.	Hazardous Chemical Storage details									
	Sr. No	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm2	Temperature °C		
	1.	Acetic Acid	Tank	50 MT	2	80 MT	Atmospheric	Ambient		
	2.	Chlorine	Tonner	900 Kg	24	21.2 MT	4 Kg/cm2	Ambient		

9.4.5 FACT SHEET of M/s. Deepak Nitrite Limited**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 5**

1.	Name of the Factory		: Deepak Nitrite Limited		
	Address		: Plot No: 4/1(p), 5(p), 6 to 12, GIDC, Nandesari Industrial Estate, Nandesari, Vadodara – 391340, Gujarat, India.		
	Phone no.		: 0265-260 1200 / 1264 / 1216 / 1203		
	E-mail		: + 91 265 284 0231 sanjay.chovatiya@godeepak.com		
	Longitude/Latitude of Company		: 22.4198656,73.0988544		
2.	Name of Occupier		: Mr. Girish Satarkar		
	Residence Address		: F-11, Samarpan Bunglows, B/h. Raneshwar Temple, off: Vasna Road, Vadodara - 390 007, Gujarat		
	Mobile No.		: 7574801412		
3.	Name of Factory Manager		: Mr. Sanjay Kumar Chovatiya		
	Residence Address		: 102, Asha Nagar, 2 Udhana, Surat -394210, Gujarat		
	Mobile No		: 6358874860		
4.	Name of Safety Officer		: Mr. Viral Pastagia		
	Residence Address		: B5 Yogipark, Opp Yash Compex Gotri Vadodara-391420		
	Mobile No		: 9825107212		
5.	Contact Person		:		
	Sr. No.	Name	Designation	Telephone Number	
				Factory / Office	
				Mobile	
	1.	Mr. Sanjay Chovatiya	Factory Manager	0265 2601203	6358874860
	2.	Mr. Somnath D	DGM- Operation	0265 2601218	9727726560
	3.	Mr. Viral pastagia	DGM, Health & Safety	0262-2601316	9825107212
	3.	Mr. Mitesh Shah	Manager Health & Safety	0265 2601261	7043000363
	4.	Mr.Laxman Chawla	Head Security	0265 2601256	9574001057
	6.	Mr.Devendra Jadeja	Dy Mgr Security	0265 2601264	9574002216
	7.	Mr. Jaimin Raval	Engineering Head	0265 2601280	7211100903
	8.	Mr. A S Sarma	Head TSD	0265 2601217	9904401746
	10.	Mr. Harish Mehta	AGM – Project	0265 2601241	9427506555
6.	Nature of Manufacturing/ Product		: Manufacture and Supply of Basic Intermediate, Fine & Specialty Chemicals and Performance Products. 1. SNI /SNA 2. NSA 3.HAS 4. MAHCL 5.MAHCL Solid, 6. MNT, 7.ONT 8. PNT 9. 2-EHN.10. MHBTF, 11. M-Xylene		
7.	Man Power & Timing				
	Shift	Time	Maximum company worker at time		In "workers" include all employees, contract workers, trainees, apprentices etc.
			Male	Female	Total
	General	09.00 to 17.00	206	9	395
	1 st	06.00 to 14.00	155	0	175
	2 nd	14.00 to 22.00	136	0	155
	3 rd	22.00 to 06.00	98	0	108
		Total	595	9	833
					1437

FACT SHEET of M/s. Deepak Nitrite Limited (Continue...)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT-5**

8. Hazardous Chemical Storage details							
Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
						Pressure Kg/cm2	Temperature °C
1.	M- Xylene	Tank	223.5	1	261.5	Atmospheric	Ambient
2.	Toluene	Tank	373.5	2	437.3	Atmospheric	Ambient
3.	2EHA	Tank	199.8	1	234.9	Atmospheric	Ambient
4.	3ABTF	Tank	29	Packed in bags	27	Atmospheric	Ambient
5.	Toluene	UG Tank	40.9	1	48.2	Atmospheric	Ambient
6.	Chlorine	Tonner	900 Kg	5	5	4.5 kg/ cm2	Ambient
7.	Ammonia	Capsule tank	50	2	90	10-12 kg/cm2	Ambient
8.	SO2	Tonner	900 Kg	52	52	4.5 kg/ cm2	Ambient
9.	Nitric Acid Conc.	Tank	350.7	3	412.5	Atmospheric	Ambient
10.	DNA (Dill. Nitric Acid)	Tank	62.4	2	73.4	Atmospheric	Ambient
			306.38		360.45		
11.	H2SO4 Sulfuric Acid	Tank	268.8	3	316.2	Atmospheric	Ambient
			94.35		111.0		
			16.8		19.7		
			24.2		28.4		
12.	NSA (Nitrosyl Sulphuric acid)	Tank	68.85	2	81.00	Atmospheric	Ambient
13.	Hydrochloric Acid	Tank	34.2	2	40.25	Atmospheric	Ambient
14.	Sodium Hydroxide	Tank	1559.1	4	1834.2	Atmospheric	Ambient
			37.3		37.3		
			25		29.5		
			17		25		
15.	Nitro Toluene(ONT,MNT, PNT)	Tank	867	3	1014.8	Atmospheric	Ambient
			208.6		243.7		
			551.2		642.1		
16.	2,6-Nitro Xylene 2,4 Nitro Xylene 3,5 NitroXylene	Tank	131.4	4	150.0	Atmospheric	Ambient
			93.69		109.5		
			64.54		75.3		
17.	2-EHN	Tank	701.2	2	820.4	Atmospheric	Ambient
18.	DMS	Tank	82.65	3	97.24	Atmospheric	Ambient
19.	HADS	Tank	34.61	1	40.72	Atmospheric	Ambient
20.	MADS	Tank	38.47	1	45.26	Atmospheric	Ambient
21.	Sodium Sulphate	Tank	160.42	Packed in bags	108.73	Atmospheric	Ambient
22.	MAHCL	Tank	53.38	2	62.8	Atmospheric	Ambient
23.	Nitro Xylene	Tank	45	1	45	Atmospheric	Ambient
			30	1	30		
			10	1	10		
24.	Sulfuric acid 70%	Tank	100	1	100	Atmospheric	Ambient

9.4.6 FACT SHEET of M/s. Dhiren Chemical Industries**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT-6**

1.	Name of the Factory		:		Dhiren Chemical Industries							
	Address		:		124/36B, GIDC Estate, Nandesari, Dist.: Vadodara – 391 340.							
	Phone no.		:		9265924259							
	E-mail		:		dhirenchemical@gmail.com							
	Longitude/Latitude of Company		:									
2.	Name of Occupier		:		Mr. R. R. Shah							
	Residence Address		:		2, Green Park Society, Nr. SNTD College, Akota, Vadodara – 390 020.							
	Mobile No.		:		9376219675							
3.	Name of Factory Manager		:		Mr. Manish K. Shah							
	Residence Address		:		12, Shreenath Residency, Opp. Ratnakar Tenament, Gotri Road, Vadodara – 390 021							
	Mobile No		:		9427320533							
4.	Name of Safety Officer		:		-							
	Residence Address		:		-							
	Mobile No		:		-							
5.	Contact Person		:									
	Sr. No.	Name	Designation	Telephone Number								
				Factory / Office					Mobile			
				1.	Mr. R. R. Shah	Proprietor	9265924259					93762 19675
				2.	Mr. Dhiren R. Shah	Sr. Manager	9265924259					94265 64461
3.	Mr. Manish K. Shah	Manager	0265-2370232					9265924259				
6.	Nature of Manufacturing/ Product		:		Chemical Industry							
7.	Man Power & Timing											
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total			
			M	F	M	F	M	F	M	F		
	General	09:00 to 17:30	4	0	0	0	0	0	4	0		
	1 st	-	-	-	-	-	-	-	-	-		
	2 nd	-	-	-	-	-	-	-	-	-		
	3 rd	-	-	-	-	-	-	-	-	-		
		Total	4	-	-	-	-	-	4	-		
8.	Hazardous Chemical Storage details											
Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters						
						Pressure Kg/cm²		Temperature °C				
1.	Ethylene Oxide	Tank	10	01	7.5	3 kg/cm ²		30 °C				

9.4.7 FACT SHEET of M/s. Farmson Basic Drugs Private Limited (UNIT-I)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 7**

1.	Name of the Factory		:		Farmson Basic Drugs Pvt Ltd. (Unit-I)					
	Address		:		Plot No. 28-35, 40/2, G.I.D.C., Nandesari, Vadodara - 391 340. Gujarat, India.					
	Phone no.		:		0265-2840082					
	E-mail		:		hr@farmson.com					
	Longitude/Latitude of Company				22.41 N/73.08 E					
2.	Name of Occupier		:		Mr.Narshibhai K Patel					
	Residence Address		:		B-31, Appunagar Society, Gotri Road, Opp.Reliance Petrol Pump, Vadodara-390021					
	Mobile No.		:		9327229107					
3.	Name of Factory Manager		:		Mayur Patel					
	Residence Address		:		B-303, Rosewood Residency, Behind Yesh Complex, Opp.Shivanjali Society, Gotri Vasna Road- 390021, Vadodara, Gujarat.					
	Mobile No		:		8511115818					
4.	Name of Safety Officer		:		Mr.Vishal Parab					
	Residence Address		:		B-101, Aradhya Ornate, BesidesSakar Opulent, Sama Savli Road, Vemali, Vadodara					
	Mobile No		:		7486088592					
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office			Mobile			
	1.	Mr.Prasad Sarode	DGM-EHS	0265-2840082			6358927014			
	2.	Mr.Himanshu Chauhan	Sr.Manager-HR	0265-2840082			8511182529			
	3.	Mr. Dushyanr Parekh	Sr. Manager-Maint.	0265-2840082			7227079415			
	4.	Dr.Prashant Shihora	Works Manager	0265-2840082			8785268663			
6.	Nature of Manufacturing / Product		:		API-Pharmaceutical / Paracetamol					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9.30AM to 5.30 PM	77	17	139	5	0	0	216	22
	1 st	7.00 AM to 3.00 PM	53	0	108	0	0	0	161	0
	2 nd	3.00 PM to 11.00 AM	50	0	58	0	0	0	108	0
	3 rd	11.00 PM to 7.00 AM	48	0	59	0	0	0	107	0
	4 th	8.00 AM to 8.00 PM	0	0	0	0	20	0	0	0
	5 th	8.00 PM to 8.00 AM	0	0	0	0	19	0	0	0
	TOTAL		228	17	364	5	39	0	631	22

FACT SHEET of M/s. Farmson Basic Drugs Private Limited (Unit-I)
(Continue...)

LCG-1: VADODARA – NANDESARI - PCC

MAH UNIT- 7

8.	Hazardous Chemical Storage details							
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature 0C
	1.	Acetic Anhydride	A/G Tank farm area	100 KL X 01 Nos. 150 KL X 01 Nos. 150 KL X 01 Nos. 75 KL X 03 Nos.	A/G Tank area	550	Atmospheric	Ambient
	2.	Sodium Hydro Sulfite	RM Store	2 MT in 50 Kgs drum	50 kgs Drums	2 MT	Atmospheric	Ambient
	3.	Activated Carbon	RM Store	07 MT in coated liner bag of 14 Kgs.	14kgs Bags	7 MT	Atmospheric	Ambient
	4.	Chlorine	Chlorine Storage Area	900 Kg X 20 Nos. Tonner	20 No's	20 No's	4.5 Kg/Cm²	Ambient

9.4.8 FACT SHEET of M/s. Farmson Basic Drugs Private Limited (UNIT-II)**LCG-I: VADODARA – NANDESARI - PCC****MAH UNIT- 8**

1.	Name of the Factory		:	Farmson Basic Drugs Private Limited (Unit-II)						
	Address		:	Plot No. 14, GIDC, Nandesari Industrial Estate, Vadodara-391340						
	Phone no.		:	0265-2840082						
	E-mail		:	hr@farmson.com						
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:	Mr.Narshibhai K Patel						
	Residence Address		:	B-31, Appunagar Society, Gotri Road, Opp.Reliance Petrol Pump, Vadodara-390021						
	Mobile No.		:	9327229107						
3.	Name of Factory Manager		:	Dr. Prashant Shihora						
	Residence Address		:	101, Soham Residency, Parishram Society, B/h INORBIT MALL, Subhanpura, Vadodara-390023						
	Mobile No		:	8758268663						
4.	Name of Safety Officer		:	Mr.Vipulkumar M Prapati						
	Residence Address		:	At & Po. Vishrampura, Ta.Petlad, Dist.Anand-388480						
	Mobile No		:	7600841187						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr.Prasad Sarode	DGM-EHS	0265-2840082				6358927014		
	2.	Mr.Anit Nair	Manager-HR	0265-2840082				7490055640		
	3.	Mr. Dushyanr Parekh	Sr. Manager-Maint.	0265-2840082				7227079415		
	4.	Mr.Mayur patel	Expert Person	0265-2840082				8511115818		
6.	Nature of Manufacturing / Product		:	API-Pharmaceutical / Paracetamol						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9.30AM to 5.30 PM	115	21	230	06	15	01	360	28
	1 st	7.00 AM to 3.00 PM	110	0	107	00	00	00	217	00
	2 nd	3.00 PM to 11.00 AM	80	0	97	00	00	00	177	00
	3 rd	11.00 to 7.00 AM	63	0	83	00	17	00	163	00
		Total	368	21	517	06	32	01	917	28

FACT SHEET of M/s. Farmson Basic Drugs Private Limited (Unit-II)**(Continue...)****LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 8**

8.	Hazardous Chemical Storage details							
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature 0C
	1.	Dilute Acetic Acid	A/G Tank farm area	50 KL X 3 Nos.	03 No's	350 kl	Atm	Ambient
	2.	Ethyl Acetic Acid	A/G Tank farm area	20 KL X 1 Nos. 30 KL X 1 Nos.	01 No's	50 Kl	Atm	Ambient
	3.	Glacial acetic Acid	A/G Tank farm area	50 KL 02 Nos.	02 No's	100 KL	Atm	Ambient
	4.	Acetic Anhydride	A/G Tank farm area	50 KL X 4 Nos. 100 .	04 No's	200 KL	Atm	Ambient
	5.	Para Amino Phenol	Road Tanker	30KL X 3 Nos.	01 No's	90 KL	Atm	Ambient
	6.	HCL	Tank farm area	50 KL X 1 Nos.	01 No's	Nil	Atm	Ambient
	7.	Caustic Lye	Tank farm area	40 KL X 1 Nos.	01 No's	Nil	Atm	Ambient
	8.	Sodium Hydro Sulfite	RM Store	12 MT in 50 Kgs drum	240 No's	12 MT	Atm	Ambient
	9.	Activated Carbon	RM Store	20 MT in coated liner bag of 14Kgs	588 No's	20 MT	Atm	Ambient
	10.	Paracetamol	Finished Goods Store	100 MT in 50 Kgs Bag	2000 No's	200 MT	Atm	Ambient
11.	Chlorine	Chlorine Storage Area	900 Kg X 16 Nos. Tonner	16 no's	14,400 kgs	4.5kgs/Cm ²	Ambient	

9.4.9 FACT SHEET of M/s. GAIL (India) Limited**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 9**

1.	Name of the Factory		:		GAIL (India) Limited					
	Address		:		GIDC Industrial Estate, Waghodia, Dist: Vadodara, PIN: 391 760					
	Phone no.		:		02668-267316					
	E-mail		:		ak.gupta@gail.co.in					
	Longitude/Latitude of Company									
2.	Name of Occupier		:		Mr. Praveer Kumar					
	Residence Address		:		Inspiration Building, Phase-1, GAIL Complex (PO), GAIL (India) Limited, Raghogarh, Guna District (Madhya Pradesh) – 473112					
	Mobile No.		:		9899654723					
3.	Name of Factory Manager		:		Mr. Abhay Kumar Gupta					
	Residence Address		:		E-302, Shantam Green, Vasna Road, Vadodara-390012					
	Mobile No		:		9756700947					
4.	Name of Safety Officer		:		Sh. S S Dharne, DGM (F&S)					
	Residence Address		:		B 304, Riddhi-Siddhi Erica, Manisha Chowkdi, Vasna Road Vadodara					
	Mobile No		:		8954892747					
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. S S Dharne	DGM (F&S)	(02668) 267440				8954892747		
	2.	Mr. Shiv Purusharthi	DGM (HR)	(02668) 267340				9810597906		
	3.	Mr. C E Bauskar	DGM (Operation)	(02668) 267318				9428511032		
	4.	Mr. Amit Deoskar	DGM (TS)	(02668) 267305				9286666874		
6.	Nature of Manufacturing/ Product			:						
				Processing of Natural gas to produce LPG, Naphtha/higher hydrocarbons, and production of steam from DM water by using heat from the exhaust of Gas turbines (GTC) for supply to customer i.e; M/s. Apollo Tyres Limited, Limda.						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09.15 to 17.45	62	3	190	22	10	2	262	27
	1 st	06.00 to 14.00	14	-	25	-	9	-	48	-
	2 nd	14.00 to 22.00	14	-	25	-	9	-	48	-
	3 rd	22.00 to 06.00	14	-	25	-	9	-	48	-
		Total	104	3	265	22	37	2	406	27

FACT SHEET of M/s. GAIL (India) Limited (Continue...)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 9**

8.	Hazardous Chemical Storage details							
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	LPG	Tank	403	2	806	10 kg/cm2	Ambient
				160	1	160		
	2.	Naphtha	Tank	58.3	4	233.2	Atmosphere	Ambient
				11.4	2	22.8		
	3.	HSD	Tank	50 KL	1	50 KL	Atmosphere	Ambient

9.4.10 FACT SHEET of M/s. GSP Crop Science Pvt. Ltd.**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 10**

1.	Name of the Factory		:		GSP Crop Science Pvt. Ltd.					
	Address		:		Plot No. 1, 2, Opp. State Bank of India, Nandesari GIDC, Nandesari, Vadodara - 391340					
	Phone no.		:		0265-6820400/21/22					
	E-mail		:		Sitehrunit3@gspcrop.in					
	Longitude/Latitude of Company		:		22°24'56.7"N 73°05'21.7"E					
2.	Name of Occupier		:		Mr. Mehul Premakantbhai Pandya, Executive Director & Occupier					
	Residence Address		:		B-2/803, Green Acres, Near Auda Garden, Prahad Nagar, Ahmedabad – 830015 Ph. 079-6820131					
	Mobile No.		:		9316784664					
3.	Name of Factory Manager		:		Dr. Dhirajlal D. Chauhan, GM - Operation					
	Residence Address		:		10-B, Marutidham, Opp. Ramvatika Apartement, Jhadeshwar Road, Bharuch Ph. 0265-6820417					
	Mobile No		:		9016135054					
4.	Name of Safety Officer		:		Mr. Nikunj Bhatt					
	Residence Address		:		B/403, Labh Residency – 2, Nr. Bapu Ni Dargah, ITI Cross, Karodiya Road, Gorwa, Vadodara – 390003 Ph. 0265-6820429					
	Mobile No		:		9712921968					
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Dr. Dhirajlal D. Chauhan	GM - Operation	0265-6820417				9016135054		
	2.	Mr. Aniruddha Deshpande	Sr. Manager- HR	0265-6820415				9875147422		
	3.	Mr. Nikunj Bhatt	Manager - Safety	0265-6820429				9712921968		
6.	Nature of Manufacturing/ Product		:		Chemical Industry -Pesticide & Plasticiezer					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09:30 To 18:00	116	05	-	-	-	-	116	05
	1 st	07:00 To 15:00	95	-	87	-	10	-	192	-
	2 nd	15:00 To 23:00	94	-	48	-	07	-	149	-
	3 rd	23:00 To 07:00	82	-	45	-	07	-	134	-
		Total	389	05	180	-	24	-	539	05

FACT SHEET of M/s. GSP Crop Science Pvt. Ltd (Continue...)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 10**

8.	Hazardous Chemical Storage details							
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container	No. of Container	Maximum Storage Capacity	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	Di Ethyl Phthalate	Tank	100 KL	2	150 KL	Atmospheric	Ambient
	2.	FO	Tank	44 KL	1	35 KL	Atmospheric	Ambient
	3.	Sulphuric Acid	Tank	25 KL	1	20 KL	Atmospheric	Ambient
	4.	SDS	Tank	200 KL	2	150 KL	Atmospheric	Ambient
	5.	Chlorine	Cylinder	0.9 MT	3	2.7 Ton	3-4 kg/cm2	Ambient
	6.	Hexane	Tank	25 KL	1	20 KL	Atmospheric	Ambient
	7.	Solvent C-9	Tank	25 KL	1	20 KL	Atmospheric	Ambient
	8.	Toluene	Tank	25 KL	1	20 KL	Atmospheric	Ambient
	9.	Ethanol	Tank	30 KL	1	24 KL	Atmospheric	Ambient
	10.	Methanol	Tank	20 KL	1	15 KL	Atmospheric	Ambient
	11.	Xylene	Tank	25 KL	1	20 KL	Atmospheric	Ambient
	12.	Hydrogen	Cylinder Bank	14-28 m3	1 Bank	~1400 M3	200 kg/cm2	Ambient
	13.	HCL	Tank	10 KL	1	8 KL	Atmospheric	Ambient
	14.	Bromine	Bottles	3 kg	---	10-12 MT	Atmospheric	Ambient
	15.	TCAC	Drum	200 lit	≤60	19 KL	Atmospheric	Ambient
	16.	Thionyle Chloride	Drum	200 Lit	≤40	8 MT	Atmospheric	Ambient
	17.	Trimethyle Amine	Drum	200 lit	≤70	14 MT	Atmospheric	Ambient
	18.	Valeric acid	Drum	200 lit	≤80	16 MT	Atmospheric	Ambient
	19.	Acrylonitrile	Tank	25 KL	1	20 KL	Atmospheric	Ambient
	20.	Caustic Lye	Tank	20 KL	2	30 KL	Atmospheric	Ambient
	21.	DETCL	Tank	30 KL	1	25 KL	Atmospheric	Ambient
	22.	DMS	Tank	25 KL	1	20 KL	Atmospheric	Ambient
	23.	EDC	Tank	25 KL	1	20 KL	Atmospheric	Ambient
	24.	MDC	Tank	20 KL	1	15 KL	Atmospheric	Ambient
	25.	Nitric Acid	Tank	30 KL	1	20 KL	Atmospheric	Ambient

9.4.11 FACT SHEET of M/s. Gujarat Alkalies and Chemicals Limited**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 11**

1.	Name of the Factory		:	Gujarat Alkalies and Chemicals Limited						
	Address		:	P.O. Ranoli, Dist. Vadodara 391 350						
	Phone no.		:	0265 – 6111000, 7119000						
	E-mail		:	Paresh.randeria@gacl.co.in						
	Longitude/Latitude of Company		:	22.3948° N, 73.1184° E						
2.	Name of Occupier		:	Mr. V. H. Patel						
	Residence Address		:	I/37, Umiya nagar Duplex, Chanakyapuri Char Rasta, New Sama Road, Vadodara						
	Mobile No.		:	7574805310						
3.	Name of Factory Manager		:	Mr. N. R. Bhargava, AGM (ES, TS, S&E, F& Security, ESG						
	Residence Address		:	303, Isabella, Nautilus E-3, Behind Sabri School, Vasna Road, Vadodara.						
	Mobile No		:	9909029496						
4.	Name of Safety Officer		:	Mr. P. T. Randeria						
	Residence Address		:	61, Swaminarayan nagar Soc., Nizampura, Vadodara 390002						
	Mobile No		:	9408250505						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. V H Patel	Occupier (Complex Head)	0265 – 6111000, 7119000				7574805310		
	2.	Mr. N R Bhargava	AGM (ES, TS, S&E, F& Security, ESG, Factory Manager	0265 – 6111000, 7119000				9909029496		
	3.	Mr. P. T. Randeria	DGM (S&E)	0265 – 6111000, 7119000				9408250505		
4.	Mr. Amit Patel	DGM (O) Expert Person	0265 – 6111000, 7119000				8980037736			
6.	Nature of Manufacturing/ Product		:	Continuous process and Chlor-alkalies and chemical products such as chlorine, Caustic, Hydrogen, Chloro Methane, Hydrogen peroxide etc...						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	08:30 am to 05:15pm	379	30	561	19	09	01	949	50
	1 st	06:00 am to 02:00pm	166	0	114	0	14	0	294	0
	2 nd	02:00 pm to 10:00pm	118	0	104	0	13	0	235	0
	3 rd	10.00 pm to 06:00am	93	0	62	0	07	0	162	0
		Total	756	30	841	19	43	1	1640	50

FACT SHEET of M/s. Gujarat Alkalies and Chemicals Limited (Continue...)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 11**

8. Hazardous Chemical Storage details								
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm ²	Temperature °C
	1.	Hydrochloric acid	TankFarm	100 M3	16	200 MT	Atm	Amb.
	2.	Methanol	TankFarm	858 M3	1	858 KL	0.009 Kg/cm ²	Atm.
	3.	Chlorine	Cylinder/To nner/T ank	107 MT	5	467MT	Liquid underpressur e (3.0 kg/cm ² . to 11 kg/cm ² .	Temp. 0o C to 40o C)
	4.	Caustic SodaLye	Tank farm	1000 MT	6	3750MT	Liquid at atmospheric pressure	Liquid at atmospheric Temp.
	5.	H2O2	Tank farm	132 m3	12	440 MT	Liquid atatmospheri c pressure	Liquid at atmospheric Temp.

9.4.12 FACT SHEET of M/s. Gujarat Refinery (Indian Oil Corporation Limited)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 12**

1.	Name of the Factory		:	Gujarat Refinery Indian Oil Corporation Limited						
	Address		:	Gujarat Refinery Indian Oil Corporation Limited PO:Jawaharnagar Dist: Vadodara 391320, Gujarat						
	Phone no.		:	0265-2237106						
	E-mail		:	prataps@indianoil.in						
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:	Shri. Rahul Prashant, Executive Director & Refinery Head						
	Residence Address		:	Gujarat Refinery Township, QRT No – 1/1 Ph No : 0265-2233301						
	Mobile No.		:							
3.	Name of Factory Manager		:	Mr. Anil Kumar, Chief General Manager (HR)						
	Residence Address		:	Gujarat Refinery Township, QRT No – 208, Tapti Guest House Ph No : 0265-2233306						
	Mobile No		:	9999799670						
4.	Name of Safety Officer		:	Mr. Prabhakar Kumar						
	Residence Address		:	Qtr.No.2/37 Gujarat Refinery Township Po.Jawaharnagar Vadodara,Gujarat Pin:391320						
	Mobile No		:	7573019360						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office		Resident		Mobile		
	1.	Mr. Prabhakar Kumar	DGM (F&S)	0265-2237441 0265 -2238441				7573019360		
	2.	Refinery Fire Station	Fire Station	0265 223 8443/8445/8446						
	3.	Mr. Ajit Narayan	CM(F&S)	0265 223 7442				8969024127		
6.	Nature of Manufacturing/ Product		:	Hydro Carbon Oil Refining Industry						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			Male	Female	Male	Female	Male	Female	Male	Female
	General	08:30am – 05:30pm	890	90	8000	349	3	-	8893	429
	1st	06:00am-02:00pm	415	6	1500	-	27	-	1942	3
	2nd	02:00pm – 10:00pm	380	6	1500	-	23	-	1903	3
	3rd	10:00pm - 06:00am	310	1	1500	-	22	-	1832	0
		Total	1995	102	12500	349	75		14570	435

FACT SHEET of M/s. Gujarat Refinery (Indian Oil Corporation Limited)
(Continue...)
LCG-1: VADODARA – NANDESARI - PCC
MAH UNIT- 12

8. Hazardous Chemical Storage details							
Sr. No.	Name	Type of Roof	Capacity of each Container KL	No. of Container	Maximum Storage Capacity KL	Parameters	
						Pressure Kg/cm2	Temperature °C
Class-A							
1.	MS	FL	12000	1	12000	Atmospheric	Ambient
2.	EBMS	FCF	5000	1	5000	Atmospheric	Ambient
3.	EBMS	FCF	5000	1	5000	Atmospheric	Ambient
4.	Heavy reformat	FL	5000	1	5000	Atmospheric	Ambient
5.	Naphtha component	FL	5000	1	5000	Atmospheric	Ambient
6.	Benzene	FCF	400	1	400	Atmospheric	Ambient
7.	Benzene	FCF	400	1	400	Atmospheric	Ambient
8.	Toluene	FCF	400	1	400	Atmospheric	Ambient
9.	Benzene	FCF	1000	1	1000	Atmospheric	Ambient
10.	Benzene	FL	1000	1	1000	Atmospheric	Ambient
11.	Toluene	FCF	1000	1	1000	Atmospheric	Ambient
12.	Naphtha	FL	5000	1	5000	Atmospheric	Ambient
13.	Naphtha	FL	5000	1	5000	Atmospheric	Ambient
14.	Naphtha	FL	5000	1	5000	Atmospheric	Ambient
15.	MS	FL	12000	1	12000	Atmospheric	Ambient
16.	Naphtha	FL	5000	1	5000	Atmospheric	Ambient
17.	MS	FL	12000	1	12000	Atmospheric	Ambient
18.	MS	FL	12000	1	12000	Atmospheric	Ambient
19.	MS	FL	12000	1	12000	Atmospheric	Ambient
20.	MS	FL	12000	1	12000	Atmospheric	Ambient
21.	Ethanol	FCF	1000	1	1000	Atmospheric	Ambient
22.	Slop	FL	5000	1	5000	Atmospheric	Ambient
23.	Slop	FL	5000	1	5000	Atmospheric	Ambient
24.	MSQ slop	FL	3000	1	3000	Atmospheric	Ambient
25.	FGH	FL	1000	1	1000	Atmospheric	Ambient
26.	FGH	FL	1000	1	1000	Atmospheric	Ambient
27.	SG crude	FL	10000	1	10000	Atmospheric	Ambient
28.	SG crude	FL	10000	1	10000	Atmospheric	Ambient
29.	SG crude	FL	16000	1	16000	Atmospheric	Ambient
30.	SG crude	FL	16000	1	16000	Atmospheric	Ambient
31.	Naphtha	FL	3000	1	3000	Atmospheric	Ambient
32.	Naphtha	FL	3000	1	3000	Atmospheric	Ambient
33.	Naphtha	FL	3000	1	3000	Atmospheric	Ambient
34.	Naphtha	FL	3000	1	3000	Atmospheric	Ambient
35.	Not in use	FL	6000	1	6000	Atmospheric	Ambient
36.	Naphtha	FL	6000	1	6000	Atmospheric	Ambient
37.	IMP Crude	FL	30000	1	30000	Atmospheric	Ambient
38.	IMP Crude	FL	30000	1	30000	Atmospheric	Ambient
39.	BH Crude	FL	30000	1	30000	Atmospheric	Ambient
40.	BH Crude	FL	30000	1	30000	Atmospheric	Ambient
41.	Naphtha	FL	10000	1	10000	Atmospheric	Ambient
42.	Naphtha	FL	10000	1	10000	Atmospheric	Ambient
43.	Naphtha	FL	10000	1	10000	Atmospheric	Ambient
44.	Naphtha	FL	10000	1	10000	Atmospheric	Ambient
45.	Slop	FL	4500	1	4500	Atmospheric	Ambient
46.	Slop	FL	4500	1	4500	Atmospheric	Ambient
47.	Alkylate	FCF	1410	1	1410	Atmospheric	Ambient
48.	Light Alkylate	FCF	1410	1	1410	Atmospheric	Ambient
49.	ImpCrude	FL	65000	1	65000	Atmospheric	Ambient

FACT SHEET of M/s. Gujarat Refinery (Indian Oil Corporation Limited)
(Continue...)

LCG-1: VADODARA – NANDESARI - PCC

MAH UNIT- 12

8.	Hazardous Chemical Storage details							
	Sr. No.	Name	Type of Roof	Capacity of each Container KL	No. of Container	Maximum Storage Capacity KL	Parameters	
							Pressure Kg/cm2	Temperature °C
	Class-A							
	50.	BH Crude	FL	30000	1	30000	Atmospheric	Ambient
	51.	ImpCrude	FL	30000	1	30000	Atmospheric	Ambient
	52.	NG Crude	FL	20000	1	20000	Atmospheric	Ambient
	53.	NG Crude	FL	20000	1	20000	Atmospheric	Ambient
	54.	NG Crude	FL	20000	1	20000	Atmospheric	Ambient
	55.	ImpCrude	FL	30000	1	30000	Atmospheric	Ambient
	56.	ImpCrude	FL	30000	1	30000	Atmospheric	Ambient
	57.	ImpCrude	FL	30000	1	30000	Atmospheric	Ambient
	58.	ImpCrude	FL	30000	1	30000	Atmospheric	Ambient
	59.	Naphtha	FL	25000	1	25000	Atmospheric	Ambient
	60.	Naphtha	FL	25000	1	25000	Atmospheric	Ambient
	61.	NG Crude	FL	30000	1	30000	Atmospheric	Ambient
	62.	MS	FL	12000	1	12000	Atmospheric	Ambient
	63.	MTBE	FCF	2700	1	2700	Atmospheric	Ambient
	64.	Ethanol	FCF	2700	1	2700	Atmospheric	Ambient
	65.	Methanol	FCF	450	1	450	Atmospheric	Ambient
	66.	Methanol	FCF	450	1	450	Atmospheric	Ambient
	67.	Methanol	FCF	400	1	400	Atmospheric	Ambient
	68.	Methanol	FCF	400	1	400	Atmospheric	Ambient
	69.	Isomerase	Dome Roof	1000	1	1000	Atmospheric	Ambient
	70.	Isomerase	Dome Roof	1000	1	1000	Atmospheric	Ambient
	71.	Light Slop	Dome Roof	2000	1	2000	Atmospheric	Ambient
	72.	GASOLINE	FCF	10000		10000	Atmospheric	Ambient
				Class B				
	1.	ATF	Fixed	5000	1	5000	Atmospheric	Ambient
	2.	ATF	Fixed	5000	1	5000	Atmospheric	Ambient
	3.	LAB product	Fixed	5000	1	5000	Atmospheric	Ambient
	4.	LAB product	Fixed	5000	1	5000	Atmospheric	Ambient
	5.	LAB product	Fixed	5000	1	5000	Atmospheric	Ambient
	6.	ATF	Fixed	5000	1	5000	Atmospheric	Ambient
	7.	ATF	Fixed	5000	1	5000	Atmospheric	Ambient
	8.	ATF	Fixed	5000	1	5000	Atmospheric	Ambient
	9.	LDO/SRGO	Fixed	5000	1	5000	Atmospheric	Ambient
	10.	LDO/SRGO	Fixed	5000	1	5000	Atmospheric	Ambient
	11.	LDO/SRGO	Fixed	5000	1	5000	Atmospheric	Ambient
	12.	MTO	FCF	1000	1	1000	Atmospheric	Ambient
	13.	LABFS	FL	12000	1	12000	Atmospheric	Ambient
	14.	LABFS	FL	12000	1	12000	Atmospheric	Ambient
	15.	LABFS	FL	12000	1	12000	Atmospheric	Ambient
	16.	LABFS	FL	12000	1	12000	Atmospheric	Ambient
	17.	N-PARAFINE	FL	3000	1	3000	Atmospheric	Ambient
	18.	LABFS	FL	3000	1	3000	Atmospheric	Ambient
	19.	LABFS	FL	3000	1	3000	Atmospheric	Ambient
	20.	Heavy slop	Fixed	2000	1	2000	Atmospheric	Ambient
	21.	SKO	FL	12000	1	12000	Atmospheric	Ambient

FACT SHEET of M/s. Gujarat Refinery (Indian Oil Corporation Limited)
(Continue...)
LCG-1: VADODARA – NANDESARI - PCC
MAH UNIT- 12

8.	Hazardous Chemical Storage details							
	Sr. No.	Name	Type of Roof	Capacity of each Container KL	No. of Container	Maximum Storage Capacity KL	Parameters	
							Pressure Kg/cm2	Temperature °C
	Class-A							
	22.	SKO	FL	12000	1	12000	Atmospheric	Ambient
	23.	SKO	FL	12000	1	12000	Atmospheric	Ambient
	24.	SKO	FL	12000	1	12000	Atmospheric	Ambient
	25.	HSD	FL	16000	1	16000	Atmospheric	Ambient
	26.	HSD	FL	16000	1	16000	Atmospheric	Ambient
	27.	HSD	FL	16000	1	16000	Atmospheric	Ambient
	28.	HSD	FL	16000	1	16000	Atmospheric	Ambient
	29.	HSD	FL	16000	1	16000	Atmospheric	Ambient
	30.	HSD	FL	16000	1	16000	Atmospheric	Ambient
	31.	SKO	FL	7000	1	7000	Atmospheric	Ambient
	32.	SKO	FL	7000	1	7000	Atmospheric	Ambient
	33.	HSD	FCF	10000	1	10000	Atmospheric	Ambient
	34.	HSD (DHDS)	FCF	10000	1	10000	Atmospheric	Ambient
	35.	SRGO	FL	25000	1	25000	Atmospheric	Ambient
	36.	HSD	FL	25000	1	25000	Atmospheric	Ambient
	37.	HSD	FL	25000	1	25000	Atmospheric	Ambient
	38.	HSD	FL	25000	1	25000	Atmospheric	Ambient
	Class- C							
	1.	LAB Offspec product	FCF	400	1	400	Atmospheric	Ambient
	2.	LAB Offspec product	FCF	400	1	400	Atmospheric	Ambient
	3.	LAB Offspec product	FCF	400	1	400	Atmospheric	Ambient
	4.	LSHS	Fixed	5000	1	5000	Atmospheric	Ambient
	5.	LSHS	Fixed	5000	1	5000	Atmospheric	Ambient
	6.	FO	Fixed	5000	1	5000	Atmospheric	Ambient
	7.	FO	Fixed	5000	1	5000	Atmospheric	Ambient
	8.	LMW	Fixed	5000	1	5000	Atmospheric	Ambient
	9.	LSHS	Fixed	5000	1	5000	Atmospheric	Ambient
	10.	LSHS	Fixed	5000	1	5000	Atmospheric	Ambient
	11.	LSHS	Fixed	5000	1	5000	Atmospheric	Ambient
	12.	LSHS	Fixed	5000	1	5000	Atmospheric	Ambient
	13.	LSHS	Fixed	5000	1	5000	Atmospheric	Ambient
	14.	LSHS	Fixed	5000	1	5000	Atmospheric	Ambient
	15.	LSHS	Fixed	3000	1	3000	Atmospheric	Ambient
	16.	LSHS	Fixed	3000	1	3000	Atmospheric	Ambient
	17.	LSHS	Fixed	1500	1	1500	Atmospheric	Ambient
	18.	FO	Fixed	1000	1	1000	Atmospheric	Ambient
	19.	PFRCB	FCF	1000	1	1000	Atmospheric	Ambient
	20.	PFRCB	FCF	1000	1	1000	Atmospheric	Ambient
	21.	Hy. Alkylate	FL	500	1	500	Atmospheric	Ambient
	22.	Hy. Alkylate	FL	500	1	500	Atmospheric	Ambient
	23.	RCO	Fixed	9000	1	9000	Atmospheric	Ambient
	24.	RCO	Fixed	9000	1	9000	Atmospheric	Ambient
	25.	RCO	Fixed	9000	1	9000	Atmospheric	Ambient
	26.	VR	Fixed	3600	1	3600	Atmospheric	Ambient
	27.	VR	Fixed	3600	1	3600	Atmospheric	Ambient
	28.	VR	Fixed	3600	1	3600	Atmospheric	Ambient

FACT SHEET of M/s. Gujarat Refinery (Indian Oil Corporation Limited)
(Continue...)

LCG-1: VADODARA – NANDESARI - PCC

MAH UNIT- 12

8.	Hazardous Chemical Storage details							
	Sr. No.	Name	Type of Roof	Capacity of each Container KL	No. of Container	Maximum Storage Capacity KL	Parameters	
							Pressure Kg/cm2	Temperature °C
	Class-A							
	29.	HFLS HSD	Fixed	7000	1	7000	Atmospheric	Ambient
	30.	HFLS HSD	Fixed	7000	1	7000	Atmospheric	Ambient
	31.	HFLS HSD	Fixed	7000	1	7000	Atmospheric	Ambient
	32.	HFLS HSD	Fixed	7000	1	7000	Atmospheric	Ambient
	33.	FO	Fixed	16000	1	16000	Atmospheric	Ambient
	34.	LSHS	Fixed	16000	1	16000	Atmospheric	Ambient
	35.	Bitumen	Fixed	5000	1	5000	Atmospheric	Ambient
	36.	Bitumen	Fixed	5000	1	5000	Atmospheric	Ambient
	37.	Bitumen	Fixed	5000	1	5000	Atmospheric	Ambient
	38.	Bitumen	Fixed	1000	1	1000	Atmospheric	Ambient
	39.	Bitumen	Fixed	1000	1	1000	Atmospheric	Ambient
	40.	Bitumen	Fixed	1000	1	1000	Atmospheric	Ambient
	41.	Bitumen	Fixed	450	1	450	Atmospheric	Ambient
	42.	Bitumen	Fixed	450	1	450	Atmospheric	Ambient
	43.	Bitumen	Fixed	100	1	100	Atmospheric	Ambient
	44.	FO	Fixed	450	1	450	Atmospheric	Ambient
	45.	FO	Fixed	450	1	450	Atmospheric	Ambient
	46.	FO	Fixed	450	1	450	Atmospheric	Ambient
	47.	LAB product	Fixed	450	1	450	Atmospheric	Ambient
	48.	LAB product	Fixed	450	1	450	Atmospheric	Ambient
	49.	LAB product	Fixed	450	1	450	Atmospheric	Ambient
	50.	RCO	Fixed	23000	1	23000	Atmospheric	Ambient
	51.	HSLS	Fixed	3600	1	3600	Atmospheric	Ambient
	52.	Bitumen	Fixed	5000	1	5000	Atmospheric	Ambient
	53.	LSHS	Fixed	20000	1	20000	Atmospheric	Ambient
	54.	RCO	Fixed	15600	1	15600	Atmospheric	Ambient
	55.	RCO	Fixed	15600	1	15600	Atmospheric	Ambient
	56.	VGO	Fixed	20000	1	20000	Atmospheric	Ambient
	57.	VGO	Fixed	20000	1	20000	Atmospheric	Ambient
	58.	VR	Fixed	25000	1	25000	Atmospheric	Ambient
	59.	VR	Fixed	25000	1	25000	Atmospheric	Ambient
	60.	VGO Hydrotreater Feed	Fixed	20000	1	20000	Atmospheric	Ambient
	61.	DCU Feed	Fixed	30000	1	30000	Atmospheric	Ambient
	62.	DCU Feed	Fixed	30000	1	30000	Atmospheric	Ambient
	63.	DCU Feed	Fixed	30000	1	30000	Atmospheric	Ambient
	64.	DCU Feed	Fixed	30000	1	30000	Atmospheric	Ambient

9.4.13 FACT SHEET of M/s. Gujarat State Fertilizers & Chemicals Limited**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 13**

1.	Name of the Factory		:		M/s. Gujarat State Fertilizers & Chemicals Limited							
	Address		:		P. O. Fertilizernagar, Dist: Vadodara-391 750							
	Phone no.		:		(0265) 2242451, 2242651, 2242751, 2242641							
	E-mail		:		ho@gsfcltd.com							
	Longitude/Latitude of Company		:									
2.	Name of Occupier		:		Mr. K. S. Badlani							
	Residence Address		:		TF-2, Pruthviraj Complex, Near Chanakya Puri Cross Road, New Sama Road, Vadodara							
	Mobile No.		:		9909965842							
3.	Name of Factory Manager		:		Mr. S. B. Patel							
	Residence Address		:		101, Gandhraj Flat, 28-Krishnakrupa Society, Sama Road, Vadodara							
	Mobile No		:		9978923094							
4.	Name of Safety Officer		:		-							
	Residence Address		:		-							
	Mobile No		:		-							
5.	Contact Person		:									
	Sr. No.	Name	Designation	Telephone Number								
				Factory / Office				Mobile				
				1.	Mr. V. S. Bhatt	VP (P-A-IV & Methanol, SA-III & IV), S & FS	0265-3093123				9909965858	
				2.	Mr. V. B. Mishra	VP (Safety & Fire Services)	0265-3092258				9979853450	
3.	Mr. D. R. Patel	Chief (Safety)	0265-3093936				9909965857					
6.	Nature of Manufacturing/ Product		:		Fertilizers & Chemicals							
7.	Man Power & Timing											
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total			
			M	F	M	F	M	F	M	F		
	General	8.00 hrs. to 17.00 hrs	1050	117	1340	30	12	-	2420	147		
	1 st	06.00 hrs to 14.00 hrs	382	-	384	-	78	1*	766	1		
	2 nd	14.00 hrs to 22.00 hrs	359	-	130	-	78	1*	489	1		
	3 rd	22.00 hrs to 06.00 hrs	335	-	94	-	74	1*	429	1		
		Total	2126	117	1948	30	242	3	4104	150		
*The female security person are deployed in Fertilizernagar for stand-by work.												

FACT SHEET of M/s. Gujarat State Fertilizers & Chemicals Limited**(Continue...)****LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 13**

8. Hazardous Chemical Storage details							
Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
						Pressure Kg/cm ²	Temperature °C
1.	Ammonia	Dome Roof	10000	2	20000	Atm.	-33°C
2.	Sulphuric Acid	Fixed Roof	2500 2000 1800	3 2 1	13300	Atm.	Amb.
3.	Oleum (23%)	Fixed Roof	800 900	2 1	2500	Atm.	Amb
4.	Oleum (29%)	Fixed Roof	800	3	2400	Atm.	Amb
5.	Methanol	Fixed cum Floating	5800 2000	2 1	13600	Atm.	Amb
6.	Naphtha	Fixed cum Floating	7000 2000	1 1	9000	Atm.	Amb.
7.	Cyclohexane	Fixed	560 750	2 1	1870	Atm.	Amb.
8.	Benzene	Fixed	600 1000 500	1 2 1	3100	Atm.	Amb.
9.	Crude Anone	Fixed	360 270 200	1 1 1	830	Atm.	Amb.
10.	Pure Anone	Fixed	550	2	3431	Atm.	Amb.
11.	MEK	Fixed	375 75	1 1	450	Atm.	Amb.
12.	Waste Liquor	Fixed	300 150	1 1	450	Atm.	Amb.
13.	Cyclohexanol	Fixed	270 70 500	1 1 1	840	Atm.	Amb.
14.	Cyclohexanone	Fixed	500	3	1500	Atm.	Amb.
15.	Absorbent	Fixed	32	1	32	Atm.	Amb.
16.	Alkaline Waste	Fixed	2150	1	2150	Atm.	Amb.
17.	Organic Waste	Fixed	100 150	2 1	350	Atm.	Amb.
18.	Nitric Acid	Fixed	125 150 100	1 1 2	375	Atm.	Atm.

9.4.14 FACT SHEET of M/s. Hari Orgo Chem. Pvt Ltd.**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 14**

1.	Name of the Factory		:	Hari Orgochem Pvt Ltd						
	Address		:	A/2 237, 238 GIDC Industrial Estate , Nandesari, Vadodara-391340						
	Phone no.		:	7227049713						
	E-mail		:	vss@hariorgo.com, bhavesh@chloritech.com						
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:	Mr. Bhavesh P. Shah						
	Residence Address		:	Harikunj, C. N. Vidyalaya, Ambawadi, At-Ahmedabad, Tal. Ahmedabad, Dist. Ahmedabad						
	Mobile No.		:	92271 40314						
3.	Name of Factory Manager		:	Mr Sandeepbhai B Garud.						
	Residence Address		:	Kana Galaxy, Bh Gayatri Temple, Khatamba, Vadodara						
	Mobile No		:	9227140324						
4.	Name of Safety Officer		:	Mr Bhargav A Patel						
	Residence Address		:	B-36,Suraj Park Society, Near BOB Maneja Vadodara						
	Mobile No		:	7490988685						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Bhavesh P Shah	Director	0265- 2774920				9227140314		
	2.	Mr Vijay S Shah	GM Technical	7227049713				9227140320		
	3.	Mr. Sandip B. Garud	Asst. Prod. Manager	9227140324				9227140324		
6.	Nature of Manufacturing/ Product		:	Trichloro Acetyl Chloride						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09:00 to 17:30	25	0	25	0	1	0	51	0
	1 st	07:00 to 15:00	32	0	20	0	2	0	54	0
	2 nd	15:00 to 23:00	30	0	20	0	0	0	50	0
	3 rd	23:00 to 07:00	30	0	20	0	2	0	52	0
		Total	117	0	85	0	5	0	207	0

FACT SHEET of M/s. Hari Orgo Chem. Pvt Ltd. (Continue...)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 14**

8. Hazardous Chemical Storage details								
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	Chlorine	Toner	18 Tones	20	18 Tones	7	Amb
	2.	Ammonia	Receiver	400 Kg	1	400 Kg	4	Amb
	3.	Tri Chloro Acetylene Chloride	Tank	48 MT	7	336 MT	Atm	Amb
	4.	Sodium Hypochlorite	Tank	15 MT	2	30 MT	Atm	Amb
	5.	Sulphur Mono Chloride	Tank	12.5 MT	1	12.5 MT	Atm	Amb
	6.	Acetic Acid	Tank	40 MT	1	40 MT	Atm	Amb

9.4.15 FACT SHEET of M/s. Inox India Limited**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 15**

1.	Name of the Factory		:	INOX Air Products Pvt. Ltd.						
	Address		:	Block No :102,106-P, Village:-Juni Jithardi, Vemardi Road, Taluka:Karjan Dist :Vadodra.						
	Phone no.		:	02666-235800 /801						
	E-mail		:	paresh.patel@inoxap.com						
Longitude/Latitude of Company										
2.	Name of Occupier		:	Mr. P. K. Jain						
	Residence Address		:	Benzer Terraces, Worli sea face, Mumbai, Maharashtra						
	Mobile No.		:	Ph. No. 022 4032 3851						
3.	Name of Factory Manager		:	Shri Paresh Patel						
	Residence Address		:	C-3, Haridarshan Bunglow, Near Omkar Residency, Opp Voltamp Company, Maneja, Vadodara						
	Mobile No		:	9879101457						
4.	Name of Safety Officer		:	Mr. Hardipsinh Parmar						
	Residence Address		:	Village: Manglej, Taluka: Karjan Dist: Vadodara						
	Mobile No		:	+917359084704						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Contact Number						
				Factory / Office			Mobile			
	1.	Mr.Paresh Patel	Factory Manager	02666-235802			9879101457			
	2.	Mr.Hardipsinh	Jr Executive-Safety	02666-235833			7359084704			
	3.	Mr.Sandip Padhiyar	Dy.Manager-P&A	02666-235811			7490001769			
	4.	Mr.Vipul Patel	Expert Person	02666-235804			9998976955			
6.	Nature of Manufacturing/ Product		:							
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9:00 am to 05:30 pm	20	-	15	-	00	-	35	-
	1 st	7:00 am to 3:00 pm	07	-	04	-	03	-	14	-
	2 nd	3:00 pm to 10:00 pm	06	-	00	-	00	-	06	-
	3 rd	10:00 pm to 7:00 am	06	-	01	-	06	-	13	-
		Total	39	-	20	-	09	-	68	-

FACT SHEET of M/s. INOX Air Products Pvt. Ltd. (Continue....)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT-15**

8.	Hazardous Chemical Storage details							
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	Liquid Oxygen	VIST	315	2	625	1.02	-183
	2.	Liquid Nitrogen	VIST	185	3	552	4.50	-196
	3.	Liquid Argon	VIST	20	1	20	0.50	-186
	4.	Liquid Nitrogen	VIST	10	1	10	10.0	-196

9.4.16 FACT SHEET of M/s. Link Pharma Chem Ltd.**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 16**

1.	Name of the Factory		:		Link Pharma-Chem Ltd.					
	Address		:		Plot No.161/162, GIDC, Nandesari-391340					
	Phone no.		:		+91 – 87806 04490					
	E-mail		:		linkpharmalimited@gmail.com					
	Longitude/Latitude of Company		:		Long : 73.09073075652122, Lat : 22.40502768999279					
2.	Name of Occupier		:		Mr.Satish Ganpatrao Thakur					
	Residence Address		:		408, Ashirwad Bunglow, Saraswati Society, Vasna Road, Vadodara.					
	Mobile No.		:		+91 – 86907 77711					
3.	Name of Factory Manager		:		Mr.Vijay B. Patel					
	Residence Address		:		7, Rajeshwar Enclave, B/h. Valam Hall, Harni, Vadodara – 390 022					
	Mobile No		:		+91 – 94265 70233					
4.	Name of Safety Officer		:							
	Residence Address		:							
	Mobile No		:							
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Rishikesh Thakur	Managing Director	+91 – 87806 04490				86907 77711		
	2.	Mr. Satish Ganpatrao Thakur	Chairman	+91 – 87806 04490				86907 77711		
	3.	Mr. Vijay B. Patel	General Manager	+91 – 87806 04490				94265 70233		
6.	Nature of Manufacturing/ Product		:		Chemical Industry -Mono Chloro Salicylic Acid,Tri-Chloro Salicyclic Acid, Di Hydroxy DiPhenyl Sulphite, Thio Di Phenol					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9:00 To 5:30	45	1	-	-	-	-	45	1
	1 st	6:00 To 2:00	20	-	-	-	-	-	20	-
	2 nd	2:00 To 10:00	20	-	-	-	-	-	20	-
	3 rd	10:00 To 6:00	20	-	-	-	-	-	20	-
	Total		105	1	-	-	-	-	105	1

FACT SHEET of M/s. Link Pharma-Chem Ltd. (Continue...)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 16**

8.	Hazardous Chemical Storage details							
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	Suphuric Acid	Vertical MS Tank	13MT	13MT	13 MT	Atmospheric	Ambient
	2.	Acetic Acid	SS Tank	13MT	12MT	12 MT	Atmospheric	Ambient
	3.	Caustic Soda Lye	MS Tank	15MT	12MT	12 MT	Atmospheric	Ambient
	4.	Sulphur Di Chloride	MS Tank	10MT	7MT	7 MT	Atmospheric	Ambient
	5.	Chlorine	Tonner	2MT	39 Tonner	39 Tonner	3-4 Kg/Cm ²	Ambient
	6	Phenol	SS Tank	25MT	25 MT	25 MT	Atmospheric	Ambient
	7	Toluene	UG MS Tank	19KL	12KL	12 KL	Atmospheric	Ambient
	8	Salicylic Acid	Bags	10MT	10MT	10 MT	Atmospheric	Ambient
	9	Methanol	UGMS TANK	19KL	12KL	12 KL	Atmospheric	Ambient
10	Acetone	UG Tank	19KL	12KL	12KL	Atmospheric	Ambient	

9.4.17 FACT SHEET of M/s. Munjal Auto Industries Ltd.**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 17**

1.	Name of the Factory		:		Munjal Auto Industries Ltd.						
	Address		:		187, GIDC Industrial Estate Tal. Wagodia, Dist Vadodara – 391760						
	Phone no.		:		9925028593						
	E-mail		:		Virendrasinh@munjalauto.com						
	Longitude/Latitude of Company		:								
2.	Name of Occupier		:		Shri Anuj Munjal						
	Residence Address		:		187, GIDC Industrial Estate Tal. Wagodia, Dist Vadodara – 391760						
	Mobile No.		:								
3.	Name of Factory Manager		:		Mr. Ravindrasingh						
	Residence Address		:		H. No. B-113, Shri Hari Township, Ajwa Road, Near Kamla Nagar, Vadodara						
	Mobile No		:								
4.	Name of Safety Officer		:		Mr. Yogendra Rana						
	Residence Address		:		338, Akshar city, Ratanpur kapurai chokdi, Vadodara						
	Mobile No		:		6354120839						
5.	Contact Person		:								
	Sr. No.	Name	Designation	Telephone Number							
				Factory / Office					Mobile		
	1.	Mr. Virendrasinh Gohil	HR- Head	9925028593					9925028593		
	2.	Mr. Yogendra Rana	Safety Officer	6354120839					6354120839		
6.	Nature of Manufacturing/ Product			:		Auto Ancilaries					
7.	Man Power & Timing										
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total		
			M	F	M	F	M	F	M	F	
	General	09.00 am to 5.30 pm	122	1	37	-	-	-	153	1	
	1 st	07.00 am to 3.30 pm	263	-	127	-	12	-	402	-	
	2 nd	3.30 pm to 11.30 Am	71	-	95	-	12	-	178	-	
	3 rd	11.30 to 07.00 am	18	-	08	-	-	-	26	-	
		Total	474	1	267	-	24	-	759	1	
8.	Hazardous Chemical Storage details										
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters				
							Pressure Kg/cm2	Temperature °C			
	1.	Propane Gas	Bullet	15	02	30	7 Kg/cm2	Ambient			

9.4.18 FACT SHEET of M/s. Nandesari Industries Association**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 18**

1.	Name of the Factory		:	Nandesari Industries Association Secondary Treatment Plant						
	Address		:	Plot No. 153/A, GIDC Industrial Estate, Nandesari, Dist. Vadodara – 391 340						
	Phone no.		:	Ph. 0265-2840321 /1016						
	E-mail		:	nia_cetp@yahoo.co.in, niacetp@gmail.com						
	Longitude/Latitude of Company		:	73.0500 / 22.2400						
2.	Name of Occupier		:	Mr. Babubhai C. Patel, Chairman						
	Residence Address		:	A-202, Taksh Iris, Near Taksh Bunglow, Vasna Road, Vadodara – 390 007						
	Mobile No.		:	98240 01925						
3.	Name of Factory Manager		:	Mr. Devendra D. Patel						
	Residence Address		:	1-Ramayan Nagar Soc, Nr. Old Telephone Exchange, Vasad-388306						
	Mobile No		:	9427382619						
4.	Name of Safety Officer		:	Mr. Karn Y. Patel						
	Residence Address		:	A-163, Nandanvan Society, Near Abhilasha Circle, Near Sama Road, Vadodara-390024						
	Mobile No		:	9898830906						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Babubhai C. Patel	Chairman	0265-2840321 / 1016				98240 01925		
	2.	Mr. Devendra D Patel	Works Manager	-				94273 82619		
	3.	Mr. Dharmik Gohil	Safety Officer	-				9904631793		
6.	Nature of Manufacturing/ Product		:	Waste water treatment to primary treated effluent and providing services for waste water analysis and treatability study						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9.00 to 17.00	27	08	12	-	-	-	39	08
	1 st	7.00 to 15.00	25	-	12	-	05	-	42	-
	2 nd	15.00 to 21.00	25	-	11	-	05	-	41	-
	3 rd	21.00 to 07.00	23	-	13	-	05	-	41	-
		Total	100	08	48	-	15	-	163	08
8.	Hazardous Chemical Storage details									
Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters				
						Pressure Kg/cm2	Temperature °C			
1.	Chlorine	Tonnors	900 Kgs	40	27 MT	3-4 Kg/cm2	Ambient			

9.4.19 FACT SHEET of M/s. Narayan Organics Pvt. Ltd.-Unit-III**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 19**

1.	Name of the Factory			: Narayan Organics Pvt. Ltd.-Unit-III						
	Address			: Plot No. 53/B, C/B, GIDC Industrial Estate, Opp. HPCL Petrol Pump, Nandesari, Dist. Vadodara – 391 340						
	Phone no.			: 0265-2991477						
	E-mail			: unit3@narayanorganics.com						
	Longitude/Latitude of Company			Latitude 22°24'24.90"N & Longitude 73°5'34.20"E						
2.	Name of Occupier			: Mr. Purav Dahyabhai Patel						
	Residence Address			: 10, Vrundavan-3, Thaltej Silaj Road, Thaltej, Ahmedabad-380059						
	Mobile No.			: 9723278937						
3.	Name of Factory Manager			: Mr. Surendrasingh Hazarisingh Solanki						
	Residence Address			: 35, Madhuvan Homes, Angadh Road, At & Post. Nandesari, Vadodara-391 340						
	Mobile No			: 9925591692						
4.	Name of Safety Officer			: Mr. Yogesh Rameshbhai Patel						
	Residence Address			: Janivalu Faliyu, Gayatri Sheri, At & Post. Undel, Tal. Khambhat, Anand-388640						
	Mobile No			: 9979992508						
5.	Contact Person			:						
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office					Mobile	
	1.	Mr. Mukesh M. Patel	Sr. Officer Admin	0265-2991477					9825085463	
	2.	Mr. Arjun M. Parmar	HR-Officer-Admin	0265-2991477					9925929933	
	3.	Mr. Yogesh R. Patel	Maintenance Engineer-Safety Officer	0265-2991477					9979992508	
6.	Nature of Manufacturing/ Product			: Manufacturing of Pigments & Inorganic Chemicals i.e. (1) Organics Pigments, (2) Organics Chemicals, (3) In-Organics Chemicals & (4) Pigment Bit Blue						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9.00 to 17.00	07	0	06	0	00	0	13	0
	1 st	7.00 to 15.00	17	0	00	0	02	0	19	0
	2 nd	15.00 to 21.00	17	0	00	0	02	0	19	0
	3 rd	21.00 to 07.00	17	0	00	0	02	0	19	0
	Total		58	0	06	0	06	0	70	0
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm2	Temperature °C		
	1.	Chlorine Tonners	Tonners in Shed	0.90	88	79.20	5.78 Kg 15 Dec C	Atm.		
	2.	Sodium Hypo Chloride	HDPE-Tanks	20 KL	1	20 KL	Atm.	Atm.		
	3.	HCL	HDPE Tank	30 KL	1	30 KL	Atm.	Atm.		

9.4.20 FACT SHEET of M/s. Oriental Aromatics Limited**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 20**

1.	Name of the Factory		:		Oriental Aromatics Limited					
	Address		:		Plot No.3, GIDC Estate, Nandesari Dist. Vaododra-391340, Gujarat					
	Phone no.		:		91-265-3081200 & +91-265-2842200					
	E-mail		:		oa@orientalaromatics.com					
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:		Mr. Satish Kumar Ray					
	Residence Address		:		Bareilly					
	Mobile No.		:		9897600477					
3.	Name of Factory Manager		:		Mr. Jigar K Patel					
	Residence Address		:		Vadodara					
	Mobile No		:		6357072318					
4.	Name of Safety Manager		:		Mr. Dharmik Goswami					
	Residence Address		:		Vadodara					
	Mobile No		:		6357072346					
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Prakash Joshi	Sr. Manager	0265-2842280				9998217997		
	2.	Mr. Dixit Kanabar	Asst. Manager	0265-2842280				9429869777		
6.	Nature of Manufacturing/ Product		:		Aromatics Product					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9.15 am to 5.45 pm	188	2	76	10	12	-	276	12
	1 st	6.30am to 2.30pm	55	-	79	-	-	-	139	-
	2 nd	2.30 pm to 10.30pm	47	-	45	-	-	-	92	-
	3 rd	10.30pm to 6.30am	47	-	58	-	12	-	117	-
		Total	337	2	258	10	24	-	624	12

FACT SHEET of M/s. Oriental Aromatics Limited (Continue...)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT-20**

8. Hazardous Chemical Storage details								
Sr. No.	Name Of Hazardous Substance	Max. Storage Cap.[Qty.]	Storage of Material At A Time	Place of It's Storage	M.O.C.	Opera Ting Press Ure And Temp.	Type Of Hazard	
1.	Propylene Oxide (VF-3004A/B)	54 KL X 2 Nos.	70 MT	RM TF AREA	SS-304	2 kg/cm ² N ₂ pressure Ambient temperature	Fire/ Explosion	
2.	Toluene	20 KL, x 1 No. U/G tank	16 MT	UG TF AREA	C.S.	ATP	Fire/ Explosion	
3.	Di Iso Amylene	15 KL x 1 No tank	10 KL	RM TF AREA	CS	ATP	Fire/ Explosion	
4.	Iso Amylene	20KLX1No. 20KLX1No.	40 KL	UG TF AREA	CS	ATP	Fire/ explosion	
5.	Iso Amylene (VF-3001 A/B)	60 KLX 2Nos	100 KL	UG TF AREA	CS	ATP Under N ₂	Fire/ explosion	
6.	Alpha Methyl Styrene (AMS) (TF-3001A/B/C)	100 KL X3 Nos.MS Tanks	250 KL	RM TF	MS	ATP	Fire	
7.	Alpha Pinene (VF-403A/B/C)	100 KL X 3 Nos. A/G CS Tank	275 KL	RM TF	CS	ATP	Fire	
8.	Campholenic Aldehyde (VF-412)	30 KL	25 KL	FG Tank Farm	SS-316	ATP Under N ₂	Fire	
9.	Butylaldehyde	16 KL	15 KL	RM TF	SS-304	ATP Under N ₂	Fire	
10.	Cyclohexane	25 X 200 kg)	5.0 MT	R.M. Store	HMHDPE	ATP	Fire	
11.	Acetic Acid	25 MT	30.0 KL	RMST	SS-304	Under ATP	Fire /toxic	
12.	Acetic Anhydride Acid	5 MT	6.0 KL	RMST	SS-304	Under ATP	Fire /toxic	
13.	Aluminium Chloride powder	20 MT (500 Kg x 20)	20 MT	Ware house	HDPE bags	Under ATP	toxic	
14.	Phosphoric acid	5 MT	6 KL	RM TF	SS-304	Under ATP	toxic	
15.	Sulphuric acid	10 MT	6 KL	RM TF	SS-304	Under ATP	toxic	
16.	Cyclohexanone	190 Kg X100 drum	19.0 MT	SCD-W/H	M.S.	ATM	Fire	

9.4.21 FACT SHEET of M/s. Panoli Intermediates (I) Pvt. Ltd.**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 21**

1.	Name of the Factory		:	Panoli Intermediates (I) Pvt. Ltd.						
	Address		:	Plot No. 11 & 18, Petrochemical Complex Industrial Estate, Ranoli- 391350, Dist.: Vadodara. State: Gujarat.						
	Phone no.		:	9687772335 (Unit Head), 7383997685 (Safety Mgr) (0265) 2396498						
	E-mail		:	Safety157@kcil.co.in						
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:	Sh. Surendra Goyal						
	Residence Address		:	Shree Ram Society, Patharwala Bunglow, Gotri Road, Vadodara - 390007						
	Mobile No.		:	9327226698						
3.	Name of Factory Manager		:	Sh. Virendra Nirwan, Unit Head						
	Residence Address		:	-						
	Mobile No		:	9687772335						
4.	Name of Safety Officer		:	-						
	Residence Address		:	-						
	Mobile No		:	-						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Surendra Goyal	Director	(0265) 2840387				9327226698		
	2.	Mr. Virendra Nirwan	Unit Head					9687772335		
3.	Mr. Uddhav Wagh	Plant Manager					9924064100			
6.	Nature of Manufacturing/ Product		:	Manufacturing of Acid Chloride						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9:00 TO 18:00	10	--	12	--	01	-	23	--
	1 st	07:00 to 15:00	18	--	04	--	03	--	25	--
	2 nd	15:00 to 23:00	18	--	04	--	03	--	25	--
	3 rd	23:00 to 07:00	16	--	04	--	03	--	23	--
		Total	62	--	24	-	10	-	96	--

FACT SHEET of M/s. Panoli Intermediates (I) Pvt. Ltd. - Plot No. 11 & 18
(Continue...)

LCG-1: VADODARA – NANDESARI - PCC

MAH UNIT-21

8. Hazardous Chemical Storage details								
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm ²	Temperature °C
	1.	Sulphur Dioxide	Tonner (Each)	0.9	5	10.8	Atmospheric	6-8 Kg/cm ²
			Pure Tank	05	02	05	Atmospheric	3-4 Kg/cm ²
	2.	Sulfuric Acid	Tank	30	02	54.6	Atmospheric	Ambient
	3.	Thionyl Chloride	Tank	90	01	75	Atmospheric	Ambient

9.4.22 FACT SHEET of M/s. Panoli Intermediates (India) Pvt. Ltd. (Unit-III)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 22**

1.	Name of the Factory		:		Panoli Intermediates (India) Pvt. Ltd. (Unit-III)					
	Address		:		Plot No. 156-A & B /157, GIDC Industrial Estate, Nandesari, Dist. Vadodara -391 340					
	Phone no.		:		(0265) 2397013, 2396751 (O)					
	E-mail		:							
	Longitude/Latitude of Company		:		22°24'13.23" N & 73°5'51.08"E					
2.	Name of Occupier		:		Mr. Surendra P Goyal					
	Residence Address		:		20-21, Harinagar Society, Gotri, Vadodara – 390 007 0265-2398555					
	Mobile No.		:							
3.	Name of Factory Manager		:		Mr. Shankar Patel					
	Residence Address		:		20-21, Harinagar Society, Gotri, Vadodara – 390 007 0265-2398555					
	Mobile No		:		9377237128					
4.	Name of Safety Officer		:		Mr. Rakesh M Patel					
	Residence Address		:		20-21, Harinagar Society, Gotri, Vadodara – 390 007 0265-2398555					
	Mobile No		:		7383997685					
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Surendra Goyal	Director	(0265) 2840405				-		
	2.	Mr. Shankarbhai Patel	Manager	(0265) 2840405				9377237128		
	3.	Mr. Prahlad Patil	Plant Manager	(0265) 2840405				8511142038		
	4.	Mr. Rakesh Patel	Expert Person	(0265) 2840405				7383997685		
6.	Nature of Manufacturing/ Product			:		Multi-functional Intermediates & Inorganic Chemicals				
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09.00 am to 06.00 pm	23	--	15	--	--	--	38	-
	1 st	07.00 am to 03.00 pm	105	--	40	--	10	--	155	-
	2 nd	03.00 pm to 11.00 pm	98	--	40	--	09	--	147	-
	3 rd	11.00 pm to 07.00 am	86	--	25	--	08	--	119	-
		Total	312	--	120	--	27	--	459	-

**FACT SHEET of M/s. Panoli Intermediates (India) Pvt. Ltd. (Unit-III) –
Continue...**

LCG-1: VADODARA – NANDESARI - PCC

MAH UNIT- 22

8. Hazardous Chemical Storage details								
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	Anhydrous Ammonia	Bullet Tank	19.3	02	11.58 (each)	4-6 kg/cm2	Ambient
	2.	Methanol	U/G Tank	50 KL	02	36 (each)	ATP	Ambient
	3.	Chlorine	Tonner	0.9	125 No's	112.5	3-4 Kg/Cm ²	ATM
	4.	Sulphuric Acid	Tank	1455	05	1236 (each)	ATM	ATM
	5.	Oleum (23%)	Tank	800	01	640	ATM	ATM
	6.	Oleum (65%)	Tank	200	01	100	ATM	ATM
	7.	Thionyl Chloride	Tank	110	04	88 (each)	ATM	ATM

9.4.23 FACT SHEET of M/s. Panoli Intermediates (India) Pvt. Ltd. (Unit-IV)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 23**

1.	Name of the Factory		:		Panoli Intermediates (I) Pvt. Ltd. (Unit – IV)						
	Address		:		Plot No. 122/1-2,128/1-2, GIDC Industrial Estate, Nandesari, Dist. Vadodara -391 340						
	Phone no.		:		(0265) 2397013, 2396751 (O) / 9374241150						
	E-mail		:		barodaoffice@kcil.co.in						
	Longitude/Latitude of Company		:		Apx. 22°24'27.72"N & 73°5'41.13"E						
2.	Name of Occupier		:		Mr. Surendra Piragchand Goyal						
	Residence Address		:		20-21, Harinagar Society, Gotri, Vadodara – 390 007 0265-2396498						
	Mobile No.		:								
3.	Name of Factory Manager		:		Mr. Jagdishbhai Patel & Mr. Govind Goyal						
	Residence Address		:		20-21, Harinagar Society, Gotri, Vadodara – 390 007						
	Mobile No		:		9374241150						
4.	Name of Safety Officer		:		Mr. Rakesh Patel						
	Residence Address		:		20-21, Harinagar Society, Gotri, Vadodara – 390 007						
	Mobile No		:		7383997685						
5.	Contact Person		:								
	Sr. No.	Name	Designation	Telephone Number							
				Factory / Office					Mobile		
	1.	Mr. Surendra P. Goyal	Director	0265-2840405					-		
	2.	Mr. Jagdishbhai Patel	Manager	0265-2840405					93742 41150		
	3.	Mr. Govind Goyal	Manager	0265-2840405					93275 83205		
	4.	Mr. Rakesh Patel	Expert Person	0265- 2840405					7383997685		
6.	Nature of Manufacturing/ Product			:		Dyes Intermediates					
7.	Man Power & Timing										
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total		
			M	F	M	F	M	F	M	F	
	General	09.00 am to 06.00 pm	09	-	-	-	1	-	10	-	
	1 st	07.00 am to 03.00 pm	20	-	8	-	3	-	31	-	
	2 nd	03.00 pm to 11.00 pm	17	-	6	-	3	-	26	-	
	3 rd	11.00 pm to 07.00 am	16	-	5	-	3	-	24	-	
		Total	62	-	19	-	10	-	91	-	

FACT SHEET of M/s. Panoli Intermediates (India) Pvt. Ltd. (Unit-IV)**Continue...****LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 23**

8. Hazardous Chemical Storage details								
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	Ethylene Oxide	Bullet Storage Tank	7.5 MT	02	15	3.5	Ambt.
	2.	Thionyl Chloride	Tank	20 KL	01	20	ATP	Ambt.
	3.	Phosphoric Acid	Tank	50 KL	01	50	ATP	Ambt.
	4.	Chloro Sulphonic Acid	MS Tank	20 KL	02	130	ATP	Ambt.
				90 KL	01			
	5.	Dil. Sulphuric Acid	MS Tank	50 KL	05	250	ATP	Ambt.
	6.	Caustic Soda Lye	MS Tank	75 KL	01	75	ATP	Ambt.
	7.	Ammonia (Anhydrous)	Receiver Storage in Chilling Plant	0.8 KL	03	2.4	115 lb/sq.inch	70oF
	8.	Acetic Acid	MS Tank	10 MT	01	10	ATP	Ambt.

9.4.24 **FACT SHEET of M/s. Rasayan Enterprises**

LCG-1: VADODARA – NANDESARI - PCC

MAH UNIT- 24

1.	Name of the Factory			:	Rasayan Enterprise					
	Address			:	Plot No.36-37, C1b26, G.I.D.C. Estate, Nandesari, Dist.Vadodara-391340.					
	Phone no.			:	0265-2963305/2840813					
	E-mail			:	rasayan@hotmail.com					
	Longitude/Latitude of Company			:						
2.	Name of Occupier			:	Mr. Saiprasad Samant					
	Residence Address			:	12-A, Abhishek Colony, Race Course Circle, Vadodara-390 007					
	Mobile No.			:	98240 33005					
3.	Name of Factory Manager			:	Mr. Kaushik K. Shah					
	Residence Address			:	B-84, Bhaghyday Society, Gorwa Refinery Road, Gorwa, Vadodara					
	Mobile No			:	9904001751					
4.	Name of Safety Officer			:	-					
	Residence Address			:	-					
	Mobile No			:	-					
5.	Contact Person			:						
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
				1.	Saiprasad Samant	Partner	0265-2840813			
2.	Kaushik K. Shah	Prod. Manager	0265-2963305				9904001751			
6.	Nature of Manufacturing/ Product			:	Emulsifiers, Defoamers, Speciality Chemicals					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	8:30 To 5:30	6	-	-	-	1	-	7	-
	1 st	-	-	-	-	-	-	-	-	
	2 nd	-	-	-	-	-	-	-	-	
	3 rd	-	-	-	-	-	-	-	-	
	Total		6	-	-	-	1	-	7	-
8.	Hazardous Chemical Storage details									
Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters				
						Pressure Kg/cm2	Temperature °C			
1.	Ethylene Oxide	S.S. Tank	9900 Ltrs Water Cap	1	7.2	40	Below 15 C			

9.4.25 FACT SHEET of M/s. Ratna Nicochem Pvt. Ltd.**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 25**

1.	Name of the Factory		:		Ratna Nicochem Pvt. Ltd.					
	Address		:		Plot No. C-1/41/ B 3 & 4, G.I.D.C., Nandesari – 391340. Dist. Vadodara.					
	Phone no.		:		0265-2968895					
	E-mail		:		ranico55@gmail.com					
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:		Mr. Mayur Jadeja					
	Residence Address		:		12, Suvarnpuri Society, Jetalpur Road, Vadodara – 390 007					
	Mobile No.		:		9824068117					
3.	Name of Factory Manager		:		Mr. Jignesh Patel					
	Residence Address		:		B-13, Ashapuri Society, Near Police Station, Vasad – 388 306. Dist. Anand					
	Mobile No		:		9879133773					
4.	Name of Safety Officer		:		-					
	Residence Address		:		-					
	Mobile No		:		-					
5.	Contact Person		:		-					
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Mayur Jadeja	Director	0265-2968895				9824068117		
	2.	Mr. Jignesh Patel	Factory Manager	0265-2968895				9879133773		
	3.	Mr. Ritesh Gohil	Administration (Officer)	0265-2968895				9662967032		
6.	Nature of Manufacturing/ Product		:		1. Cuprous Chloride 2. Cupric Chloride Anhydrous					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	10.00 AM to 6.00 PM	01	01	-	-	-	-	01	01
	1 st	8.00 AM to 4.00 PM	03	-	11	-	-	-	14	-
	2 nd	4.00 PM to 12.00 PM	01	-	09	-	01	-	11	-
	3 rd	12.00 PM to 8.00 AM	01	-	06	-	01	-	08	-
		Total	06	01	26	0	02	0	34	01
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm2	Temperature °C		
	1.	Chlorine	Toner	900 Kg.		85 Nos. (76.5 MT)	4 Kg/cm2	Ambient		
	2.	HCL	Carboys	50 Kg.		500 Kgs.	Atm.	Amb.		
3.	Caustic Soda	Carboys	50 Kg.		1000 Kgs.	Atm.	Amb.			

9.4.26 **FACT SHEET of M/s. Reliance Industries Ltd.**

LCG-1: VADODARA – NANDESARI - PCC

MAH UNIT-26

1.	Name of the Factory		:	Reliance Industries Limited Vadodara Manufacturing Division						
	Address		:	PO Petrochemicals, Vadodara -391346, Gujarat						
	Phone no.		:	0265-3107783						
	E-mail		:	Rajiv.agrawal@ril.com						
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:	Sh. Hital R. Meswani						
	Residence Address		:	21, Krishna Kunj, Walkeshwar Bombay-4000006						
	Mobile No.		:	9082820772						
3.	Name of Factory Manager		:	Mr. Rajiv Agrawal						
	Residence Address		:	Site Presidents Bungalow, Opp. Gokul Guest House, Reliance Township, PO IPCL, Near Undera, Vadodara-391345						
	Mobile No		:	9662048260						
4.	Name of Safety Officer		:	Mr. Vipul A. Mehta						
	Residence Address		:	A17, Mira Society, Near Hathibhai Nagar, Diwalipura, Vadodara-15						
	Mobile No		:	8511554709						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
				1. Mr. Jay Shah				Head operations		
				2. Mr. Ramesh Solanki				Head HSEF		
				3. Mr.. Jay shah				Head SSM office		
4. Sh. Jay shah				Expert Person						
0265-3107830				7574822348						
02653107407				9998954068						
02653107830				7574822348						
02653107830				7574822348						
6.	Nature of Manufacturing/ Product		:	Petrochemicals, Rubber, Polymers						
			:							
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	08:30 to 17:00/18:00	819	55	823	25	-	-	1642	80
	1 st	06:00 to 14:00	251	1	236	-	-	-	487	1
	2 nd	14:00 to 22:00	261	1	95	-	-	-	356	1
	3 rd	22:00 to 06:00	205	0	99	-	-	-	304	0
		Total	1536	57	1253	25	-	-	2789	82

FACT SHEET of M/s. Reliance Industries Ltd. (Continue...)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT-26**

8. Hazardous Chemical Storage details							
Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
						Pressure Kg/cm2	Temperature °C
1.	Ammonia	Bullets	35 M3 106 M3	03	247 M3	12.0	Amb
2.	Ethylene Oxide	Bullets	62.5	02	125	3.0	0
3.	Ethylene	Sphere	640	06	3480	6.0	-29
4.	Propylene	Sphere	396	02	788	15.0	40
		Sphere	355	01	355	15.0	40
		Sphere	60	03	180	15.0	40
5	VCM	Sphere	92.0	03	276	4.2	Amb
	VCM	Sphere	542	02	1084	4.2	Amb
6	Butadiene	Sphere	501.5	02	1003	4.0	Amb
	Butadiene	Sphere	90.0	02	180	1.8	10
	Butadiene	Bullets	17.0	01	17	1.9	40
7	LPG	Sphere	700	03	2100	8.0	40
	LPG	Bullets	78	01	78	1.5	40
8	Naptha	Floating roof tank	15000 KL	02	30000 KL	Atm	Amb
			24000 KL	01	24000 KL	Atm	Amb
			3000 KL	03	9000 KL	Atm	Amb

9.4.27 FACT SHEET of M/s. Schaeffler India Limited**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 27**

1.	Name of the Factory		:		Schaeffler India Limited							
	Address		:		Plot no. 498, 468, 487, P.O. Manjea, Vadodara-390 013							
	Phone no.		:		9879633819, 0265-6602861							
	E-mail		:		Shital.shah@schaeffler.com							
	Longitude/Latitude of Company		:		Latitude : 22 0 14' 11.21"N, Longitude : 73 0 10' 58.49"E							
2.	Name of Occupier		:		Mr. Harsha Kadam, MD							
	Residence Address		:		No. 518, 2 nd Main, 3rd Cross, BEML 5th Stage, Raja Rajeshwari Nagar, Bangalore South, Bangalore-560098 (Karnataka)							
	Mobile No.		:									
3.	Name of Factory Manager		:		Mr. Amarjeet Singh Benipal							
	Residence Address		:		B-50, Shreeji Nagar, Makarpura, Vaddoara-390010							
	Mobile No		:		-							
4.	Name of Safety Officer		:		-							
	Residence Address		:		-							
	Mobile No		:		-							
4.	Contact Person		:									
	Sr. No.	Name	Designation	Telephone Number								
				Factory / Office				Mobile				
				1.	Mr. Kuljit Pal Singh	Sr. Manager	9879633819, 0265-6602861				6359011293	
				2.	Mr. Shital Shah	Sr. Manager	9879633819, 0265-6602861				9879633819	
3.	Mr. Pramodkumar Pawar	Executive	9879633819, 0265-6602861				9725891146					
5.	Nature of Manufacturing/ Product		:		Bearing Manufacturing							
6.	Man Power & Timing											
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total			
			M	F	M	F	M	F	M	F		
	General	08.30 am to 05.00 pm	311	12	110	6	1	1	422	19		
	1 st	07.00 am to 3.30 pm	283	0	658	4	11	0	652	04		
	2 nd	03.30 pm to 12.00 am	216	0	459	0	11	0	686	0		
	3 rd	12.00 am to 07.00 am	154	0	344	0	11	0	509	0		
		Total	964	12	1571	10	34	1	2569	23		

FACT SHEET of M/s. Schaeffler India Limited**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 27**

7. Hazardous Chemical Storage details								
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm ²	Temperature °C
	1.	LPG	Bullet	9.4 MT	1	9.4 MT	4-7 Kg/cm ²	Ambient
	2.	Propane	Bullet	8.3 MT	2	16.6 MT	10-12 Kg/cm ²	Ambient
	3.	Liq Nitrogen	Vessel	20 KL	1	20 KL	12-15 Kg/cm ²	Ambient
	4.	High Speed Diesel	Under Ground Tank	46 KI	1	46 KL	-	Ambient
	5.	Methanol	Under Ground Tank	20 KI	1	20 KL	-	Ambient
	6.	Ammonia	Cylinder	50 Kg	1	200 Kg	30 Kg/cm ²	Ambient

9.4.28 FACT SHEET of M/s. Silox India Private Limited- Atladara**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 28**

1.	Name of the Factory		:	Silox India Private Limited						
	Address		:	Kalali Road, Atladra, Vadodara-390012 Gujarat, India						
	Phone no.		:	0265-2680401-5						
	E-mail		:	Satyananda.patra@siloxindia.com; cbjoshi@siloxindia.com						
	Longitude/Latitude of Company		:	73.16294252872467/22.2744431066730						
2.	Name of Occupier		:	Mr. Prakash Raman, Managing Director						
	Residence Address		:	Pent House No 602, 6th Floor, Opp Darshnam Splendora, Vasant Vihar Road, Bhayli, Vadodara 391 410, Gujarat.						
	Mobile No.		:	9702995995						
3.	Name of Factory Manager		:	Mr. Manoj Gupta						
	Residence Address		:	Riv Residency, Sarsaswati Society, Vasna Road, Vadodara – 390023						
	Mobile No		:	90999 39041						
4.	Name of Safety Officer		:	Mr. Chetan Joshi						
	Residence Address		:	18, Divyalok Society, Near Passprt Office, Nizampura, Vadodara-390002.						
	Mobile No		:	9978918304						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Manoj M.Gupta	AVP- Operations & Factory Manager	0265-2680401-Extn.354				9099939041		
	2.	Mr. Satyanandaq Patra	GM-EHS	0265-2680401-Extn.245				9558821706		
	3.	Shiba Prasad Bharati	Expert Person	0265-2680401-Extn.314				9825128961		
	4.	Mr. Chetan Joshi	Manager -EHS	0265-2680401-Extn.292				9978918304		
6.	Nature of Manufacturing/ Product		:	1) Zinc Formaldehyde Sulphoxylate (Safolin) 2) Sodium Formaldehyde Sulphoxylate (Safolite) 3) SO ₂ 4) Zinc Derivative-(Zinc Phosphate & Zinc Carbonate)						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09:00 to 18:00 hrs	123	10	22	0	3	-	148	10
	1 st	06:00 to 14:00 hrs	85	-	114	-	8	-	207	
	2 nd	14:00 to 22:00 hrs	70	--	67	-	8	-	145	
	3 rd	22:00 to 06:00 hrs	65	--	61	-	3	-	129	
		Total	343	10	264	0	22	-	629	10

FACT SHEET of M/s. Silox India Private Limited - Atladara (Continue...)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT-28**

8.	Hazardous Chemical Storage details							
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	Caustic Soda Lye	Liquid (A/G)	1x120 MT	01	120 MT	Atm	Ambient
	2	Methyl Alcohol	Liquid (U/G)	1x20 KL	01	40 KL	Atm	Ambient
				1x20 KL	01			
	3	Formaldehyde (37%)	Liquid (A/G)	3x30 MT	03	90 MT	Atm	Ambient
	4	Oleum (65%)	Liquid (A/G)	3x30 MT	03	90 MT	Atm	Ambient
	5	SO2	Liquified Gas (A/G)	2 x 6 MT	03	14.5 MT	5 Kg/cm2	35 deg.c
				1x2.5 MT				
	6	SO2 in tonners	Liquified gas	1x900 Kg	28	25.2 MT	5 Kg/cm2	35 deg.c
	7	Sulphur	Solid	Loose	-	70 MT	Atm	Ambient
	8	Hydrogen Peroxide (50%)	Liquid(A/G)	1x17 MT	01	17 MT	Atm	Ambient
	9	Phosphoric Acid	Liquid(A/G)	1x18 MT	01	18 MT	Atm	Ambient
	10	FO	Liquid(A/G)	1x100KL	01	100KL	Atm	Ambient
	11	Sulphuric Acid	Liquid(A/G)	1 X 30 KL 1 X 12 KL	02	42 KL	Atm	Ambient
	12	Hydrochloric Acid	Liquid	1 X 30 Kg	100	3 KL	Atm	Ambient
	13	Ammonia Cylinder	Gas	1 X 50 KG	12	600 KG	5 Kg/Cm2	Ambient
14	LDO	Liquid(A/G)	1 X 27 KL	1	27 KL	Atm	Ambient	
15	Carbon Di-Oxide in Cylinder	Gas	1 X 30 KG	25	750 KG	55 Kg/cm2	Ambient	
16	Carbon Di-Oxide	Gas	1 X 900 KG	1	900 KG	22 Kg/Cm2	Ambient	

9.4.29 FACT SHEET of M/s. Simalin Chemical Industries Pvt. Ltd.**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT-29**

1.	Name of the Factory		:	Simalin Chemical Industries Pvt. Ltd.						
	Address		:	Plot No. 13, GIDC, Nandesari, Vadodara -391 340						
	Phone no.		:	0265-2840265 /66						
	E-mail		:	Simalin@simalin.com						
	Longitude/Latitude of Company		:	Longitude 73°05'24.32"E / Latitude 22°24'49.46"N						
2.	Name of Occupier		:	Mr. Ashokbhai V. Patel (MD)						
	Residence Address		:	Krishnapriya, Near Madhuvan Vatika, Behind Vaikunth Banglow, Gotri, Vadodara						
	Mobile No.		:	9712906569						
3.	Name of Factory Manager		:	Mr. Avinash V Joshi, VP (Opr.)						
	Residence Address		:	802, Bhagyoday Tower No. 02, Pashabhai Park, Near Natubhai circle, Racecourse, Vadodara						
	Mobile No		:	9979872488						
4.	Name of Safety Officer		:	Mr. Vasant A Sikligar						
	Residence Address		:	C/55, Maheshwari Society, B/H Harinagar Water tank, Gotri Road, Vadodara						
	Mobile No		:	9227897157						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Avinash Joshi	V.P.	(0265) 2840265/2840266				99798 72488		
	2.	Mr. Dhiren Patel	G.M.	(0265) 2840265/2840266				9316608019		
	3.	Shift Supervisor	Shift In-charge	(0265) 2840265/2840266				98258 03356		
6.	Nature of Manufacturing/ Product		:	Chemical Manufacturing. Formaldehyde, Hexamine, Paraformaldehyde, Hexalye						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09:00 to 17:30	10	-	09	-	1	-	20	-
	1 st	07:00 to 15:00	09	-	08	-	2	-	19	-
	2 nd	15:00 to 23:00	09	-	07	-	1	-	17	-
	3 rd	23:00 to 07:00	09	-	03	-	2	-	14	-
		Total	37	-	27	-	6	-	70	-
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm2	Temperature 0C		
	1.	Methanol	Storage Tank	1X500, 2X800 1X600,2X50	6	2800 KL	Atmospheric	Ambient		
	2.	Ammonia	Storage Tank	3x5	3	15 MT	10 Kg/cm2	Ambient		
	3.	Formaldehyde	Storage Tank	2x200, 1x250 2x800	5	2250 KL	Atmospheric	Ambient		
	4.	Hydrochloric Acid	Carboys	50 KG	50	5.0 MT	Atmospheric	Ambient		
	5.	Caustic Lye	Carboys	50 KG	50	5.0 MT	Atmospheric	Ambient		
	6.	Sulphuric Acid	Storage Tank	4.5 KL	1	5.0 KL	Atmospheric	Ambient		

9.4.30 FACT SHEET of M/s. Styrenix Performance materials limited**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 30**

1.	Name of the Factory		:	Styrenix Performance materials limited						
	Address		:	51, GIDC Industrial Estate, Nandesari-391340 Dist: Vadodara, Gujarat						
	Phone no.		:	0265-2301101						
	E-mail		:	-						
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:	Mr. Ravishankar Kompalli						
	Residence Address		:	Neptune Vicenza magnolia 301, Near Narayan Gardens, Laxmipura, Gotri road, Gotri, 390021						
	Mobile No.		:	98250 33214						
3.	Name of Factory Manager		:	Mr. Divyang Madhusudan Chokshi						
	Residence Address		:	A/7, Vardhaman Housing Society, Behind Indrapuri Society Harni Road, Vadodara – 390 016						
	Mobile No		:	9979890248						
4.	Name of Safety Officer		:	-						
	Residence Address		:	-						
	Mobile No		:	-						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Divyang M Chokshi	Plant Manager	0265-2301135				9979890248		
	2.	Mr. Hitesh Parmar	HR Manager	0265-2301137				9558623035		
6.	Nature of Manufacturing/ Product		:	ABS Powder						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9.00 to 17.00	52	1	89	5	1	0	142	6
	1 st	6.30 to 14.30	28	0	39	0	5	0	72	0
	2 nd	14.30 to 22.30	29	0	32	0	0	0	61	0
	3 rd	22.30 to 6.30	28	0	17	0	5	0	50	0
		Total	137	1	177	5	11	0	325	6

FACT SHEET of M/s. Styrenix Performance materials limited (Continue...)**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 30**

8. Hazardous Chemical Storage details								
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container KL	No. of Container	Maximum Storage KL	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	Butadiene	Sphere	136.54	1	136.54	4 kg/cm2	20 0 C
	2.	Styrene	Tank	118.30	2	236.6	Atmospheric	27 0 C
	3.	Acrylonitrile	Tank	112.84	2	225.68	Atmospheric	Ambient
	4.	Sulfuric Acid	Tank	27.6	1	27.6	Atmospheric	Ambient
	5.	Hydrochloric Acid (32%)	Tank	16.5	2	33	Atmospheric	Ambient

9.4.31 FACT SHEET of M/s. Swati Chloride Pvt. Ltd.**LCG-1: VADODARA – NANDESARI - PCC****MAH UNIT- 31**

1.	Name of the Factory		:		Swati Chlorides Pvt. Ltd.					
	Address		:		99/1-B &A, GIDC Industrial Estate, Nandesari, Dist. Vadodara -391 340					
	Phone no.		:		0265 – 2840843					
	E-mail		:		rahuljain45@gmail.com					
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:		Mr. Om Parkash Jain (MD)					
	Residence Address		:		67-68, Antica Greenwoods, Sevasi, Ankodiya Road, Vadodara					
	Mobile No.		:		9824036177					
3.	Name of Factory Manager		:		Mr. Rahul Jain					
	Residence Address		:		67-68, Antica Greenwoods, Sevasi, Ankodiya Road, Vadodara					
	Mobile No		:		9898003678					
4.	Name of Safety Officer		:		-					
	Residence Address		:		-					
	Mobile No		:		-					
5.	Contact Person		:		-					
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Om Parkash Jain	Managing Director	0265 – 2840843				98240 36177		
	2.	Mr. Rahul Jain	Director	0265 – 2840843				98980 03678		
6.	Nature of Manufacturing/ Product		:		Chemical Industry					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09.00 to 17.50	7	-	-	-	-	-	7	-
	1 st	07.00 to 15.00	6	-	5	-	-	-	11	-
	2 nd	15.00 to 23.00	6	-	5	-	-	-	11	-
	3 rd	23.00 to 07.00	6	-	5	-	-	-	11	-
		Total	25	-	15	-	-	-	40	-
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm²	Temperature °C		
	1.	Chlorine	Tonnars	900 kg	40	36.0 MT	3-4 Kg/Cm ²	Ambient		
	2.	Acetic acid	Tank	50 KL	01	40 KL	Atmospheric	Ambient		
	3.	Caustic Lye	Tank	40 KL	01	25 KL	Atmospheric	Ambient		
	4.	Phenol	Tank	30 KL	01	25 KL	Atmospheric	Ambient		
	5.	Sulphur	Loose	25 kgs bags	800 bags	15	Atmospheric	Ambient		
	6.	MCA	Bags	50 kgs bags	2000 bags	300 MT	Atmospheric	Ambient		
7.	SMC	Tank	20 MT	01	15 MT	Atmospheric	Ambient			

9.4.32 FACT SHEET of M/s. Adar Chemicals Pvt. Ltd.**LCG-2: - PADRA****MAH UNIT- 1**

1.	Name of the Factory		:		Adar Chemicals Pvt. Ltd.					
	Address		:		Block No. 383, Village: Luna, Taluka: Padra, District: Vadodara.					
	Phone no.		:		(M)- +91 98791 06137					
	E-mail		:		adarchem@rediffmail.com, support@adarchem.com					
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:		Mr. Marzban J. Patel					
	Residence Address		:		61, Radha Krishna Park, Productivity Road, Akota, Vadodara – 390 020					
	Mobile No.		:		(M) - +91 98791 06137					
3.	Name of Factory Manager		:		Mr. Alpesh Solanki (B.SC Chemistry – Factory Incharge)					
	Residence Address		:		Village: Dabhasa, Taluka – Padra, Dist.: Vadodara 391440					
	Mobile No		:		9879106627					
4.	Name of Safety Officer		:		Mr. Alpesh Solanki					
	Residence Address		:		Village: Dabhasa, Taluka – Padra, Dist.: Vadodara 391440					
	Mobile No		:		9879106627					
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. M. J. Patel	Director	(M)- +91 98791 06137				-		
	2.	Mr. Pravin M. Baria	Works Manager	(M)- +91 98791 06137				98791 06136		
	3.	Mr. Alpesh R. Solanki	Factory Incharge	(M)- +91 98791 06137				98791 06627		
6.	Nature of Manufacturing/ Product		:		Sulphur Mono Chloride, Straight Sulphur Fertilizer/Sulphur Powder					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General									
	1 st	06.00 to 02.00	5	0	0	0	0	0	5	-
	2 nd	02.00 to 10.00	4	0	0	0	0	0	4	-
	3 rd	10.00 to 06.00	4	0	0	0	0	0	4	-
		Total	13	0	0	0	0	0	13	-
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm2	Temperature °C		
	1.	Chlorine	Tonner	900 kg	45	40.5	3-4 Kg/Cm ²	Ambient		

9.4.33 FACT SHEET of M/s. Aroma De France**LCG-2: - PADRA****MAH UNIT- 2**

1.	Name of the Factory		:	Aroma De France						
	Address		:	Block No. 324, Nr. Ipca Laboratories, Village-Ranu, Ta-Padra, Dist. Vadodara						
	Phone no.		:	9890264331						
	E-mail		:							
	Longitude/Latitude of Company		:	22.21617`N - 73.01911`E						
2.	Name of Occupier		:	Mr. Minesh M. Patel						
	Residence Address		:	6, Param Park Society, Bhayli Vasna Road, Vasna, Vadodara						
	Mobile No.		:	8141444944						
3.	Name of Factory Manager		:	Mr. Ketan J. Brahmbhatt						
	Residence Address		:	B/12, Vrajdharm Society, Narayan Wadi, Padra-Atladara Road, Atladara						
	Mobile No		:	9662529776						
4.	Name of Safety Officer		:	Mr. Junnaid A. Khan						
	Residence Address		:	Faiza Avenue, Flat 304, Nr. JP Road Police Station, Tandalja, Vadodara.						
	Mobile No		:	9890264331						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Ratnesh Dubey	Manager	Ext. No. 51				8401559928		
	2.	Satyendra Yadav	Manager	-				6355200755		
	3.	Ketan Brahmbhatt	Manager	Ext. No. 14				9662529776		
	4.	Hiren Patel	Expert Person	Ext. No. 81				9537731182		
6.	Nature of Manufacturing/ Product		:	Perfume , DEO						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09:00 TO 17:30	71	18	177	91	5	2	253	111
	1 st	-	-	-	-	-	-	-	-	-
	2 nd	-	-	-	-	-	-	-	-	-
	3 rd	-	-	-	-	-	-	-	-	-
	Total		71	18	177	91	5	2	253	111
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm2	Temperature °C		
	1.	LPG	LPG Bullets	5 MT	4	4 x 5 MT	Atm.	Amb.		
	2.	Denatured Ethyl Alcohol	SS Storage Tank	20 KL 25 KL	1 2	70 KL	Atm.	Amb.		

9.4.34 FACT SHEET of M/s. Bodal Chemicals Ltd. (UNIT-VII)**LCG - PADRA****MAH UNIT- 3**

1.	Name of the Factory		:	Bodal Chemicals Ltd.(Unit-VII)						
	Address		:	Block No. 795 to 804, Village : Dudhwada, ECP channel Road, Tal. Padra, Dist. Vadodara						
	Phone no.		:	9909950852/53/54/99						
	E-mail		:	unit7@bodal.com						
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:	Mr. Rajarshi Ghosh						
	Residence Address		:	D/58 Nirman Complex, R.C Technical Road, Chankyapuri, Ghatlodia, Ahmedabad						
	Mobile No.		:	9909950907						
3.	Name of Factory Manager		:	Mr. Dineshbhai Laljibhai Patel						
	Residence Address		:	19 Saraswati Chandra Society, Near Jain Derasar, Odhav. Ahmedabad-382415.						
	Mobile No		:	9909950831						
4.	Name of Safety Officer		:	Mr. Vijay Joshi						
	Residence Address		:	L-102, Aaruni Residency, Atladra-Padra Road, Vadodara						
	Mobile No		:	9712922425						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Dineshbhai Laljibhai Patel	Factory Manager	9909950852/53/54/99				9909950831		
	2.	Mr. Jignesh Bharmabhatt	Dy. General Manager (P&A)	9909950852/53/54/99				9925043234		
	3.	Mr. Vijay Joshi	Manager (Safety)	9909950852/53/54/99				9712922425		
6.	Nature of Manufacturing/ Product		:	Chemicals - H-Acid, Dyes, Beta Naphthol, VS, Acetanilide, Sulphuric Acid, Oleum, Chloro Sulphonic Acid, Thionyl Chloride etc.						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9:00 TO 17:30	154	4	255	5	1	-	410	9
	1 st	7:00 TO 15:00	321	-	211	-	10	-	542	0
	2 nd	15:00 TO 23:00	238	-	198	-	10	-	446	0
	3 rd	23:00 TO 7:00	254	-	109	-	14	-	377	0
		Total	967	4	773	5	35	0	1775	9

FACT SHEET of M/s. Bodal Chemicals Ltd. (UNIT-VII) (Continue...)**LCG-2: - PADRA****MAH UNIT-3**

8. Hazardous Chemical Storage details							
Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity	Parameters	
						Pressure Kg/cm ²	Temperature °C
1.	Ethylene Oxide	Bullet	7.468 MT 7.400 MT	2 Nos.	14 MT	Nitrogen 3 Kg/cm ²	12 -15°C
2.	Ammonia	Bullet	9.99 KL × 2	2 Nos.	10 KL	5g/cm ²	Amb
3.	Chloro Sulphonic Acid – 99%	Tank	195 MT×3 100 MT×1	4 Nos.	560 MT 80 MT	Atm.	Amb.
4.	Sulphuric Acid- 98%	Tank	1300 MT ×2 35 MT ×1	3 Nos.	2500 MT 30 KL	Atm.	Amb.
5.	Caustic soda Lye	Tanks	40 KL×1 120 KL×1	2 Nos.	35 KL 100 KL	Atm.	Amb.
6.	Acetanilide	Bags	50 Ton×1	50 kg.- 1	40 MT	Atm.	Amb.
7.	Acetic Acid	Tank	7 Ton×1	1 Nos	5.6 Ton	Atm.	Amb.
8.	Hydrochloric Acid	Tanks	30 MT × 2 175 MT ×2 40 MT ×1	5 Nos.	50 MT 280 MT 30 MT	Atm.	Amb.
9.	Naphthalene	Bags	50 Ton	100kg -1		Atm.	Amb.
10.	Oleum 65%	Tanks	35MT × 2 175MT × 2 280 MT ×1	2 Nos.	55 MT 280 MT 230 MT	Atm.	Amb.
11.	98 % Sulphuric Acid	Tanks	35MT × 2	2 Nos.	55 MT	Atm.	Amb.
12.	Nitric Acid	Tanks	20MT × 2	2 Nos.	30 MT	Atm.	Amb.
13.	Methanol	Tanks	15 MT ×1 13 MT ×1	2 Nos.	22.4 MT	Atm.	Amb.
14.	Thionyl Chloride	Tanks	175 MT x5	5 Nos.	700 MT	Atm.	Amb.
15.	98% H ₂ SO ₄	Tanks	1280MT x 2	2 Nos.	2000 MT	Atm.	Amb.
16.	70% H ₂ SO ₄	Tanks	50KL x 2	2 Nos.	80 KL	Atm.	Amb.
17.	Spent Acid	Tanks	100 KLx 1	1 Nos.	80 KL	Atm.	Amb.
18.	23% Oleum	Tanks	215 MT x 1	4 Nos.	190MT	Atm.	Amb.
19.	23% Oleum	Tanks	215 MT x 1 175 MT x 3	4 Nos.	180 MT 450 MT	Atm.	Amb.
20.	Chloro Sulphonic Acid	Tanks	175 MT x5 60MT×2 280MT×2	9 Nos.	1310 MT	Atm.	Amb.
21.	70% Sulphuric Acid	Tanks	175 MT X 2	2 Nos.	350 MT	Atm.	Amb.
22.	Caustic Soda Flax	Bags	40 MT	1 No.	30 MT	Atm.	Amb.
23.	Sulphur (Clean Molten)	Tanks	320 MT X 1	1 No.	320 MT	Atm.	Amb.
24.	Solid Sulphur Storage	Open	6000 MT	-	-	Atm.	Amb.
25.	Aniline Oil	Tanks	125 KLX 2	2 Nos.	200 KL	Atm.	Amb.
26.	Chlorine	Tonner	900 KGS x 240	240 Nos.		Atm.	Amb.

9.4.35 FACT SHEET of M/s. Bodal Chemicals Ltd. (UNIT-VIII)

LCG-2: - PADRA

MAH UNIT- 4

1.	Name of the Factory			: Bodal Chemicals Ltd.(UNIT-VIII)						
	Address			: Plot No-106-108, Village Ekalbara, Tal. Padra, Dist. Vadodara						
	Phone no.			: 9909950847						
	E-mail			: Unit8@bodal.com						
Longitude/Latitude of Company			:							
2.	Name of Occupier			: Mr. Rajarshi Ghosh						
	Residence Address			: D/58 Nirman Complex, R.C Technical Road, Chankyapuri,Ghatlodia,Ahmedabad						
	Mobile No.			: 9909950907						
3.	Name of Factory Manager			: Mr. Shailesh Meghani						
	Residence Address			: 15, Nilkanth Banglows, TP-4, Near Wave club, Opp. Lira International School, Bhayli, Vadodara-391410.						
	Mobile No			: 9909950835						
4.	Name of Safety Officer			: Mr. Vijay Joshi						
	Residence Address			: L-102, Aaruni Residency, Atladra-Padra Road, Vadodara						
	Mobile No			: 9712922425						
5.	Contact Person			:						
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr.Shailesh Meghani	Factory Manager	9909950835				9909950835		
	2.	Mr. P. M. Patel	Manager	9909950847				9909950922		
3.	Mr.Vijaybhai Joshi	Safety Manager	9909950847				9712922425			
6.	Nature of Manufacturing/ Product			: Dasa & FC Acid, 6 Acteyl Opsa						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9:00 TO 17:30	27	0	60	3	1	0	88	3
	1 st	7:00 TO 15:00	18	0	10	0	4	0	32	0
	2 nd	15:00 TO 23:00	18	0	10	0	3	0	31	0
	3 rd	23:00 TO 7:00	24	0	20	0	3	0	47	0
	Total		87	0	100	3	11	0	198	3
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm2	Temperature °C		
	1.	Sulphuric Acid-98 %	Tank	30 MT	2 Nos	60 MT	Atm	Amb		
	2.	Oleum-23 %	Tank	30 MT	1 Nos	30 MT	Atm	Amb		
	3.	Caustic Soda Lye	Tank	30 MT	1 Nos	30 MT	Atm	Amb		
4.	HCL	Tank	30 MT	1 Nos	30 MT	Atm	Amb			

9.4.36 FACT SHEET of M/s. Greenovat Organics Pvt. Ltd.**LCG-2: - PADRA****MAH UNIT- 5**

1.	Name of the Factory		:	Greenovat Organics Pvt. Ltd.						
	Address		:	Block No. 231, Village: Ekalbara, Taluka: Padra, Dist: Vadodara – 391 440						
	Phone no.		:	(02662) 244455, 244194						
	E-mail		:	greenovat@yahoo.com						
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:	Mr. Pravin B. Rabadia, Managing Director						
	Residence Address		:	A-4, Nilkanthnagar, B/h. Girls High School, College Road, Padra, Dist.: Vadodara.						
	Mobile No.		:	98980 27373						
3.	Name of Factory Manager		:	Mr. Mayank Patel						
	Residence Address		:	C-6, Shivam society, Tajpura Road, Padra, Dist.: Vadodara						
	Mobile No		:	98986 77466						
4.	Name of Safety Officer		:	-						
	Residence Address		:	-						
	Mobile No		:	-						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Pravin B. Rabadia	Managing Director	02662-244455				98980 27373		
	2.	Mr. Mayank Patel	Manager	02662-244194				98986 77466		
6.	Nature of Manufacturing/ Product		:	Chemical Industry - Pigment Green - 7						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09:00 To 18:00	02	0	0	0	0	0	02	0
	1 st	08:00 To 16:00	06	0	0	0	0	0	06	0
	2 nd	16:00 To 24:00	05	0	0	0	0	0	05	0
	3 rd	00:00 TO 8:00	04	0	0	0	0	0	04	0
		Total	17	0	0	0	0	0	17	0
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm2	Temperature °C		
	1.	Liquid Chlorine	Tonner	0.9	21	18.900	3-4 Kg/Cm ²	Ambient		
	2.	Mono Chloro Benzene	MS Tank	10.0	3	30.00	Atm.	Ambient		

9.4.37 FACT SHEET of M/s. Grindly Gases & Petrochemical Pvt. Ltd.**LCG-2: - PADRA****MAH UNIT- 6**

1.	Name of the Factory			:	Grindly Gases & Petrochemical Pvt. Ltd.					
	Address			:	Plot No. 570 - 573, Mobha - Gavasad Road, Village Mobha, Taluka Padra, Dist. Vadodara					
	Phone no.			:	02662-242202					
	E-mail			:	Mauliky2k@yahoo.com					
	Longitude/Latitude of Company			:						
2.	Name of Occupier			:	Mr. Maulik Vyas, Director					
	Residence Address			:	37-38, Parichay Park, Diwalipura, Old Padra Road, Vadodara-390 020					
	Mobile No.			:	99250 28368					
3.	Name of Factory Manager			:	Mr. Vihagbhai Jokhakar					
	Residence Address			:	VIP Road, Vadodara					
	Mobile No			:	99249 24947					
4.	Name of Safety Officer			:	-					
	Residence Address			:	-					
	Mobile No			:	-					
5.	Contact Person			:						
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Maulic P. Vyas	Director	02662-242202				98252 96554		
	2.	Mr. Vihag Jokhakar	Manager	02662-242202				99249 24947		
6.	Nature of Manufacturing/ Product			:	Refilling of LPG Cylinders and Blending of LPG					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09.00 to 17.00	07	0	25	-	-	-	32	-
	1 st	-	-	-	-	-	-	-	-	-
	2 nd	-	-	-	-	-	-	-	-	-
	3 rd	-	-	-	-	-	-	-	-	-
		Total	07	0	25	-	-	-	32	-
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm²	Temperature °C		
	1.	LPG	Tank	10 MT	2	100 MT	14.5 Kg/cm ²	Ambient		
		40 MT	2							
	2.	Propane	Tank	10 MT	1	10 MT	21 Kg/cm ²	Ambient		
3.	Propane	Tank	10 MT	1	10 MT	21 Kg/cm ²	Ambient			

9.4.38 FACT SHEET of M/s. Gulbrandsen Chemicals Pvt. Ltd.**LCG-2: - PADRA****MAH UNIT- 7**

1.	Name of the Factory		:	Gulbrandsen Chemicals Pvt Ltd						
	Address		:	On Coastal Highway, Mujpur, Padra, Vadodara 391440, Gujarat						
	Phone no.		:	02662-229-137						
	E-mail		:	cshah@gulbrandsen.com						
	Longitude/Latitude of Company		:	72° 59' 56" E / 22° 15' 19" N						
2.	Name of Occupier		:	Mr. Narendra Varma						
	Residence Address		:	128, Suncity Paradise, Bh Vishramitri Township, Nr Vishvamitri over bridge, Mujmahuda, Vadodara - 390011						
	Mobile No.		:	9099001023						
3.	Name of Factory Manager		:	Mr. Chinmay Shah						
	Residence Address		:	50, Pratham Vista, Near Navrachna International School, Vasna Bhayali Road, Bhayli, Vadodara – 391410						
	Mobile No		:	9909023503						
4.	Name of Safety Officer		:	Mr. Snehal Patel						
	Residence Address		:	102, PEARL Tower, Prakruti Residency, Opp. Narayan Garden, Gotri, Vadodara-390021						
	Mobile No		:	9924133683						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Chinmay Shah	Factory Manager	02662-229-137				9909023503		
	2.	Mr. Snehal Patel	Safety Officer	02662-229-128				9924133683		
	3.	Mr. Saurabh Shah	Head HR	02662-229-102				9979899459		
6.	Nature of Manufacturing/ Product		:	Metal Alkyls, Organotin, PE Wax and derivatives, Triazine Derivatives and Inorganic chemicals						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09:00 to 18:30	117	4	103	1	0	0	220	5
	1 st	06:00 to 14:00	63	0	97	0	10	0	170	0
	2 nd	14:00 to 22:00	51	0	54	0	0	0	105	0
	3 rd	22:00 to 06:00	42	0	40	0	11	0	93	0
		Total	273	4	294	1	21	0	588	5

FACT SHEET of M/s. Gulbrandsen Chemicals Pvt. Ltd. (Continue...)**LCG-2: - PADRA****MAH UNIT- 7**

8. Hazardous Chemical Storage details							
Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
						Pressure Kg/cm ²	Temperature °C
1.	Aluminum	Bags	500 / 1000 kg.	-	50 MT	Atm	Ambient
2.	Sodium	Drums	200 Litr.	4	400 kg.	Atm	Ambient
3.	n/i-Butene	C.S. Tank	19.9 KL	2	39.8 KL	6 bar	Ambient
4.	Hydrogen	Cylinder 152- Rack	88 kg	3 Racks	264 Kg	200 bar	Ambient
5.	Ethanol	U/G Tank	16 KL	1	16 KL	Atm	Ambient
6.	Xceltherm HT	Drum	200 Lit.	5	1000 Litr.	Atm	Ambient
7.	Quench Oil	Drum	200 Lit.	5	1000 Litr.	Atm	Ambient
8.	LPG	Cylinders	21 kg	50	1000 kg	12 bar	Ambient
9.	Furnace Oil (FO)	Tank	40 KL	1	40 KL	Atm	Ambient
10.	TnBAI	Tank	20 KL	3	60 MT	0.5 bar	Ambient
11.	TEAL	Tank	50 KL	1	50 KL	0.5 bar	Ambient
12.	Hexane	U/G Tank	16 KL	1	16 KL	Atm	Ambient
13.	Toluene	U/G Tank	16 KL	2	32 KL	Atm	Ambient
14.	m-Xylene	Drums	2 KL	10	5 KL	Atm	Ambient
15.	ODCB	Tank	10 KL	1	10 KL	Atm	Ambient
16.	Di Ethyl Zinc	Tank	7 KL	1	7000 Kg	Atm	Ambient
17.	TEAL	Tank	50 KL	3	120 KL	0.5 bar	Ambient
18.	TEAL	Tank	14 KL	2	22.2 MT	0.5 bar	Ambient
19.	TnBAI	Tank	14 KL	1	22.2 MT	0.5 bar	Ambient
20.	DEAC	Tanks	40 KL	1	39 MT	0.5 bar	Ambient
21.	EASC	Tanks	40 KL	1	39 MT	0.5 bar	Ambient
22.	PAC	Tanks	50 KL	4	200 MT	Atm	Ambient
23.	ACS	Tanks	50 KL	4	190 MT	Atm	Ambient
24.	Hexene	Tanks	16 KL	1	32 KL	Atm	Ambient
25.	Octene	Tanks	16 KL	1	32 KL	Atm	Ambient

9.4.39 FACT SHEET of M/s. Kadillac Chemicals Pvt. Ltd.

LCG -2:- PADRA

MAH UNIT-8

1.	Name of the Factory			:	Kadillac Chemicals Pvt. Ltd.					
	Address			:	Block No. 853/854, Village: Chokari, Tal.Padra, Dist: Vadodara					
	Phone no.			:	(02662) 273376					
	E-mail			:	info@kadillac.com, sales@kadillac.com					
	Longitude/Latitude of Company			:	22.2066292 / 72.9237954					
2.	Name of Occupier			:	Mr. Kantibhai D. Patel, Managing Director					
	Residence Address			:	3, Shivshray Society, Opp. D-mart, Vasna Road, Vadodara – 390 007.					
	Mobile No.			:	9909929977					
3.	Name of Factory Manager			:	Mr. Vishnubhai D. Patel					
	Residence Address			:	39, Pratham Citadel, Nr. Bright Day School, Bhayli, Vadodara - 391410					
	Mobile No			:	99099 29969					
4.	Name of Safety Officer			:	-					
	Residence Address			:	-					
	Mobile No			:	-					
5.	Contact Person			:						
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Lakshak Patel	Director	(02662) 273376				9909929966		
	2.	Mr. Vishnubhai Patel	Factory Manager	(02662) 273376				9909929969		
	3.	Mr. Krunal Bhatt	QC Head	(02662) 273376				9722143512		
6.	Nature of Manufacturing/ Product			:	Organic Chemicals such as Benzyl Chloride, Benzaldehyde, Benzyl Benzoate & Hydrochloric Acid					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9:00 to 5:30	18	-	-	-	-	-	18	-
	1 st	07.00 to 15.30	16	-	-	-	1	-	17	-
	2 nd	15.00 to 23.30	16	-	-	-	1	-	17	-
	3 rd	23.30 to 07.00	16	-	-	-	1	-	17	-
	Total		66	-	-	-	3	-	69	-
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm2	Temperature °C		
	1.	Toluene	Tank-U.G	35	3	105	Atmospheric	Ambient		
	2.	Chlorine	Tonnors	0.9	60	54	3-4 Kg/Cm ²	Ambient		

9.4.40 FACT SHEET of M/s. Kiri Industries Limited - Unit – III**LCG-2: - PADRA****MAH UNIT- 9**

1.	Name of the Factory		:	Kiri Industries Limited Unit -03						
	Address		:	Plot No. 396/399,403/404, ECP Canal Road Village: Dudhwada, Taluka: Padra, Dist: Vadodara						
	Phone no.		:	91-2662-273444						
	E-mail		:	adminpadra@kiriindustries.com						
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:	Mr. Manishbhai P. Kiri						
	Residence Address		:	53, Manek Baug Society, Ambavadi, Satelite Road, Ahmedabad						
	Mobile No.		:							
3.	Name of Factory Manager		:	Mr. Jayeshkumar G. Vyas						
	Residence Address		:	E71/72, Surbhi Park Society, Near Balaji Nagar, B/h Samta Flat, Vadodara.						
	Mobile No		:	9687681058						
4.	Name of Safety Officer		:	Mr. Narendra Mehta						
	Residence Address		:	A-206, Haridham Complex, Nr. Rang Vatika Bhavan, Bapod, Vaghodiya Road, Vadodara.						
	Mobile No		:	7575007883						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Jayeshkumar G. Vyas	C.E.O	02662 - 273444				9687681058		
	2.	Mr. Rajesh Kothari	General Manager	02662 - 273444				9825400166		
	3.	Mr. Narendra Mehta	Manager - EHS	02662 - 273444				7575005368		
6.	Nature of Manufacturing/ Product		:	Manufacturing of Dyes intermediate.						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09.00 to 17.30	90	3	13	32	3	-	106	35
	1 st	07.00 to 15.00	120	-	38	-	5	-	163	-
	2 nd	15.00 to 23.00	120	-	41	-	6	-	167	-
	3 rd	23.00 to 07.00	135	-	64	-	12	-	211	-
		Total	465	03	156	32	26	-0	647	35

FACT SHEET of M/s. Kiri Industries Limited - Unit – III (Continue...)**LCG-2: - PADRA****MAH UNIT- 9**

8.	Hazardous Chemical Storage details							
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	Aniline	MS	25+27	4+2	100	Atmospheric	Ambient
	2.	Chloro Sulphonic Acid	MS	80+40	4+1	80+20	Atmospheric	Ambient
	3.	Ethylene Oxide	SS	19.9	2	25	4 -5 Kg/cm2	11 0C.
	4.	Hydro Chloric Acid	HDPE	80+80+30+20	2+4+1+1+	80+65+30+20	Atmospheric	Ambient
	5.	Methenol	MS	14 + 24	2+2	14+24	Atmospheric	Ambient
	6	Thionyl Chloride	SS+MS	80+30	2+1	80+25	Atmospheric	Ambient
	7	Oleum 65%	MS	25+40+60+60	1+2+3+2	20+60+50+50	Atmospheric	Ambient
	8	Oleum 23%	MS	30+20	2+1	15+20	Atmospheric	Ambient
	9	Caustic Soda lye	MS	80+40+30+80	2+1+2+1	80+30+20+60	Atmospheric	Ambient
	10	Sulphuric Acid, 98 %	MS	60+50+34+41+20	2+1+1+1+1	60+38+31+10	Atmospheric	Ambient
	11.	Sulphuric Acid 23%	MS	30+20+80	1+1+1	20+15+60	Atmospheric	Ambient
	12.	Ammonia	MS	40+15	1+1	30+10	Atmospheric	Ambient
	13.	Ortho Nitro Toluene	MS	60	1	25	Atmospheric	11 0C
	14.	Nitro Benzene	Ms	60	1	25	Atmospheric	11 0C
	15	Ethyl Acetate	MS	5	1	3	Atmospheric	Ambient
	16	Nitric Acid	MS	20+20+25+25+60	1+1+1+1+1	15+15+20+20+50	Atmospheric	Ambient
	17	Sodium Sulphate	MS	40	1	30	Atmospheric	Ambient
	18	Acetic Anhydride	MS	20	2	30	Atmospheric	Ambient
	19	Acetic Acid	MS+ HDPE	30+20	1+1	20+10	Atmospheric	Ambient
	20	Acetic Acid - recover	MS	5	1	3	Atmospheric	Ambient
	21	Diutel. Acetic Acid	MS	30	5	100	Atmospheric	Ambient
	22	Spent Acid	HDPE	40+150+180+80+25+35+60	4+4+3+1+2+2+6	80+300+400+40+15+20+300	Atmospheric	Ambient
	23	Sodium Bi sulfate	HDPE	30+20+80	1+1+1	20+16+60	Atmospheric	Ambient
	24	Furnace Oil	MS	15+20	1+1	10+15	Atmospheric	Ambient

9.4.41 FACT SHEET of M/s. Kiri Industries Limited - Unit – V**LCG-2: - PADRA****MAH UNIT- 10**

1.	Name of the Factory		:		Kiri Industries Limited - Unit 5							
	Address		:		Plot No. 552 A, 566, 567, 569, 571 ECP Canal Road Village: Dudhwada, Taluka: Padra, Dist: Vadodara							
	Phone no.		:		91-2662-273724 and 273725							
	E-mail		:		adminpadra@kiriindustries.com							
	Longitude/Latitude of Company		:									
2.	Name of Occupier		:		Mr. Manishbhai P. Kiri							
	Residence Address		:		53, Manek Baug Society, Ambavadi, Satelite Road, Ahmedabad							
	Mobile No.		:									
3.	Name of Factory Manager		:		Mr. Bhasker Joshi							
	Residence Address		:		14, Shreeem Bungalows, NearNaug, Vasana Road Vadodara							
	Mobile No		:									
4.	Name of Safety Officer		:		Mr. Narendra Mehta							
	Residence Address		:		A-206, Haridham Complex, Nr. Rang Vatika Bhavan, Bapod, Vaghodiya Rd., Vadodara.							
	Mobile No		:		7575007883							
5.	Contact Person		:									
	Sr. No.	Name	Designation	Telephone Number								
				Factory / Office				Mobile				
				1.	Mr. Bhasker Joshi	VP-Manufacture	02662 - 273444				09687681202	
				2.	Mr. Rajesh Kothari	General Manager	02662 - 273444				098254 00166	
3.	Mr. Narendra Mehta	Manager - EHS	02662 - 273444				7575005368					
6.	Nature of Manufacturing/ Product		:		Chemical Industry -Sulfuric Acid, Oleum 65%, Oleum 23% & chloro sulfonic Acid							
7.	Man Power & Timing											
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total			
			M	F	M	F	M	F	M	F		
	General	09.00 to 17.30	14	NIL	0	NIL	01	NIL	15	00		
	1 st	07.00 to 15.00	28	NIL	13	NIL	09	NIL	50	Nil		
	2 nd	15.00 to 23.00	19	NIL	0	NIL	05	NIL	24	Nil		
	3 rd	23.00 to 07.00	15	NIL	1	NIL	06	NIL	22	Nil		
		Total	76	NIL	14	NIL	21	NIL	111	00		

FACT SHEET of M/s. Kiri Industries Limited - Unit – V (Continue...)**LCG-2: - PADRA****MAH UNIT- 10**

8.	Hazardous Chemical Storage details							
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	Chloro Sulphonic Acid	MS Tank	250	03	500	Atmospheric	Ambient
	2.	Oleum 65%	MS Tank	250	02	250	Atmospheric	Ambient
	3.	Oleum 23%	MS Tank	250	02	250	Atmospheric	Ambient
	4.	Caustic Soda lye	MS Tank	25	01	20	Atmospheric	Ambient
	5.	Sulphuric Acid 98 %	MS Tank	10000	03	2000	Atmospheric	Ambient
	6.	Sulphuric Acid 70%	MS Tank	250	02	250	Atmospheric	Ambient
	7.	Spent Acid – Hydro Chloric Acid	MS Bricked lined Tank	250	03	500	Atmospheric	Ambient
	8.	Chlorine	Tonner	900 Kg	92	92	3 Kg/cm2	Ambient
9	Thonyl choride	SS Tank	75	01	50	Atmosphric	Ambient	

9.4.42 FACT SHEET of M/s. Mayur Dyechem Intermediates LLP (Unit - III)**LCG -2: - PADRA****MAH UNIT- 11**

1.	Name of the Factory		:		Mayur Dyechem Intermediates LTD (Unit - III)					
	Address		:		Survey No. 327 To 334 A, Vill: Karakhadi/Dudhwada Tal.Padra, Dist: Vadodara – 391450					
	Phone no.		:		9825008407, 9825048585					
	E-mail		:		mayurdyeint@yahoo.com , mayurdyeir@gmail.com mayurdyeint@gmail.com					
	Longitude/Latitude of Company		:		22.1923725,72.8967900					
2.	Name of Occupier		:		Shri Mayurbhai B. Patel (CMD)					
	Residence Address		:		43, Tulip Bungalows, Thaltej, Drive in Ahmedabad					
	Mobile No.		:		9825008407					
3.	Name of Factory Manager		:		Mr. Shirishbhai M. Shah					
	Residence Address		:		D-8, Akshardham TEN, Sunpharma Road, Vadodara					
	Mobile No		:		98250 48585					
4.	Name of Safety Officer		:		Mr. Vikas Bhuptani					
	Residence Address		:		IRIS-1004, Green Heaven Society, Atladara-Padra main Road, Near Bhayli Station, Samiyala, Vadodara 391410					
	Mobile No		:		8140413088					
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Shirish Shah	General Manager	98250 48585				98250 48585		
	2.	Mr. Vipul Shah	Plant Manager	99250 19808				99250 19808		
	3.	Mr. P. D. Patel	Plant Manager	99250 19814				99250 19814		
	4.	Mr. Vijay Dave	Maintenance Manager	99250 19328				99250 19328		
	5.	Mr. Gaurang Parikh	H.R	99795 61791				99795 61791		
6.	Nature of Manufacturing/ Product		:		Chemicals (Dyestuff Intermediates) Manufacturing H-Acid and Vinyl Sulphone					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09.00 am to 5.30 pm	27	-	07	-	01	-	35	-
	1 st	07.00 am to 3.00 pm	26	-	72	-	05	-	103	-
	2 nd	3.00 pm to 11.00 pm	26	-	72	-	05	-	103	-
	3 rd	11.00 pm to 7.00 am	26	-	72	-	05	-	103	-
		Total	129	-	223	-	16	-	344	-

FACT SHEET of M/s. Mayur Dyechem Intermidates LLP (Unit - III) (Continue...)**LCG -2: - PADRA****MAH UNIT- 11**

8. Hazardous Chemical Storage details								
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Containers	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	Methanol	Tank	12	3	36	Atmospheric	Ambient
	2.	Anilin Oil	Tank	45	6	270	Atmospheric	Ambient
	3.	Oleum 65%	Tank	65	3	195	Atmospheric	Ambient
	4.	Nitric Acid	Tank	25	2	50	Atmospheric	Ambient
	5.	Acetic Acid	Tank	24	3	48	Atmospheric	Ambient
	6.	Acetic Anhydride	Tank	15	1	15	Atmospheric	Ambient
	7.	Caustic Soda Lye	Tank	30	2	60	Atmospheric	Ambient
	8.	Chloro Sulphonic Acid	Tank	60	4	240	Atmospheric	Ambient
	9.	Sulphuric Acid 98%	Tank	65	4	260	Atmospheric	Ambient
	10.	Thionyl Chloride	Tank	20	3	60	Atmospheric	Ambient
	11.	Ethylene Oxide	Tank	07	2	14	2-3 Kg/cm2	12°C

9.4.43 FACT SHEET of M/s Neogen Chemicals Limited**LCG-2: - PADRA****MAH UNIT-12**

1.	Name of the Factory			:	Neogen Chemicals Limited					
	Address			:	At & Po : Village Karakhadi – 391 450 Tal. Padra, Dist. Vadodara, Gujarat					
	Phone no.			:	02662- 273329, 9727699911, 9727699922					
	E-mail			:	jigar.tamboli@neogenchem.com					
	Longitude/Latitude of Company			:	22.197528762359493, 72.9087668008539					
2.	Name of Occupier			:	Mr. Shyamsundar Upadhyay					
	Residence Address			:	F.No. 103, Harmony Highland Residency, Kolshet RD, Dhoka, Thane, Maharashtra – 400 608					
	Mobile No.			:	9833567877					
3.	Name of Factory Manager			:	Mr. Kamlesh Bhavesh Kumar Hariyani					
	Residence Address			:	A-37, Yoginar-1, B/h Narayan Wadi, Atladra, Vadodara-390 012					
	Mobile No			:	9909956059					
4.	Name of Safety Officer			:	Mr. Pruthviraj Solanki					
	Residence Address			:	B-58, Park Rest Society, Behind L&T Knowledge City, Near Taksh Aura, Vilalge Ankhol Vadodara-390 019					
	Mobile No			:	6352458917					
5.	Contact Person			:						
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Kamlesh Hariyani	Factory Manager	02662 273329				9909956059		
	2.	Mr. Kirit Chauhan	Sr. VP- HR	02662 273329				9909956332		
	3.	Mr. Jugar Tamboli	Sr. Manager – HR & Admn.	02662 273329				9909956203		
6.	Nature of Manufacturing/ Product			:	Chemical Industry					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09.00 to 17.30	62	-	94	-	10	-	166	-
	1 st	07.00 to 15.00	46	-	68	-	16	-	130	-
	2 nd	15.00 to 23.00	32	-	25	-	11	-	68	-
	3 rd	23.00 to 07.00	17	-	42	-	11	-	70	-
		Total	157	-	229	-	48	-	434	-
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm2	Temperature °C		
	1.	Methanol	Tank	30 KL	01	30 KL	Atmospheric	Ambient		
	2.	Bromine	Tank	6.3 KL	06	80 KL	Atmospheric	Ambient		
	3.	Caustic Lye	Tank	10 Ton	01	10 MT	Atmospheric	Ambient		

9.4.44 FACT SHEET of M/s Prime Organic**LCG-2: - PADRA****MAH UNIT-13**

1.	Name of the Factory		:	Prime Organic						
	Address		:	Block No. 565/B, ECP Road, Village Luna, Tal. Padra, Dist. Vadodara-391 440						
	Phone no.		:	-						
	E-mail		:	primeorganic@rediffmail.com						
	Longitude/Latitude of Company			22 °16'16.69"N / 73° 3'11.82"E						
2.	Name of Occupier		:	Mr. Kalpesh J. Amin						
	Residence Address		:	6, Avadhut Society, Vishwamitri Road, Vadodara						
	Mobile No.		:	9825028386						
3.	Name of Factory partner		:	Mr. Kalpesh J. Amin						
	Residence Address		:	6, Avadhut Society, Vishwamitri Road, Vadodara						
	Mobile No		:	9825028386						
4.	Name of Safety Officer / Supervisor		:	Mr Bharat B. Makwana						
	Residence Address		:	At: Parshuram Bhattha, Sayajigunj, Vadodara						
	Mobile No		:	9712018807						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office		Resident		Mobile		
	1.	Mr. Kalpesh J. Amin	Partner	Office		-		9825028386		
	2.	Mr Bharat B. Makwana	Supervisor	Factory		-		9712018807		
6.	Nature of Manufacturing/ Product		:	In organic chemicals.						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9 am to 5 pm	6	-	-	-	-	-	6	-
	1 st	7am to 3 pm	2	-	-	-	-	-	2	-
	2 nd	3 pm to 11pm	2	-	-	-	-	-	2	-
	3 rd	11 pm to 7 am	2	-	-	-	-	-	2	-
		Total	12	-	-	-	-	-	12	-
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm2	Temperature °C		
	1.	Chlorine	Tonner	0.9 M.T.	12	24	3-4 Kg/cm2	Amb.		

9.4.45 FACT SHEET of M/s. Shimmer Chemicals Pvt. Ltd.

LCG:2: - PADRA

MAH UNIT-14

1.	Name of the Factory		:	Shimmer Chemicals Pvt. Ltd.						
	Address		:	Block No.336/338, Padra–Borsad State Highway, Village:Mujpur, Tal.Padra, Dist: Vadodara-391 440						
	Phone no.		:	02662-244325						
	E-mail		:	info@shimmerchem.com						
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:	Mr. Ramanbhai Chhotabhai Patel						
	Residence Address		:	A-9/10, Sakar Bunglow, Opp. Madhav Nagar Soc. Old Padra Road, Vadodara-390020						
	Mobile No.		:	98797 76612						
3.	Name of Factory Manager		:	Mr. JayaeshbhaiChhotabhai Patel						
	Residence Address		:	A-9/10, SakarBunglow, Opp.Madhav Nagar Soc. Old Padra Road, Vadodara-390020						
	Mobile No		:	98250 95336						
4.	Name of Safety Officer		:	-						
	Residence Address		:	-						
	Mobile No		:	-						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Ramanbhai C. Patel	Director	265-2561026/2561914				98797 76612		
	2.	Mr. Jayeshbai R. Patel	Director	02662-244325				98250 95336		
	3.	Mr. Vishant D Patel	Director	02662-244325				9099984962		
4.		Expert Person								
6.	Nature of Manufacturing/ Product		:	Speciality Chemicals						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9.00 to 18.00	21	03	-	-	01	-	22	03
	1 st	08.00 to 16.00	05	-	10	-	-	-	15	-
	2 nd	16.00 to 24.00	05	-	10	-	-	-	15	-
	3 rd	00.00 to 08.00	05	-	10	-	-	-	68	-
		Total	36	03	30	-	02	-	120	03

FACT SHEET of M/s. Shimmer Chemicals Pvt. Ltd. (Continue...)**LCG -2:- PADRA****MAH UNIT-14**

8. Hazardous Chemical Storage details							
Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
						Pressure Kg/cm ²	Temperature °C
1	Toluene	U/G Tank	25MTX2 Nos. 30MTX1 No.	3	96 KL	Atmospheric	Ambient
2	Chloine	Tonners	900 Kgs.	27 Tonner	30 MT	4 / 6Kg/cm ²	Ambient
3	Caustic Lye	HDPE Tanks	15 MT	01	15 MT	Atmospheric	Ambient
4	Benzyl Chloride	HDPE Tanks	20 MT	01	20 MT	Atmospheric	Ambient
5	Benzaldehyde	HDPE Tanks	20 MT	01	20 MT	Atmospheric	Ambient
6	Hydrochloric Acid	HDPE Tanks	05 MT	08	40 MT	Atmospheric	Ambient
7	N-Butanol	U/G Tank	30Mt	1	30MT	Atmospheric	Ambient
8	Acetone	U/G Tank	25MT	1	20Mt	Atmospheric	Ambient
9	N-Pentanol	U/G TankM	25MT	2	50MT	Atmospheric	Ambient
10	Ortho Chlro Toluene	Drum Storage	10MT		10MT	Atmospheric	Ambient
11	1.6 Hexane Diol	Drum Storage	5MT		5MT	Atmospheric	Ambient
12	Para Chloro Toluene	Drum Storage	20MT		20Mt	Atmospheric	Ambient
13	2.4diChloro Toluene	Drum Storage	5MT		5MT	Atmospheric	Ambient

9.4.46 FACT SHEET of M/s. Shiva Pharmachem Ltd.**LCG -2:- PADRA****MAH UNIT- 15**

1.	Name of the Factory		:	Shiva Pharmachem Ltd.						
	Address		:	ECP Canal Road, Plot No. 588, 589, 590/B, 592/B, 593, 594, 595 Village Luna, Tal.Padra, Dist: Vadodara – 391 210						
	Phone no.		:	(02662) 221021						
	E-mail		:	amresh.verma@shivapharmachem.com						
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:	Mr. Jagmohan Zalani						
	Residence Address		:	28, Snow Pearls Bungalows, Vasna Road, Vadodara						
	Mobile No.		:	9825040747						
3.	Name of Factory Manager		:	Mr. Amresh Kumar Verma						
	Residence Address		:	B-56, Yogoraj Duplex, Laxmipura Road, Gorwa, Vadodara.						
	Mobile No		:	7490008032						
4.	Name of Safety Officer		:	Mr. Vishal Dixit						
	Residence Address		:	9, Ishwerkrupa Society, Opp. Jaggannathpuram Society, Manjalpur, Vadodara						
	Mobile No		:	8347001833						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Ketan Shah	Dy. Manager	(02662) 221021				98244 43507		
	2.	Mr. Vishal Dixit	Safety Officer	(02662) 221021				8347001833		
6.	Nature of Manufacturing/ Product		:	Chemical Industry -Carboxylic Acid & Alkyl Chlorides						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09.00 to 06.00	98	01	58	02	00	-	159	-
	1 st	07.00 to 03.00	48	-	56	-	05	-	109	-
	2 nd	03.00 to 11.00	48	-	38	-	04	-	90	-
	3 rd	11.00 to 07.00	44	-	49	-	05	-	98	-
		Total	238	01	201	02	14	-	456	-

FACT SHEET of M/s. Shiva Pharmachem Ltd. (Continue...)**LCG-2: - PADRA****MAH UNIT- 15**

8. Hazardous Chemical Storage details								
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm ²	Temperature °C
	1.	Acid/ Alkyl Chlorides (FG)	Storage Tanks (PP FRP/MSG/ MSLB)	30	12		Atmospheric	Ambient
	2.	Carboxylic acids/Aliphatic Alcohols	Storage Tanks of PP+FRP/CS/ SS	25 to 50	12		Atmospheric	Ambient
	3.	Liquid Chlorine	CS Cyinders	0.9	-	-	7.5 Kg/Cm ²	Ambient
	4.	Liquid SO ₂	CS Storage Tanks	02	4	04 *	7.5 Kg/Cm ²	Ambient
	5.	Liquid SO ₂	CS Cylinders	0.9	18		7.5 Kg/Cm ²	Ambient
	6.	Thionyl Chloride	Storage Tanks of SS	25	3	50 *		ambient

***1 Tank is always kept empty**

9.4.47 FACT SHEET of Silox India Private Limited - Ekalbara**LCG -2:- PADRA****MAH UNIT-16**

1.	Name of the Factory		:		Silox India Private Limited					
	Address		:		At & Po: Ekalbara, Tal: Padra, Dist: Vadodara, Gujarat-391 440					
	Phone no.		:		9909924311, 9909924313, 9909924813					
	E-mail		:		info@siloxindia.com; shreedhar.kantharia@siloxindia.com					
	Longitude/Latitude of Company		:		Latitude 22.1400, Longitude 73.5000					
2.	Name of Occupier		:		Mr. Prakash Raman, Managing Director					
	Residence Address		:		Pent House No 602, 6th Floor, Opp Darshnam Splendora, Vasant Vihar Road, Bhayli, Vadodara 391 410, Gujarat.					
	Mobile No.		:		9702995995					
3.	Name of Factory Manager		:		Mr. Bhushan Shinde, GM (Operation)					
	Residence Address		:		E-301, Iscon Heights, Gotri, Vadodara					
	Mobile No		:		6359914851					
4.	Name of Safety Officer		:		Mr. Nikunj Koli					
	Residence Address		:		E101, Devesh Imperia, b/h Sagun Party plot, Bill Canal Road, Bill, Vadodara 391410					
	Mobile No		:		6359914915					
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Ramakant Sahoo	SVP-Operation	0265 2680401				7043707003		
	2.	Mr. Bhushan Shinde	GM-Operation	6359914851				6359914851		
	3.	Shiba Prasad Bharati	Director-Technology	0265 2680401				9825128961		
	4.	Mr. Darshan Trivedi	DGM - EHS	6359914624				9099028335		
6.	Nature of Manufacturing/ Product		:		Sodium Hydro Sulphite, Zinc Oxide, Zinc Carbonate.					
7.	Manpower & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	Gen	09.00 To 17.30	92	2	42	0	0	0	134	2
	1 st	06.00 TO 14.00	84	0	167	0	19	0	270	0
	2 nd	14.00 TO 22.00	88	0	153	0	0	0	241	0
	3 rd	22.00 TO 06.00	62	0	131	0	19	0	212	0
		Total	326	2	493	0	38	0	857	2

FACT SHEET of Silox India Private Limited - Ekalbara (Continue...)**LCG-2: - PADRA****MAH UNIT-16**

8. Hazardous Chemical Storage details							
Sr. No.	Name	Type of Storage / Container	Capacity of each Container	No. of Container	Maximum Storage Capacity	Parameters	
						Pressure Kg/cm²	Temperature °C
1.	Methyl Alcohol	U/G Tank	20 KI, 40 KL	2	60KL	Atm	Atm
2.	Oleum 25 %	Tank-, A/G	30MT	1	30MT	Atm	Atm
3.	Sulphuric Acid	vertical Tank-, A/G	36KL 22KL	1 1	36KL 22 KI	Atm	Atm
4.	Sodium Hydroxide	Tank-, A/G	40KL 30KL 80KL	1 2 2	40KL 30 KL 80 KL	Atm	Atm
5.	Sulphur	Loose	100MT	-	100MT	Atm	Atm
6.	Furnace Oil	Tank-, A/G	90KL	1	90KL	Atm	Atm
7.	Ethylene Oxide	Tank-, A/G	10KL	2	20 KL	3.5 Kg/CM ²	@-4°C
8.	SO ₂ tonner	Tonner	900 kg	44+ 30	66.6MT	7.5 KG/CM ²	Atm
9.	Hydrochloric Acid	Tank, A/G	20 KL	1	20 KL	Atm	Atm
10.	Ammonia	Cylinder	50kg	5	250 kg	18Kg/Cm ²	Atm
11.	Hydrogen Peroxide	Tank-A/G	10MT	1	10MT	Atm	Atm

9.4.48 FACT SHEET of M/s. TML Industries Ltd.**LCG-2: - PADRA****MAH UNIT-17**

1.	Name of the Factory		:	M/s. TML Industries Ltd						
	Address		:	Block No. 79,1896,1902 & 1903, Village:Karakhadi, Ta:Padra, Dist: Vadodara.						
	Phone no.		:	91+2662-273563						
	E-mail		:	tml@tmlind.com						
	Longitude/Latitude of Company		:	Long : 72.91965537449852 Lat : 22.206649090686316						
2.	Name of Occupier		:	Shri Avtar Singh						
	Residence Address		:	House No : 5411, Section 38 west, Chandigarh, Chandigarh-1600014, Ph. 0265-234302						
	Mobile No.		:	98726 00005						
3.	Name of Factory Manager		:	Mr. Alpesh Patel						
	Residence Address		:	A-31,Upvan Society,B/H Ayodhya Nagar,VIP Road,KareliBaug,Vadodara-390018						
	Mobile No		:	9601151017						
4.	Name of Safety Officer		:	Mr. Vipul Dabhi						
	Residence Address		:	B/ 306 , Vrundalaya Heights , Nr. Podar World School , Chhani Sama Canal Road , Vadodara - 391740						
	Mobile No		:	90990 27287						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Narendra Patel	Asst. Manager (Operation)	+ 91 7227984581				7227984581		
	2.	Mr. Alpesh P Patel	Sr. Officer	+91 7490018936				7490018936		
6.	Nature of Manufacturing/ Product		:	The unit of manufacturing of acid chlroride base product.						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09:30 to 17:30	21	-	12	-	-	-	33	-
	1 st	06:30 to 14:30	17	-	13	-	02	-	32	-
	2 nd	14:30 to 22:30	14	-	12	-	02	-	28	-
	3 rd	22:30 to 06:30	13	-	09	-	02	-	24	-
		Total	34	-	46	-	06	-	117	-

FACT SHEET of M/s. TML Industries Ltd. (Continue...)

LCG-2: - PADRA

MAH UNIT-17

8. Hazardous Chemical Storage details								
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm ²	Temperature °C
	1.	Terephthalic Acid	Jumbo Bag	1200kg	50	60 MT	Atm.	Amb.
	2.	Thionyl Chloride	ISOTank	24KL	02	48 KL	Atm.	Amb.
	3.	Caustic soda Lye	Tank	40 MT	01	40 MT	Atm.	Amb.
	4.	Acide Chloride	ISOTank	24KL	02	48 KL	Atm.	80 Degree
	5.	Sulphuric acid (H ₂ SO ₄)	Tank	30 MT & 10 MT	02	40 MT	Atm.	Amb.
	6.	Hydrochloric Acid (HCL)	Tank	50 MT	04	200 MT	Atm.	Amb.
	7.	Sodium bisulphate (S.B.S.)	Tank	50 MT	01	50 MT	Atm.	Amb.
	8.	Sulphure Dioxide (SO ₂)	Tonner	900 kg	45	40 MT	Atm.	Amb.

9.4.49 **FACT SHEET of M/s Transpek Industry Limited**

LCG-2: - PADRA

MAH UNIT-18

1.	Name of the Factory		:	Transpek Industry Limited						
	Address		:	At & Post: Ekalbara , Tal: Padra, Dist: Vadodara - 391440,Gujarat. India.						
	Phone no.		:	+91 02662-244444, 244318, 244309						
	E-mail		:	dharmesh.pancholi@transpek.com						
	Longitude/Latitude of Company		:	22.2516° N, 73.0143° E						
2.	Name of Occupier		:	Shri Avtar Singh						
	Residence Address		:	5411, Sector-38, West- Chandigadh, Sector-14, Pincode:-160014 Ph. No. 0265-6700300						
	Mobile No.		:	98726 00005						
3.	Name of Factory Manager		:	Shri R.B.Shetty						
	Residence Address		:	8/ Adinath banglow, 27 Goyagate Society, R V Desai Road, Pratapnagar , Vadodara-390004						
	Mobile No		:	9898508837						
4.	Name of Safety Officer		:	Mr. Dharmesh Pancholi						
	Residence Address		:	B-55,Earth Somnath Villa,Gotri Sevasi Road,Opp.Zydex Building,Vadodara						
	Mobile No		:	7574801006						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Shri R.B.Shetty	Factory Manager	+9102662-244444,244318,244309, Ext. 111				9898508837		
	2.	Shri S.P Singh	General Manager	+9102662-244444,244318,244309, Ext.112				96380 77766		
	3.	Shri. Dharmesh Pancholi	Manager - Safety	+9102662-244444,244318,244309, Ext. 100				7574801006		
	4.	Shri. D.A.Paul	Asst. Gen. Manager	+9102662-244444,244318,244309, Ext. 179				9898991294		
6.	Nature of Manufacturing / Product		:	Industrial Chemicals						
	1	Thionyl Chloride			11	Oleum 27%				
	2	Sulfure Mono chloride			12	Propargyl Chloride				
	3	Sulphuric Acid			13	Pera Chloro Benzoyl Chloride				
	4	Isophthaloyl Chloride			14	n-Valeroyl Chloride				
	5	Terephthaloyl Chloride			15	Octanoyl Chloride				
	6	2,4,6 Trimethyl Benzoyl Chloride			16	2-Propoxy Ethyl Chloride				
	7	Sulphur Di-Chloride			17	Neodecanoyl Chloride				
	8	Sulphur Dioxide			18	4- Pentenoyl Chloride				
	9	2,Chloroethylamine hydro chloride			19	Pera Nitro Benzoyl Chloride				
	10	Methoxyacetyl Chloride			20	Sulfuryl Imine				
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	08.30 hrs to 17 00 hrs.	238	27	162	2	2	0	402	29
	1 st	06.00 hrs to 14 00 hrs..	161	0	58	0	17	0	336	0
	2 nd	14..00 hrs to 22 00 hrs.	148	0	25	0	18	0	191	0
	3 rd	22.00 hrs.to 06.00 hrs.	122	0	44	0	18	0	184	0
		Total	669	27	289	2	55	0	1013	29

FACT SHEET of M/s. Transpek Industry Limited (Continue...)**LCG-2: - PADRA****MAH UNIT-18**

8.	Hazardous Chemical Storage details						
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container	No. of Containers	Maximum Storage Capacity	Parameters Pressure Kg/cm2 Temperature 0C
	1	Thionyl Chloride	Horizontal Tank	25 MT – 05 10 MT- 01 08 MT-01	07 Nos.	118 MT	Atm. Atm.
	2	Sulphuric Acid	Vertical Tank	25 MT – 02 110 MT – 02	03 Nos	270 MT	Atm. Atm.
	3	Sulphur	Storage Godown	2000 MT	01 Nos	1800 MT	Atm. Atm.
	4	Isophthaloyl Chloride	Horizontal Tank	90 MT	03 Nos.	50 MT	Atm. Atm.
	5	Terephthaloyl Chloride	Horizontal Tank	60 MT	02 Nos	40 MT	Atm. Atm.
	6	2,4,6 Trimethyl Benzoyl Chloride	Vertical Tank	10 KL – 02 nos 06 KL – 02 nos 05KL-01 nos	05 Nos	21 MT	Atm. Atm.
	7	Sulphur Di-Chloride	Horizontal Tank	30 MT -1nos 03 MT- 2 nos	03 Nos	36 MT	Atm. Atm.
	8	Toluene	U.G.Tank	35 KL in bulk 20 KL other than bulk	02 Nos	20 KL	Atm. Atm.
	9	Mesitylene	Horizontal Tank	20 MT-02 nos 24 MT-02 nos	02 Nos	40 MT	Atm. Atm.
	10	Methanol	Storage Room In Drum	10 MT	01 Nos	10 MT	Atm. Atm.
	11	Chlorine	Storage Godown	0.9 MT	150 Nos	135 MT	Atm. Atm.
	12	Sulphur Dioxide	Plant & Storage Godown	1.8 KL – 02 10 KL - 01 8 KL – 04	60 Nos (Tonners)	42 MT	6 to 7 Kg/cm2 Atm.
	13	2,Chloroethylamine hydro chloride	Drum	30 MT	----	10 MT	Atm. Atm.
	14	Propargyl Chloride	Horizontal Tank	25 MT x 2	02 Nos	40 MT	Atm. Atm.
	15	n-Valeroyl Chloride	Drum	40 MT	----	13 MT	Atm. Atm.
	16	Octanoyl Chloride	Drum	20 MT	----	20 MT	Atm. Atm.
	17	2-Propoxy Ethyl Chloride	Drum	40 MT	-----	20 MT	Atm. Atm.
	18	Neodecanoyl Chloride	Drum	25 MT	-----	25 MT	Atm. Atm.
	19	4- Pentenoyl Chloride	Drum	15 MT Non bulk	-----	03 MT	Atm. Atm.
	20	HCL	FRP Tanks	50 MT	16 Nos	800 MT	Atm. Atm.
	21	Para Nitro Benzoyl Chloride	Carboys	40 KG Per Each Carboy	-----	10 MT	Atm. Atm.
	22	Aluminium Chloride	FRP Tanks	50 MT- 02	02 Nos	100 MT	Atm. Atm.
	23	Sulphur Monochloride	Tank	16 MT-01 Nos 28 MT-01 Nos 30 MT-01 Nos	03 Nos	74 MT	Atm. Atm.
	24	Caustic Lye 48%	Tank	20 MT-01 Nos 40 MT-02 Nos	03 Nos	60 MT	Atm. Atm.

9.4.50 **FACT SHEET of M/s. Anugrah In-Org Pvt. Ltd.**

LCG-3: - SAVLI

MAH UNIT- 1

1.	Name of the Factory		: Anugrah In- Org (P) Ltd.							
	Address		: 1088/B, Village Lamdapura, Tal. Savli, Dist. Vadodara							
	Phone no.		: 0265 – 2773675/ 2762272							
	E-mail		: info@anugrah.co.in							
	Longitude/Latitude of Company		:							
2.	Name of Occupier		: Mr. Kashyap Shah							
	Residence Address		: 33, Nilamber Grandeur, Near Navrachna University, Bhayali- Vasana, Vadodara-391410							
	Mobile No.		: 9825007278							
3.	Name of Factory Manager		: Mr. Janak Shah							
	Residence Address		: 11/1, Bhagirath Society, Chhani Jakat Naka, Vadodara.							
	Mobile No		: 9825988988							
4.	Name of Safety Officer		: Mr. Umesh Rana							
	Residence Address		: D-5, Geeta Park, Opp. Payal Park, Amitnagar Sama Road, Karelibaug Vadodara.							
	Mobile No		: 9825728121							
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Janak Shah	V P Operation	0265- 2762272				98259 88988		
	2.	Mr. Umesh Rana	Safety Offcier	0265- 2762272				9825728121		
	3.	Mr. Brijesh Rarthod	Expert Person							
6.	Nature of Manufacturing/ Product		: Chemical Manufacturing							
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9AM To 5 PM	7	-	-	-	2	-	9	-
	1 st	8 AM To 4 PM	30	-	-	-	--	-	30	-
	2 nd	4 PM TO 12 MidnighT	19	-	-	-	--	-	19	-
	3 rd	12 Midnight To 8 AM	15	-	-	-	--	-	15	-
		Total	71	-	-	-	2	-	73	-
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm2	Temperature °C		
	1.	Glacial Acetic Acid	HDPE Tank	25 KL 10 KL	03 01	75 KL 10 KL	Atm.	Amb		
	2.	Chlorine	M S Tonner	900 KG		42 Tonners	4 Kg/cm2			
	3.	MCA				400 MT	Atm.	Amb		
	4.	HCL	HDPE Tank	25 KL	07	175 KL	Atm.	Amb		
	5.	Mother Lique of MCA	HDPE Tank	25 KL	04	100 KL	Atm.	Amb		

9.4.51 FACT SHEET of M/s. Base Metal Chemical**LCG-3; - SAVLI****MAH UNIT- 2**

1.	Name of the Factory		:		Base Metal Chemicals					
	Address		:		Plot No.2, Rs. No.1089/B, Lamadapura Road, Vill- Majusar, Taluka- Savli, Dist. Vadodara					
	Phone no.		:		9978905311					
	E-mail		:		bmc_admin@basemetal.co.in					
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:		Mr. Bipin D. Ramani					
	Residence Address		:		27, Antika Green Woods, Ankodiya, Khanpur Road, Sevasi, Vadodara 391101					
	Mobile No.		:		9978777744					
3.	Name of Factory Manager		:		Mr. Himanshu K. Mehta					
	Residence Address		:		B-33, Shrenik Park, Akota, Vadodara					
	Mobile No		:		9825303215					
4.	Name of Safety Officer		:		Mr. Vinod Shrivastav					
	Residence Address		:		Manjusar, Tal. Savli, Dist. Vadodara					
	Mobile No		:		9725504251					
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
1.	Mr. Himanshu K. Mehta	Factory Manager	9978905311				9825303215			
2.	Mr. R. N. Pandey	Sr. Manager- HR & Administration	9978905311				9978901869			
6.	Nature of Manufacturing/ Product		:		Manufacturing of Aluminium Chloride					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09.00 hrs – 17.00 hrs	42	02	-	-	---	-	42	02
	1 st	06.00 hrs - 14.00 hrs	22	-	17	-	02	-	41	-
	2 nd	14.00 hrs-22.00 hrs	20	-	17	-	02	-	39	-
	3 rd	22.00 hrs- 06.00 hrs	20	-	07	-	02	-	29	-
	Total		104	02	41	-	06	-	151	02
8.	Hazardous Chemical Storage details									
Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters				
						Pressure Kg/cm²	Temperature °C			
1.	Chlorine	In Tonner	900 kg	75	67.5 MT	3-4 Kg/Cm ²	Ambient			

9.4.52 FACT SHEET of M/s. Chemcon Speciality Chemicals Limited**LCG-3: - SAVLI****MAH UNIT-3**

1.	Name of the Factory		:		Chemcon Speciality Chemicals Limited						
	Address		:		Ploat No. 336, 355 Paiki, Manjusar Kunpad Road, Vill : Manjusar, Taluka Savli, Dist-Vadodara						
	Phone no.		:		02667-290128						
	E-mail		:		info@cscpl.com, himanshu@cscpl.com						
Longitude/Latitude of Company						22.4521, 73.1844					
2.	Name of Occupier		:		Mr. Himanshu Purohit						
	Residence Address		:		204, Surya Darshan Complex, Nr. Taksh Complex, Vasna Road, Vadodara-15						
	Mobile No.		:		9879204812						
3.	Name of Factory Manager		:		Mr. Himanshu Purohit						
	Residence Address		:		204, Surya Darshan Complex, Nr. Taksh Complex, Vasna Road, Vadodara-15						
	Mobile No		:		9879204812						
4.	Name of Safety Officer		:		Mr. Arpan Sharma & Mr. Nilesh Modi						
	Residence Address		:		Mr. Arphan Sharma F-104, Krishna Prime, TP 13, Chhani Jakat Naka Vadodara-390024 Mr. Nilesh Modi C-368, Akshar City, Dabhoi Vadodara Main Road Village – Kelanpur, Vadodara-390004						
	Mobile No		:		Arphan Sharma – M. 8849153188, Nilesh Modi-M. 9974984684						
5. Contact Person			:								
	Sr. No.	Name	Designation	Telephone Number							
				Factory / Office				Mobile			
	1.	Mr. Kamal Aggarwal	Chairman & MD	02667-290128				9825008195			
	2.	Mr. Navdeep Goyal	Dy. Managing Director	02667-290128				9879204811			
	3.	Mr. Rajesh Gandhi	Director – CFO	02667-290128				9879204802			
4.	Mr. Rajveer Aggarwal	Director	02667-290128				9687615067				
5.	Nature of Manufacturing/ Product		:		Pharmaceutical Intermediates & Speciality Chemicals						
7. Man Power & Timing											
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total		
			M	F	M	F	M	F	M	F	
	General	9:30 AM to 6:00 PM	50	0	54	0	6	0	110	0	
	1 st	07:00 AM to 03:00 PM	50	0	32	0	0	0	82	0	
	2 nd	03:00 PM to 11:00 PM	45	0	32	0	0	0	77	0	
	3 rd	11:00 PM to 07:00 AM	45	0	32	0	5	0	82	0	
		Total	190	0	150	0	11	0	351	0	

FACT SHEET of M/s. Chemcon Speciality Chemicals Limited (Continue...)**LCG-3: - SAVLI****MAH UNIT-3**

8.	Hazardous Chemical Storage details							
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	HMDO	U/G SS Tank	20 MT.. 01 Nos. , 20 MT..05 Nos.	06	120 MT	Ambient	Atmospheric
	2.	HMDS	Tank	20 MT	02	40 MT	Ambient	Atmospheric
	3.	TMCS	PVC/MS Drum	200 Ltr	150 Approx	30 MT	Ambient	Atmospheric
	4.	Ammonia	Tank	7.5 MT...02 Nos.1.0 MT....01Nos	04	17 MT	Ambient	Under pressure
	5.	IPA	SS Tank	10 KL	02	20 KL	Ambient	Atmospheric
	6.	Chlorine	Tonner	900 kgs	24	21.6 MT	Ambient	Under pressure
	7.	Sulphur	HDPE Bags	50 Kg	40	20 MT	Ambient	Atmospheric
	8.	Diesel	PVC Drum	200 Liters	15	3.0 MT	Ambient	Atmospheric
	9.	Bromine	Tank	8.0 KL	09	72 MT	Ambient	Atmospheric
	10.	MCF	PVC/MS Drum	200 liters	50	10 MT	Ambient	Atmospheric
	11.	HCL 30%	HDPE/FRP Tanks	20 KL... 6 Nos &15 KL ... 2 Nos	08	150 MT	Ambient	Atmospheric
	12.	Ammonium Chloride Solution	HDPE Tanks	20 KL..2 Nos, 10 KL .20 Nos	4	60 KL	Ambient	Atmospheric
	13	MDC	UG SS Tank	50 KL	1	50 KL	Ambient	Atmospheric
	14	Benzene	SS Tank	50 Kl	6	300 KL	Ambient	Atmospheric
	15	Aluminium Chloride Solution	HDPE Tank	20 KL	1	20 KL	Ambient	Atmospheric

9.4.53 FACT SHEET of M/s. Gurunanak Chemical Industries

LCG -3:- SAVLI

MAH UNIT- 4

1.	Name of the Factory			:	Gurunanak Chemical Industries					
	Address			:	663, Lamdapura Road, Tal. Savli Majusar, Baroda – 391775					
	Phone no.			:	02667 – 264236					
	E-mail			:	gcimktg@yahoo.co.in, gurunanakchemicals@rediffmail.com					
	Longitude/Latitude of Company				27.2046 ⁰ N, 77.4977 ⁰ E					
2.	Name of Occupier			:	Mr. Sameer Bhaskaran					
	Residence Address			:	C-802, Bhadrlok Old Padra Road, Vadodara					
	Mobile No.			:	9824115950					
3.	Name of Factory Manager			:	Mr. Vinod Nair					
	Residence Address			:	A/8/91, Samta Flats, Samta, Subhanpura, Vadodara					
	Mobile No			:	9427784232					
4.	Name of Safety Officer			:	-					
	Residence Address			:	-					
	Mobile No			:	-					
5.	Contact Person			:						
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Sameer Bhaskaran	Occupier	02667 - 264236				9824115950		
	2.	Mr. Vinod Nair	Factory Manager	02667 - 264236				9427784232		
6.	Nature of Manufacturing/ Product			:	Chemicals (Chlorinated Paraffin Plasticizer)					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09.00 to 17.00	1	-	-	-	-	-	1	-
	1 st	08.00 to 1600	3	-	2	-	-	-	5	-
	2 nd	16.00 to 2400	3	-	2	-	-	-	5	-
	3 rd	00.00 to 0800	2	-	2	-	-	-	4	-
		Total	9	-	6	-	-	-	15	-

FACT SHEET of M/s. Gurunanak Chemical Industries

LCG -3:- SAVLI

MAH UNIT- 4

8. Hazardous Chemical Storage details								
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm ²	Temperature °C
	1.	HNP	Tank	40 KL	2	80 KL	Atmospheric	Ambient
	2.	HNP	Tank	24 KL	2	48 KL	Atmospheric	Ambient
	3.	HNP	Tank	32 KL	1	32 KL	Atmospheric	Ambient
	4.	HNP	Tank	50 KL	1	50 KL	Atmospheric	Ambient
	5.	Chlorine	Tonner	900 Kg	66	59.4 MT	3-4 Kg/Cm ²	Ambient

9.4.54 FACT SHEET of M/s. HARI ORGOCHEM PVT. LTD.**LCG -3:- SAVLI****MAH UNIT-5**

1.	Name of the Factory		:		Hari Orgochem Pvt. Ltd.					
	Address		:		Block No.579 At & Po Manjusar Ta. Savli, Dist. Vadodara					
	Phone no.		:		0265- 2775217					
	E-mail		:		nilay@hariorgo.com, dcu@hariorgo.com					
	Longitude/Latitude of Company				11331 M2					
2.	Name of Occupier		:		Mr. Nilay P. Shah					
	Residence Address		:		Harikunj, C N Vidyalaya, Ambawadi, At Ahmedabad, Tal. Ahmedabad, Dist. Ahmedabad					
	Mobile No.		:		9227422660					
3.	Name of Factory Manager		:		Mr. Divyang C. Upadhyay					
	Residence Address		:		B-401, Palm Exotica, Subhanpura Road, Near Jain Derasar, At. Vadodara, Tal. Vadodara, Dist. Vadodara					
	Mobile No		:		9227140325					
4.	Name of Safety Officer		:		Mr. Minhaj M. Pathan					
	Residence Address		:		A-101, Golden Height Sun Pharma Road, At.Vadodara, Tal.Vadodara, Dist.Vadodara					
	Mobile No		:		9904860317					
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Vijay.S.Shah	General Manager	0265 2775217				9227140320		
	2.	Mr. Vipul.S.Shah	Plant Incharge	0265 2775217				7265826285		
3.	Mr.Mukesh.P.Rathod	Asst. Safety Officer	0265 2775217				9909147632			
4.	Mr.Jaimin.K.Rajput	Hr-Executive	0265 2775217		-		9979588015			
6.	Nature of Manufacturing/ Product		:		Nitration, Distillation & Chlorination MCA					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09.30 To 17.30	22	-	18	-	-	-	40	-
	1 st	07.00 To 15.00	18	-	17	-	2	-	37	-
	2 nd	15.00. To 23.00.	18	-	17	-	2	-	37	-
	3 rd	23.00. To 07.00	18	-	17	-	2	-	37	-
		Total	76	-	69	-	6	-	151	-
8.	Hazardous Chemical Storage details									
Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters				
						Pressure Kg/cm2		Temperature °C		
1.	Acetic Acid	Tank	38 MT	1	40 MT	Atm		Atm		
2.	MCA Mass	Tank	42MT	1	45 MT	Atm		Atm		

9.4.55 FACT SHEET of M/s. Hindustan Petroleum Corporation Limited**LCG -3:- SAVLI****MAH UNIT-6**

1.	Name of the Factory		:	Hindustan Petroleum Corpo. Ltd.						
	Address		:	Village- Asoj Pilol, GIDC Manjusar, Vadodara						
	Phone no.		:	02667-268800						
	E-mail		:							
	Longitude/Latitude of Company			22.429070,73.221471						
2.	Name of Occupier		:	Sh. Rajendrra Niraanjan						
	Residence Address		:	Village- Asoj Pilol, GIDC Manjusar, Vadodara						
	Mobile No.		:	9820134807						
3.	Name of Factory Manager		:	Sh. Yashvendra Singh						
	Residence Address		:	Village- Asoj Pilol, GIDC Manjusar, Vadodara						
	Mobile No		:	9982083332						
4.	Name of Safety Officer		:	Girish Kumar Yadav						
	Residence Address		:	L- 401, Samsara Apartment , Canal Road, Chhani, Vadodara-390024						
	Mobile No		:	9078681566						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Rajendrra Niraanjan	DGM - Installation	02667-268800				'919820134807		
	2.	Girish Kumar Yadav	Sr. Manager	02667-268800				'919078681566		
	3.	Saurabh Bhatt	Sr. Manager	02667-268800				'919687606093		
	4.	Yashvendra Singh	Sr. Manager	02667-268800				'919982083332		
	5.	Manoj Kumar	Sr. Manager	02667-268800				'919598932111		
	6.	Rohit Kumar	Manager	02667-268800				'917696055196		
	7.	D S Rathore	Asst Manager	02667-268800				917665029888		
6.	Nature of Manufacturing/ Product		:	Finished Petroleum Product Receipt, Storage and Distribution						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	08:30 AM to 17:00 PM	16	1	40	0	23	1	79	2
	1 st	-	-	-	-	-	-	-	-	-
	2 nd	-	-	-	-	-	-	-	-	-
	3 rd	-	-	-	-	-	-	-	-	-
	Total		16	1	40	0	23	1	79	2

FACT SHEET of M/s. Hindustan Petroleum Corporation Limited (Continue...)**LCG-3: - SAVLI****MAH UNIT-6**

8.	Hazardous Chemical Storage details							
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container (KL)	No. of Container	Maximum Storage Capacity (KL)	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	Motor Spirit	AG Tanks	15600	5	15600	Atm pr.	Amb Temp
	2.	High Speed Diesel	AG Tanks	20600	5	20600	Atm pr.	Amb Temp
	3.	MTO	AG Tanks	2000	2	2000	Atm pr.	Amb Temp
	4.	Ethanol	AG Tanks	3900	1	3900	Atm pr.	Amb Temp
	5.	Kerosene	AG Tanks	2000	1	2100	Atm pr.	Amb Temp
	6.	Motor Spirit	UG Tank	100	3	100	Atm pr.	Amb Temp
	7.	High Speed Diesel	UG Tank	100	2	100	Atm pr.	Amb Temp
	8.	MTO	UG Tank	100	1	100	Atm pr.	Amb Temp
	9.	Ethanol	UG Tank	100	2	100	Atm pr.	Amb Temp
	10.	Kerosene	UG Tank	100	1	100	Atm pr.	Amb Temp

9.4.56 FACT SHEET of M/s. IndianOil Adani Ventures Limited, Dumad**LCG-3: - SAVLI****MAH UNIT- 7**

1.	Name of the Factory		:	IndianOil Adani Ventures Limited						
	Address		:	Indian Oil Corporation Limited, Vadodara Savli Road –Dumad -391740						
	Phone no.		:	96304 51155						
	E-mail		:	iotldumad@indianoil.in						
	Longitude/Latitude of Company		:	73°11'48.72"E / 22°24'12.57"N						
2.	Name of Occupier		:	Mr. Anubhav Jain						
	Residence Address		:	1305, Burlington Building, Patlipada, Off Ghodbandar Road, Hiranandani Estate, Thanne, Maharashtra 400 607						
	Mobile No.		:	79954 44047						
3.	Name of Factory Manager		:	Mr. Deepak Naik						
	Residence Address		:	405, Vihan L&T Reality Building, Chhani, Vadodara						
	Mobile No		:	96304 51155						
4.	Name of Safety Officer		:	Mr. Sayan Mondal						
	Residence Address		:	E-107, Saakar Spandoora II, Canal Road, Sama Savli, Vadodara						
	Mobile No		:	76174 63463						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Deepak Naik	Terminal Manager	-				96304 51155		
	2.	Mr. Jayanta Bhattacharyya	Operations Manager	-				85110 29443		
	3.	Mr. Divyesh Rana	Maintenance Manager	-				98257 88848		
6.	Nature of Manufacturing/ Product		:	Storage and distribution of MS, HSD, SKO, ATF						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	8:30 to 17: 00	15	1	16	2	6	1	37	4
	1st	6:00 to 14:00	2	0	2	0	5	0	9	0
	2nd	14:00 to 22:00	2	0	2	0	6	0	10	0
	3rd	22:00 to 6:00	2	0	2	0	5	0	9	0
		Total	21	1	22	2	22	1	65	4

FACT SHEET of M/s. IndianOil Adani Ventures Limited Dumad**LCG-3: - SAVLI****MAH UNIT- 7**

8.	Hazardous Chemical Storage details							
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	MS	Internal Floating roof tank	1770	4	7080	Atm	Amb
	2.	HSD	Conicak roof tank	11923	3	35769	Atm	Amb
	3.	SKO	Conicak roof tank	3737	2	7474	Atm	Amb
	4.	ATF	Conicak roof tank	3737	2	7474	Atm	Amb

9.4.57 FACT SHEET of M/s. INDO AMINES LTD.**LCG-3: - SAVLI****MAH UNIT-8**

1.	Name of the Factory		:	Indo Amines Ltd.						
	Address		:	Plot No.1723,1724 & 1746 Vill-Tundav, Tal-Savli, Dist.Vadodara - 391 775						
	Phone no.		:	7574863071						
	E-mail		:	adminbrd@indoaminesltd.com						
	Longitude/Latitude of Company		:							
2.	Name of Occupier		:	Mr. Keyur Chitre						
	Residence Address		:	A-403, Green Vrundavan Appt. Sama Savli Vadodara.						
	Mobile No.		:							
3.	Name of Factory Manager		:	Mr. Saji Jose						
	Residence Address		:	B-9, Toral Society, Gorwa Panchvati, Vadodara						
	Mobile No		:	7203040383						
4.	Name of Safety Officer		:	Mr.Bhavesh Makwana						
	Residence Address		:	D-205, Yogirajgreen Appertment, Dahsrath, Vadodara						
	Mobile No		:	7203040221						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr.Keyur Chitre	Director Operation	7574863071				9913687791		
	2.	Mr.Deepak Parmar	Sr.Manager HR, IR & Admin	7574863071				7203040201		
	3.	Mr.Bhavesh Makwana	EHS Officer	7574863071				7203040221		
6.	Nature of Manufacturing/ Product		:	Fatty Amines, Specialty Chemicals & Derivatives						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09:00 to 17:30	45	-	10	-	0	-	26	-
	1 st	07:00 to 15:00	20	-	20	-	3	-	56	-
	2 nd	15:00 to 23:00	16	-	18	-	4	-	35	-
	3 rd	23:00 to 07:00	17	-	20	-	4	-	35	-
		Total	98	-	68	-	11	-	177	-

FACT SHEET of M/s. Indo Amines Ltd. (Continue...)**LCG-3: - SAVLI****MAH UNIT-8**

8. Hazardous Chemical Storage details								
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm ²	Temperature °C
	1.	Ethylene Oxide	Bullets	15 MT	2 Bullets	30 MT	2.5 Kgs/cm ²	10°C (Under Chilling)
	2.	Ammonia	Bullets	9.4 MT	2 Bullets	18.8 MT	3.5 Kgs/cm ²	Ambient
	3.	Hydrogen Gas	Trolley	1 Trolley with 300 cylinders	1 Trolley	1 Trolley	220 Kgs/cm ²	Ambient
	4.	Methyl Chloride	Tonnors	800 KGs	5 Tonners	4000 KGs	5.0 Kgs/cm ²	Ambient
	5.	Acrylonitril	Tanks	10 MT	2 Tanks	20 MT	Atmospheric	Ambient
	6.	Styrene	Tanks	22 MT	1 TANK	22 MT	Atmospheric	>22°C (Under Chilling)

9.4.58 FACT SHEET of M/s. Jubilant Ingrevia Limited

LCG-3: - SAVLI

MAH UNIT- 9

1.	Name of the Factory		:	Jubilant Ingrevia Limited						
	Address		:	Block – 133, Village: Samlaya, Jarod – Savli Road, Tal.: Savli, Dist: Vadodara-391520.						
	Phone no.		:	9428520198						
	E-mail		:	Gurish.khosla@jubl.com						
	Longitude/Latitude of Company									
2.	Name of Occupier		:	Mr. Chandan Singh Sengar						
	Residence Address		:	Flat No-V-1,12A TF,Eldeco Utopia,Sector 93A, Noida,Gautambuddh Nagar,Uttar Pradesh.201304						
	Mobile No.		:	9801043368						
3.	Name of Factory Manager		:	Mr Gurish Khosla (Site Head)						
	Residence Address		:	55, Shri hari Residency,Vasna Bhaili road, Vadodara 391410						
	Mobile No		:	9428520198						
4.	Name of Safety Officer		:	Mr. Amrish Sharma						
	Residence Address		:	B 502, City Corner apartment, Vasna Bhaili road,Vadodara-391410						
	Mobile No		:	9909476480						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr Gurish Khosla	Site Head	(02667) 268302				9428520198		
	2.	Mr. Neeraj Tripathi	HR Head	(02667) 268303				7767087403		
6.	Nature of Manufacturing/ Product		:	Choline Chloride,Premixes						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	09.00 am to 05.30 pm	39	2	40	1	1	1	80	4
	1 st	07.00 am to 03.00 pm	22	-	40	-	8	-	70	-
	2 nd	03.00 pm to 11.00 pm	15	-	25	-	8	-	48	-
	3 rd	11.00 pm to 07.00 am	15	-	22	-	8	-	45	-
		Total	91	2	127	1	25	1	243	4
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm2	Temperature °C		
	1.	Ethylene Oxide	Bullet	23.8MT	1	23.8MT	4Kg	5°C		
	2.	Trimethylamine	Bullet	60MT	1	60MT	3.5kg			
	3.	Butadine	Bullet	48MT	1	48MT	3.5kg	5°C		

9.4.59 **FACT SHEET of M/s. LUBI GEL LLP**

LCG-3: - SAVLI

MAH UNIT- 10

1.	Name of the Factory		:	LUBI GEL LIMITED						
	Address		:	Savli - Vadodara Road, Block / Survey No : 513/B, At & Post : Manjusar Taluka : Savli , Dist.: Vadodara-391775						
	Phone no.		:	02667- 264368 / 69 / 70, Mobile No. 9512880010						
	E-mail		:	info@lubigelindia.com, narendra.patel@lubigelindia.com						
	Longitude/Latitude of Company			Longitude :73.1500 , Latitude :22.3300						
2.	Name of Occupier		:	Mr. Purshotam Kumar Hissaria						
	Residence Address		:	E-394, MIA, 2 nd Phase, Basni, Jodhapur-342 005						
	Mobile No.		:	9414126581						
3.	Name of Factory Manager		:	Mr. Rajeev Hissaria						
	Residence Address		:	House No.1002, 4 th Floor, Amin Residency Appartments 38, Alkapuri Society, Alkapuri Vadodara-390007						
	Mobile No		:	8003004555						
4.	Name of Safety Officer		:	Mr. Narendra M. Patel						
	Residence Address		:	9, Parmatma Park Society, Chhani Jakat Naka, Vadodara						
	Mobile No		:	9512880010						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Tushar Patel	DGM, QA.QC.	02667-299053 / 93				9512880011		
	2.	Mr. Narendra Patel	Manager -HSE	02667-299053 / 93				9512880010		
	3.	Mr. Shiraz Parvez	HR & Logistics Executive	02667-299053 / 93				9512880066		
4.	Mr. Ketan Shah	Sr. Manager – Production Expert Person	02667-299053 / 93				9512880015			
6.	Nature of Manufacturing/ Product		:	1. Manufacturing of Cassia / Guar Gum Powder and it's derivatives for food, personal care applications from natural vegetative product & 2. Spent Solvent Distillation						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9.00 a.m to 5.30 p.m	56	1	16	0	1	0	73	1
	1 st	6.00 a.m to 02.00 p.m	40	0	0	0	1	0	41	0
	2 nd	2.00 p.m to 10.00 p.m	40	0	0	0	1	0	41	0
	3 rd	10.0 p.m to 06.00 a.m	40	0	0	0	1	0	41	0
		Total	176	1	16	0	4	0	196	1

FACT SHEET of M/s. LUBI GEL LLP**LCG-3: - SAVLI****MAH UNIT- 10**

8. Hazardous Chemical Storage details							
Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
						Pressure Kg/cm²	Temperature °C
1	LPG	Horizontol Tank (Bullet)	9.4 MT	2	7.5 MT	7 Kg/cm ²	Ambient
2	Isopropyl Alcohol	SS Vertical tank	70 KL	1	70 KL	Atm.	Ambient.
3		SS Vertical tank	30 KL	1	30 KL	Atm.	Ambient.
4		SS Vertical tank	40 KL	1	40 KL	Atm.	Ambient.
5	Distilled Isopropyl Alcohol	SS Vertical tank	15 KL	1	15 KL	Atm.	Ambient.
6	Intermediate Isopropyl Alcohol	SS Vertical tank	15 KL	4	15 KL	Atm.	Ambient.
7		SS Vertical tank	20 KL	2	20 KL	Atm.	Ambient.
8		SS Vertical tank	40 KL	2	20 KL	Atm.	Ambient.
9	Spent Isopropyl Alcohol	SS Vertical tank	70 KL	3	70 KL	Atm.	Ambient.
10		SS Vertical tank	15 KL	2	15 KL	Atm.	Ambient.
11		SS Vertical tank	14 KL	2	14 KL	Atm.	Ambient.
12		SS Vertical tank	30 KL	1	30 KL	Atm.	Ambient.
13		SS Vertical tank	22 KL	2	22 KL	Atm.	Ambient.
14	Distillation Residue	MS Tank	15 KL	1	15 KL	Atm.	Ambient.
15		MS Tank	30 KL	1	30 KL	Atm.	Ambient.
16	QUAB - 151 (70%) (2,3 - Epoxy Propyl Trimethyl Ammonium Chloride)	SS Vertical tank	20 KL	2	40 KL	Atm.	12 to 20° C

9.4.60 FACT SHEET of M/s. National Engineering Industries Limited**LCG-3: - SAVLI****MAH UNIT- 11**

1.	Name of the Factory		: National Engineering Industries Limited							
	Address		: Plot No.2-7/3, Alindra Estate, GIDC Manjusar, Savli, Dist.Vadodara 391775							
	Phone no.		: 91-2667-266259							
	E-mail		: Bhavesh.pathak@nbcbearings.com							
Longitude/Latitude of Company			Latitude: 22°26'16.47"N, Longitude: 73°12'40.59"E							
2.	Name of Occupier		: Mr. Manohar lal Pachisia							
	Residence Address		: 4, Ali park place, Ali pore, Kolkata, West Bangal - 700027							
	Mobile No.		: 9830026351							
3.	Name of Factory Manager		: Mr. Manish Pandey							
	Residence Address		: House No-K25, Income Tax Colony, Tonk Road, Jaipur, Rajasthan-302018							
	Mobile No		: 9726579972							
4.	Name of Safety Officer		: Hirensinh R Rathod							
	Residence Address		: A 109 Anjani Krupa Flats, Dingdong Chokdi, TP -13, Channi jakat naka, Vadodara							
	Mobile No		: 8469791541							
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Bhavesh Pathak	Head – HR /IR	2667-266200 / 4207				9879336252		
	2.	Jitendrasinh Mahida	Sup – Fire / Safety	2667-266200 / 4237				8320463568		
	3.	Sp singh / Dinesh Sharma	Admin - Security	2667-266200 / 4201				9664857263/8320092202		
	4.	Hirensinh Rathod	Expert Person	2667-266200 / 4203				8469791541		
6.	Nature of Manufacturing/ Product		: Ball and Tapper Roller Bearings							
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	08:30 to 05:30	73	4	0	30	0	2	73	36
	1 st	07:00 to 03:30	118	7	199	46	9	1	326	54
	2 nd	03:30 to 12:00	98	0	202	0	0	0	300	00
	3 rd	12:00 to 07:00	90	0	185	0	9	0	284	00
		Total	379	11	586	76	18	3	983	90

FACT SHEET of M/s. National Engineering Industries Limited**LCG-3: - SAVLI****MAH UNIT- 11**

8. Hazardous Chemical Storage details							
Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
						Pressure Kg/cm2	Temperature °C
1	LPG	Tank	9.405	02	18 kl	09	Ambient
2	Methanol	Drum Storage	210 ltr	20	15 kl	Atm.	Ambient
3	Exxsol-D-80	Storage in process	20 kl	01	20 kl	Atm.	Ambient
4	Liquid Nitrogen	Tank	8.370	01	8.370 kl	16	Ambient

9.4.61 FACT SHEET of M/s. Nirma Ltd.

LCG-3: - SAVLI

MAH UNIT- 12

1.	Name of the Factory		:	Nirma Limited						
	Address		:	Detergent complex, Village: Alindra, Ta: Savli, Dist: Vadodara-391775						
	Phone no.		:	02667-269100 - 104						
	E-mail		:	hr_alindra@nirma.co.in						
	Longitude/Latitude of Company									
2.	Name of Occupier		:	Mr. Shailesh V. Sonara						
	Residence Address		:	F-1, Shivani Flat, Azad Society Road, Ambavadi, Ahmedabad-15						
	Mobile No.		:	9825015291						
3.	Name of Factory Manager		:	Dr. Navin Kishor						
	Residence Address		:	D-80, Pushpam Tenament, Opp. Yash complex, Gotri Road, Vadodara						
	Mobile No		:	9879618697						
4.	Name of Safety Officer		:	Mr. Yogesh K. Pandya						
	Residence Address		:	D – 22, Purshottam Nagar Society, Near Amit Nagar Circle, VIP Road, Vadodara.						
	Mobile No		:	9879618637						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Dr. Navin Kishor	Unit Head	02667-269100-104				9879618697		
	2.	Mr. A K Singh	Head-Maintenance	02667-269100-104				9879618693		
	3.	Mr. Anand Mishra	Head-Operation	02667-269100-104				9099940959		
6.	Nature of Manufacturing/ Product		:	Linear Alkyl Benzene						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	08:30 to 17:00	110	02	78	-	-	-	188	02
	1 st	06:00 to 14:00	230	170	10	06	29	-	269	176
	2 nd	14:00 to 22:00	260	-	09	-	-	-	269	-
	3 rd	22:00 to 30:00	70	-	09	-	25	-	104	-
		Total	670	172	106	06	54	-	830	178

FACT SHEET of M/s. Nirma Limited (Continue...)**LCG-3: - SAVLI****MAH UNIT- 12**

8. Hazardous Chemical Storage details								
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters	
							Pressure Kg/cm2	Temperature °C
	1.	Benzene	MS vertical cylindrical with cone -floating roof tank	1479	2	2958	40 mm wc	Ambient
	2.	n-Pentane	MS vertical cylindrical with conical roof tank	259	1	259	3000 mm wc	Ambient
	3.	Kerosene	MS vertical cylindrical with cone -floating roof tank	5800	8	46400	25 mm wc	Ambient
	4.	Naphtha	MS vertical cylindrical with cone -floating roof tank	219	1	219 (Empty – No stock)	25 mm wc	Ambient
	5.	Iso- Octane	MS vertical cylindrical with conical roof tank	259	1	259	25 mm wc	Ambient
	6.	Desorbent	MS vertical cylindrical with dome -floating roof tank	387	1	387	3000 mm wc	Ambient
	7.	HCL	MS vertical cylindrical with cone roof tank	32	1	32	Atm	Ambient
	8.	Hydrogen	Bullet	45.6	1	45.6	30 KSC	Ambient
	9.	Sulphuric Acid	Cylindrical tank	35	1	35	Atm.	Ambient
	10.	LPG	Bullet	46	2	92	17 KSc	Ambient

9.4.62 FACT SHEET of M/s. Schaeffler India Limited**LCG-3: - SAVLI****MAH UNIT-13**

1.	Name of the Factory		:		Schaeffler India Limited					
	Address		:		Plot No.1, Alindra, Savli GIDC, Tal: Savli, Dist.: Vadodara, Gujarat – 391 775					
	Phone no.		:		(912667) 663131					
	E-mail		:							
	Longitude/Latitude of Company				73.2200 / 22.2900					
2.	Name of Occupier		:		Mr. Harsha Kadam					
	Residence Address		:		BSG Kadam, #518, 2 nd main 3 rd cross, BEML, 5 th Stage, Rajrajeshwari Nagar, Bangalore					
	Mobile No.		:		+91 7069003230					
3.	Name of Factory Manager		:		Mr. Yogesh Sawarkar					
	Residence Address		:		B6/303, Samnvay Saptarshi complex, Near Monalisha Apartment, Manjalpur, Vadodara -390011					
	Mobile No		:		+91 9712976048					
4.	Name of Safety Officer		:		Ms. Kajal Doshi					
	Residence Address		:		A-1/143, Darshan Green, W-D Ring Road, Vadodara					
	Mobile No		:		+91 9824025212					
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Yogesh Sawarkar	Factory Manager	02667-663145				+91 9712976048		
	2.	Mr. Mallikharjuna Evani	Plant Head	02667-663111				+91 9727787521		
6.	Nature of Manufacturing/ Product		:		Bearing Production Unit					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	08.30 am to 05.30 pm	87	14	6	3	1	-	94	17
	1 st	07.00 am to 3.30 pm	196	-	108	31	10	1	314	32
	2 nd	03.30 pm to 12.00 am	206	-	76	-	11	-	293	-
	3 rd	12.00 am to 07.00 am	135	-	71	-	11	-	217	-
	Total		624	14	261	34	33	1	918	49
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm2	Temperature °C		
	1.	Propane	Above Ground Tank	20+20	2	40	Atm.	Amb.		
	2.	Methanol	Under Ground Tank	30+20	2	50	Atm.	Amb.		
	3.	Diesel	Under Ground Tank	20	1	20	Atm.	Amb.		
	4.	Liq Nitrogen	Above Ground Tank	20	1	20	Atm.	Amb.		

9.4.63 FACT SHEET of M/s. Thermax Limited**LCG-3: - SAVLI****MAH UNIT-14**

1.	Name of the Factory		:		Thermax Limited					
	Address		:		Plot No.: 21/1,2,3, GIDC, Manjusar Tal. Savli, Vadodara – 391774					
	Phone no.		:		02667-266535					
	E-mail		:		Haripratap.singh@thermaxglobal.com					
	Longitude/Latitude of Company		:		22.43909 73.21453					
2.	Name of Occupier		:		Mr. Ashish Bhandari					
	Residence Address		:		Phase 5, Flat No. 1522A, The Magnolias, DLF Golf Course Road, Gurgaon, Haryana					
	Mobile No.		:							
3.	Name of Factory Manager		:		Mr. Kiran Shaligram					
	Residence Address		:		I / 602, Ruturang Swar Road, Sahakar Nagar, Pune, Maharastra- 411009					
	Mobile No		:		+91 9881057833					
4.	Name of Safety Officer		:		Mr. Hari Pratap Singh					
	Residence Address		:							
	Mobile No		:		+91 8543977715					
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Mr. Kiran Shaligram	Factory Manager	02667 - 266525				9881057833		
	2.	Mr. Hemant Firke	Prod. Manager	02667 - 266553				9689882273		
	3.	Mr. Bakul Prajapati	Maintenance & FMG	02667-266545				9723432359		
	4.	Mr. Hari Pratap Singh	SafetyOfficer	02667-266545				8543977715		
6.	Nature of Manufacturing/ Product		:		Assembled Drums & Shell, Tubular Product, Steam Accessories and Spares for Boilers					
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	9:00 to 17:30	51	-	178	1	1	-	230	2
	1 st	6:30 to 15:00	9	-	250	-	8	-	267	-
	2 nd	15:00 to 23:30	9	-	171	-	8	-	188	-
	3 rd	23:30 to 6:30	1	-	53	-	9	-	63	-
		Total	70	1	652	1	26	-	748	2
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm2	Temperature °C		
	1.	Propane Gas	Tank	19.9	2	39.8	2 to 3Kg/cm2	Ambient		

9.4.64 FACT SHEET of M/s. Vadodara LPG Terminal (IOCL)**LGG-3: - SAVLI****MAH UNIT-15**

1.	Name of the Factory		:	M/s. Vadodara LPG Terminal, IOCL, Dumad						
	Address		:	Indian Oil Corporation Limited Vadodara LPG Terminal (VLT) Vadodara – Savli Road, Village: Dumad, Vadodara						
	Phone no.		:	9448286697						
	E-mail		:	vbhatkar@indianoil.in						
	Longitude/Latitude of Company			27.2046 °N, 77.4977 °E						
2.	Name of Occupier		:	Mr. Vijay Bhatkar, Deputy General Manager (P), VLT						
	Residence Address		:	Room No. 210, Tapti Tansit Hostel, Refinery Township, Jawahar Nagar, Vadodara-391 320						
	Mobile No.		:	9448286697						
3.	Name of Factory Manager		:	Mr. P. C. Pawar, Chief Manager (Plant), VLT						
	Residence Address		:	House No. 49, Vedant Elegance, Chanakya Nagari Road, Opp. CM Patel Farm, Kalali, Vadodara-390 012						
	Mobile No		:	9706075357						
4.	Name of Safety Officer		:	-						
	Residence Address		:	-						
	Mobile No		:	-						
5.	Contact Person		:							
	Sr. No.	Name	Designation	Telephone Number						
				Factory / Office				Mobile		
	1.	Shri P. C. Pawar	CM (Plant)	9448286697				9316280617		
	2.	Shri Abhishek Rawat	Expert Person	9448286697				9706075357		
6.	Nature of Manufacturing/ Product		:	Only Finished Product LPG						
7.	Man Power & Timing									
	Shift	Time	Direct Employee		Contractor's Person		Security / Watchman		Total	
			M	F	M	F	M	F	M	F
	General	08.30 to 17.00 Hrs.	5	1	40	6	0	1	45	8
	1 st	06.00 to 14.00 Hrs	6	2	50	-	12	-	68	2
	2 nd	14.00 to 22.00 Hrs	8	-	50	-	12	-	70	-
	3 rd	22.00 to 06.00 Hrs	-	-	2	-	06	-	8	-
		Total	42	0	142	6	30	1	191	1
8.	Hazardous Chemical Storage details									
	Sr. No.	Name	Type of Storage / Container	Capacity of each Container MT	No. of Container	Maximum Storage Capacity MT	Parameters			
							Pressure Kg/cm²	Temperature °C		
	1.	LPG	Mounded Bullets	1388 MT	6	(5 X 1388 MT) + (1 X 1410 MT) = 8350MT	16.87 kg/cm ²	Amb.		

CHAPTER 10

PREPAREDNESS BY M.A.H. UNITS

10.1 INTRODUCTION

The major potential risks of MAH Units are maximum storage quantities of the Hazardous Chemicals. Further, These hazardous chemicals are posed to various hazards during handling, transporting, processing etc. The failure scenarios can be obtained from Risk Assessment and HAZOP. Further, on-site emergency plans of the M.A.H. Units provide the Maximum Credible Scenarios. These worst maximum scenarios are to be considered to be creation of probable chemical emergency in the industrial pockets.

However, the management of M.A.H. Units are well prepared to mitigate chemical emergency at their level at certain limit. The details on preparedness by them are described in the as following.

10.2 PRIMARY ASSESSMENT

The location of incidence is most significant factor. Further, the availability of required resources is to be considered as prime important to control such emergency. Worst scenario can be decided based on the involved hazardous chemicals, their properties & quantities. On assessing the situation, immediately appropriate responding actions can be started. Emergency services should have such details on hands, so that emergency handling and controlling measures can be decided in time. Primary Assessment of hazards on basis of maximum storages of major hazardous chemicals are given in Appendix – B.

10.3 FIRE PROTECTION SYSTEM HELD BY MAH UNITS

The Details of Fire Fighting Equipments, storage of water etc held by MAH Units is given at Appendix – C.

10.4 PERSONAL PROTECTIVE EQUIPMENT HELD BY MAH UNITS

The details pertaining to Personal Protective Equipments and Safety Equipment held by each MAH units are given at Appendix – D.

10.5 MEDICAL FACILITY HELD BY MAH UNITS

The Details on Medical Facilities held by MAH Units is given at Appendix – F.

10.6 VEHICLES FACILITIES HELD BY MAH UNITS

The Details on vehicles & communication facilities held by MAH is given at Appendix – E.

10.7 MATERIAL SAFETY DATA SHEETS

The M.S.D.S. of selected major hazardous chemicals stored, handled or used by MAH units are given.

VADODARA DISTRICT OFF - SITE EMERGENCY PLAN 2025

APPENDIX SECTION

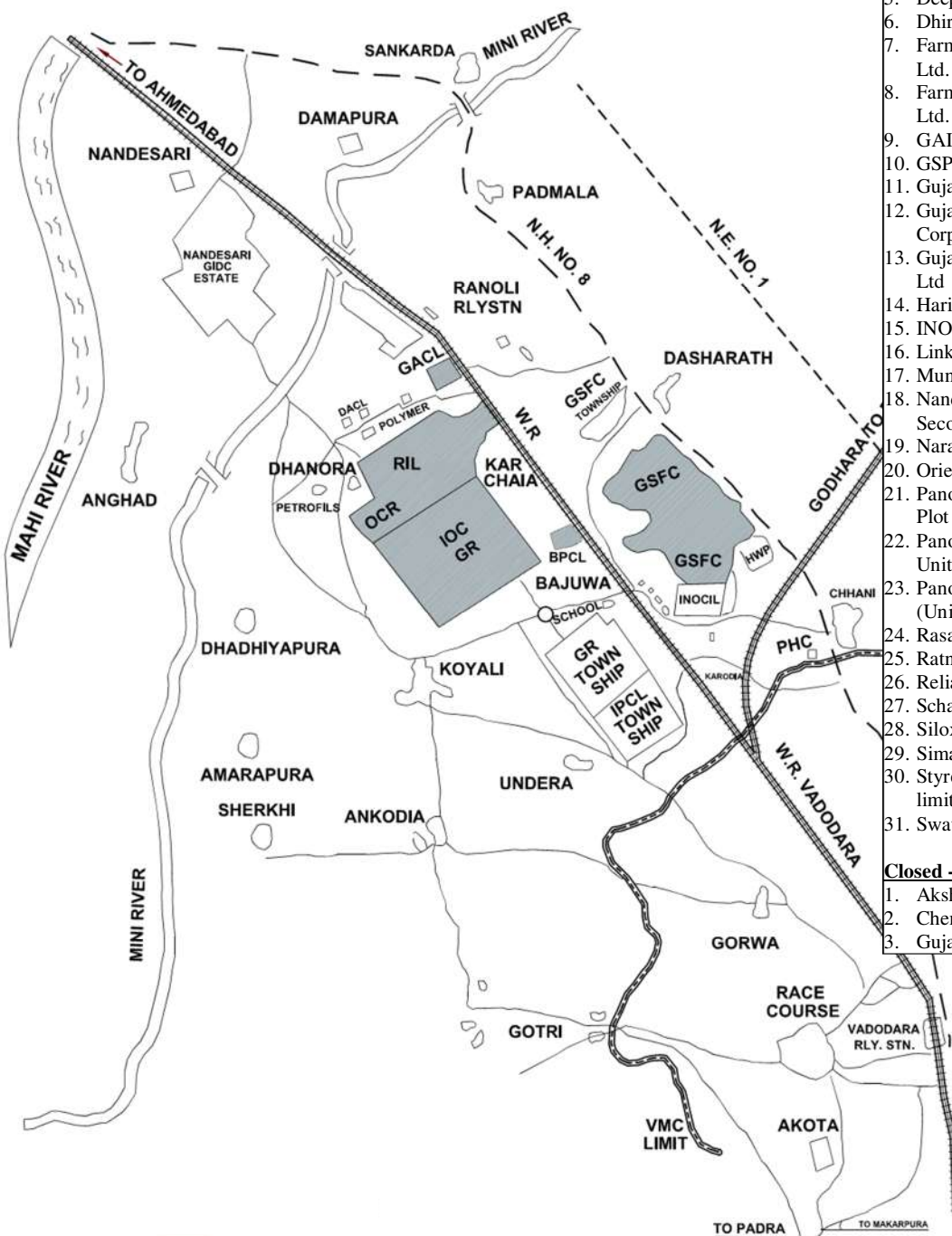
Prepared by
**VADODARA DISTRICT CRISIS GROUP
VADODARA
2025**

Appendix – A-1**MAP OF LCG –1 : Vadodara – Nandesari - PCC****Vadodara – Nandesari - PCC****Total - 34****Working -31**

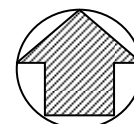
1. Bharat Petroleum Corporation Ltd.
2. Chemtech Intermediates Pvt. Ltd.
3. Chloritech Industries
4. Deep Darshan LLP
5. Deepak Nitrite Ltd.
6. Dhiren Chemical Industries
7. Farmson Pharmaceutical Gujarat Pvt. Ltd. (Unit-I)
8. Farmson Pharmaceutical Gujarat Pvt. Ltd. (Unit-II)
9. GAIL (India) Limited
10. GSP Crop Science Pvt Ltd, Unit 3
11. Gujarat Alkalies & Chemicals Ltd.
12. Gujarat Refinery (Indian Oil Corporation Limited)
13. Gujarat State Fertilizers & Chemicals Ltd
14. Hari Orgo Chem Pvt.Ltd.
15. INOX Air Products Pvt. Ltd.
16. Link Pharma Chem Ltd.
17. Munjal Auto Industries Ltd
18. Nandesari Industries Association Secondary Treatment Plant
19. Narayan Organics Pvt. Ltd.-Unit-III
20. Oriental Aromatics Limited
21. Panoli Intermediates (I) Pvt. Ltd. - Plot No. 11 & 18, Ranoli
22. Panoli Intermediates (I) Pvt. Ltd, Unit-III
23. Panoli Intermediates (I) Pvt. Ltd. (Unit – IV)
24. Rasayan Enterprise
25. Ratna Nicochem. Pvt Ltd.
26. Reliance Industries Ltd.
27. Schaeffler India Limited
28. Silox India Private Limited
29. Simalin Chemical Industries Pvt. Ltd
30. Styrenix Performance materials limited.
31. Swati Chloride Pvt. Ltd.

Closed - 3

1. Akshar Organics Pvt. Ltd.
2. Chemstar Organics (I) Ltd.
3. Gujarat Dyestuff Industries



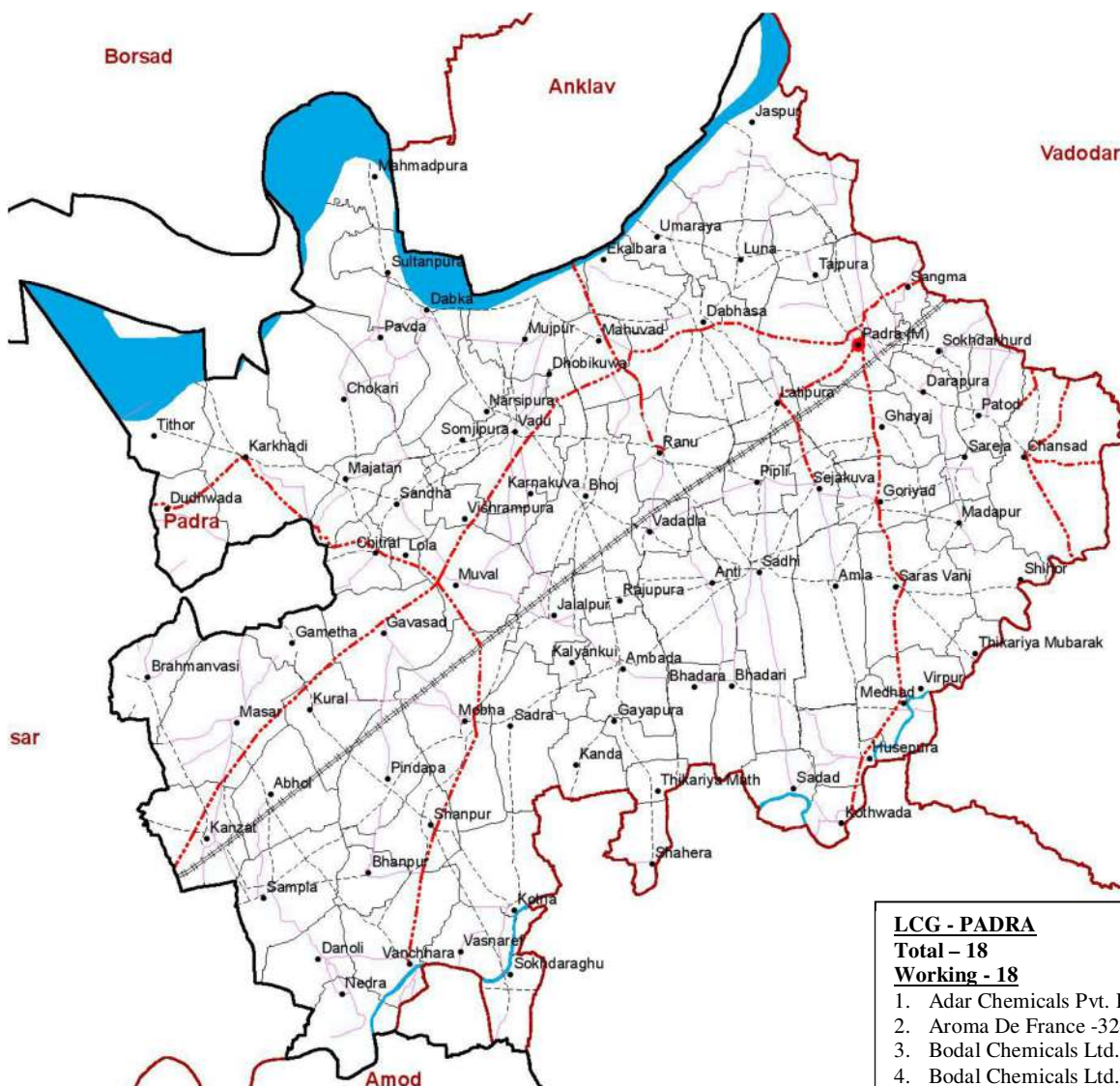
VADODARA DISTRICT CRISIS GROUP
OFF-SITE
EMERGENCY PLAN

**LEGEND**

MAH Units

Appendix – A-2

MAP OF LCG -2: PADRA



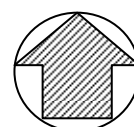
LCG - PADRA

Total – 18

Working - 18

1. Adar Chemicals Pvt. Ltd.
2. Aroma De France -324 at Ranu
3. Bodal Chemicals Ltd. (Unit - VII)
4. Bodal Chemicals Ltd. (Unit - VIII)
5. Greenovat Organics Pvt. Ltd.
6. Grindly Gasses & Petro. Pvt. Ltd.
7. Gulbrandsen Chemical Pvt. Ltd.
8. Cadillac Chemicals Pvt. Ltd.
9. Kiri Industries Limited Unit – III
10. Kiri Industries Limited - Unit 5
11. Mayur Dychem Intermediates Ltd (Unit - III)
12. Neogen Chemicals Limited
13. Prime Organic
14. Shimmer Chemicals Ltd.
15. Shiva Pharmachem Ltd.
16. Silox India Pvt. Ltd.
17. TML Industries Ltd.
18. Transpek Industry Ltd.

VADODARA DISTRICT CRISIS GROUP
OFF-SITE
EMERGENCY PLAN



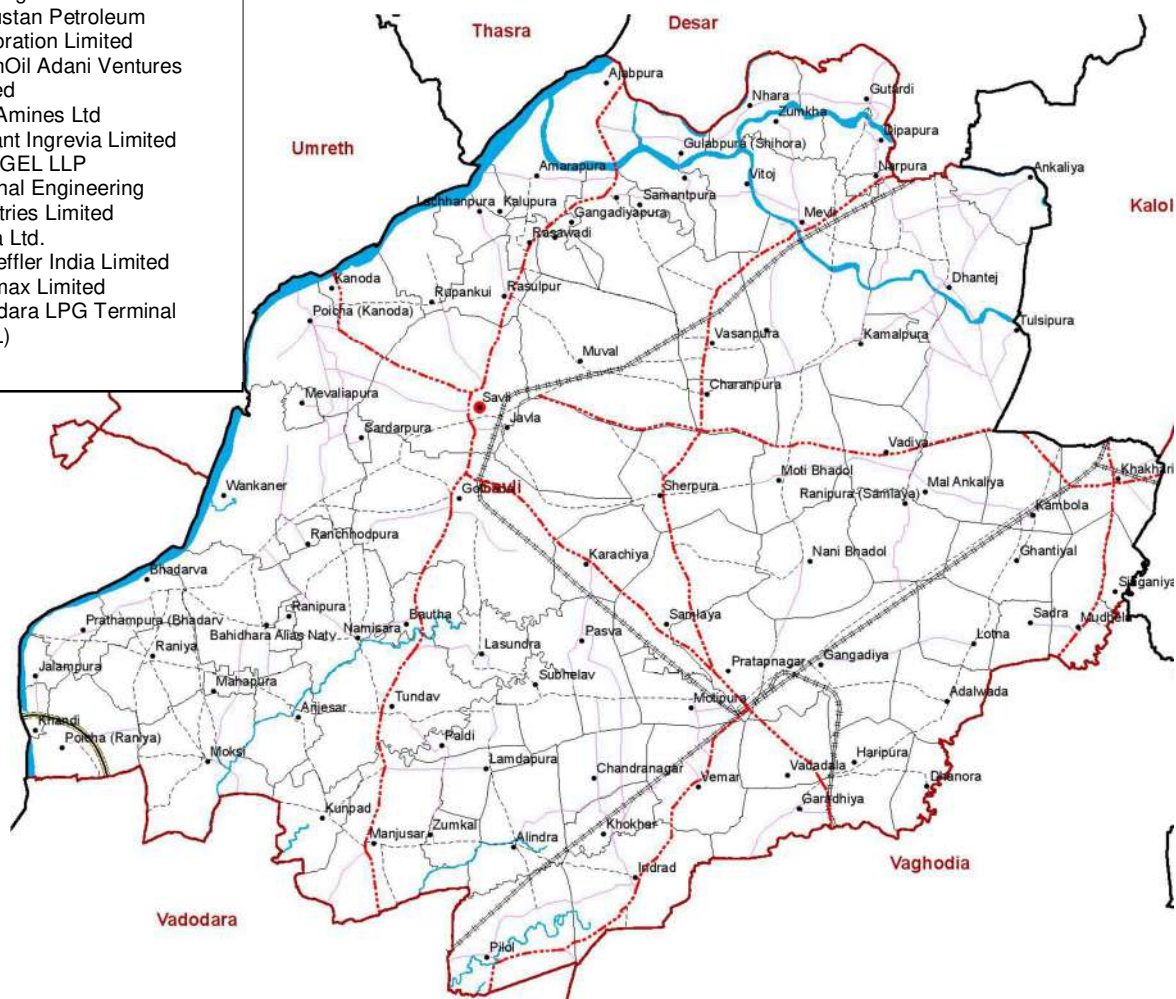
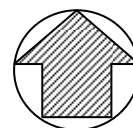
LEGEND

MAH Units



Appendix – A-3**MAP OF LCG – 3 : SAVLI****LCG -Savli****Total - 15****Working - 15**

1. Anugrah In-Org (P) Limited
2. Base Metal Chemicals
3. Chemcon Speciality Chemicals Limited
4. Gurunanak Chemical Industries
5. Hari Orgo Chem Pvt.Ltd.
6. Hindustan Petroleum Corporation Limited
7. IndianOil Adani Ventures Limited
8. Indo Amines Ltd
9. Jubilant Ingrevia Limited
10. LUBI GEL LLP
11. National Engineering Industries Limited
12. Nirma Ltd.
13. Schaeffler India Limited
14. Thermax Limited
15. Vadodara LPG Terminal (IOCL)

**VADODARA DISTRICT CRISIS GROUP**
**OFF-SITE
EMERGENCY PLAN**
**LEGEND**

MAH Units



Appendix-B**VADODARA DISTRICT CRISIS GROUP****PRIMARY CONSEQUENCE ASSESSMENT****TABLE- B-1****Fire & Explosion : Vadodara – Nandesari - PCC Industrial Pocket**

Sr. No.	Name of the Unit	Chemical	Largest Storage Qty. (MT)	Damage Distance (m)							Population likely to be affected
				Pool Fire		BLEVE		UVCE			
				FZR	IZR	FZR	IZR	D-LFL	FZR	IZR	
1.	Bharat Petroleum Corporation Ltd.	MS	3029	82	102	-	-	-	-	-	250
2.	Dhiren Chemicals Industries	EO	10	14	20	104	216	8	3	12	300
3.	Gujarat Refinery (Indian Oil Corporation Limited)	LPG	75	-	-	391	738	543	90	288	300
		LPG	720	-	-	1324	2211	970	184	588	1000
		LPG	900	-	-	1561	2608	1096	213	702	3000
4.	Reliance Industries Ltd.	Butadiene	700	-	-	1318	2282	977	139	740	5000
		Butane	145	-	-	550	1314	790	113	597	1000
		C4	463	-	-	999	1727	852	162	503	1500
		Ethylene	853	-	-	1473	2529	1134	200	1062	2500
		LPG	700	-	-	1324	2211	970	184	588	2000
		Propylene	475	-	-	1061	1865	946	163	865	2000
		VCM	560	-	-	1164	2032	918	173	918	2000
5.	Styrenix Performance materials limited	Butadiene	120	-	-	492	912	608	103	542	1200
6.	Rasayan Enterprise	EO	7	14	20	104	216	8	3	12	300
7.	Panoli Intermediates (I) Pvt. Ltd. (Unit – IV)	EO	7.5	14	20	104	216	8	3	12	300
8.	Oriental Aromatics Limited	Propylene Oxide	54	32	84						
9.	Panoli Intermediates (I) Pvt. Ltd. (Unit – II)	EO	7.5	14	20	104	216	8	3	12	300
10.	Simalin Chemical Industries Pvt. Ltd	Mehanol	600	32	84	-	-	-	-	-	300
11.	Gas Authority of India Ltd.	LPG	400	-	-	589	1080	660	114	366	500
		Naptha	58 MT	-	-	963	1705	836	153	491	700
12.	Munjal Auto Industries Ltd.	Propane	7 MT	0	0	95	198	281	40	128	700
13.	Schaeffler India Limited	LPG	9.4 MT	-	-	150	285	281	40	128	500

LEGEND

- IZR: Injury Zone Radius : Corresponds to 1st degree burns (5 KW/sq.m) for Pool Fire/BLEVE and corresponds to 1% injuries (0.01 bar) for UVCE
- FZR: Fatality Zone Radius : Corresponds to 1 % Lethality (10 KW/sq.m) for Pool Fire/BLEVE and corresponds to 1% lethality (1 bar) for UVCE

Appendix-B

Continue...

VADODARA DISTRICT CRISIS GROUP**PRIMARY CONSEQUENCE ASSESSMENT****TABLE- B-2****Toxic Dispersion: Vadodara – Nandesari - PCC Industrial Pocket**

Sr. No.	Name of the Unit	Chemical	Largest Storage Qty. (MT)	Damage Distance (m)		Population likely to be affected
				D-3	F-1.5	
1.	Chloritech Industries	Chlorine	900 Kg	1000	1400	5200
2.	Deep Darshan LLP	Chlorine	900 Kg	1000	1400	5200
3.	Deepak Nitrite Ltd.	Sulphur Dioxide	900 Kg	1100	879	5200
		Chlorine	900 Kg	1000	1400	5200
		Ammonia	30	4900	6200	8500
4.	Dhiren Chemical Industries	Ethylene Oxide (EO)	10	1300	1200	5200
5.	Farmson Basic Drugs Pvt Ltd. (Unit-I)	Chlorine	900 Kg	1000	1400	5200
6.	Farmson Basic Drugs Private Limited (Unit-II)	Chlorine	900 Kg	1000	1400	5200
7.	GSP Crop Science Pvt Limitd, Unit 3	Acrylonitrile	25	82	95	300
8.	Gujarat Alkalies and Chemicals Ltd.	Chlorine	100	7300	10000	25000
9.	Gujarat State Fertilizers & Chemicals Limited	Ammonia	10000	4700	10000	25000
10.	Hari Orgo Chem Pvt.Ltd	Chlorine	900 Kg	1000	1400	5200
11.	INOX Air Products Pvt. Ltd.	Liquid Nitrogen	552 MT	481	579	300
12.	Link Pharma Chem Ltd.	Chlorine	900 Kg	1000	1400	5200
13.	Nandesari Industries Association Secondary Treatment Plant	Chlorine	900 Kg	1000	1400	5200
14.	Narayan Organics Pvt. Ltd.-Unit-III	Chlorine	900 Kg	1000	1400	5200
15.	Panoli Intermediates (I) Pvt. Ltd,	Sulphur Dioxide	900 Kg	1100	879	5200
16.	Panoli Intermediates (I) Pvt. Ltd, Unit-III	Chlorine	900 Kg	1000	1400	5200
17.	Panoli Intermediates (I) Pvt. Ltd. (Unit – IV)	Ethylene Oxide (EO)	7.5	1300	1200	5200
18.	Rasayan Enterprise	Ethylene Oxide (EO)	7	1300	1200	5200
19.	Ratna Nicochem Pvt Ltd.	Chlorine	900 Kg	1000	1400	5200
20.	Reliance Industries Ltd.	Acrylonitrile	900	771	855	5000
		Ammonia	50	4900	6200	8500
		Butadiene	700	4700	4800	8000
		VCM	560	10000	10000	25000
21.	Silox India Private Limited	Oleum 65%	30MT	580	1100	5500
		SO2	900 kg	2100	2400	5500
22.	Simalin Chemical Industries Pvt. Ltd	Ammonia	5	2300	2456	8500
23.	Styrenix Performance materials limited	Acrylonitrile	248.48	9 (IDLH)	47 (TLV)	300
24.	Swati Chloride Pvt. Ltd.	Chlorine	900 Kg	1000	1400	5200

LEGEND

- D-5 : Toxic vapour dispersion under Atmospheric Stability Class "D" (Neutral) and wind speed of 5 m/s
- F – 1.5 Toxic vapour dispersion under Atmospheric Stability Class "F" (Very Stable) with a wind speed of 1.5 m/s

Appendix-B

Continue...

VADODARA DISTRICT CRISIS GROUP**PRIMARY CONSEQUENCE ASSESSMENT****TABLE- B-3****Fire & Explosion : Padra Taluka Industrial Pocket**

Sr. No.	Name of the Unit	Chemical	Largest Storage Qty. (MT)	Damage Distance (m)							Population likely to be affected
				Pool Fire		BLEVE		UVCE			
				FZR	IZR	FZR	IZR	D-LFL	FZR	IZR	
1.	Bodal Chemicals Ltd. (Unit - VII)	E.O.	7.5	14	20	104	216	8	3	12	823
2.	Grindly Gasses & Petro. Pvt. Ltd.	LPG	40 MT	-	-	285	548	477	78	247	150
3.	Gulbrandsen Chemical Pvt. Ltd	n-Butane	18.8 KL	-	-	240	468	-	-	-	350
4.	Kiri Industries Limited Unit – III	E.O.	19.9	14	20	186	328	15	7	18	1225
5.	Mayur Dyechem Intermediates LLP. Unit 3	EO	7	14	20	104	216	8	3	12	300
6.	Aroma De France	LPG	5	-	-	33	145	-	42	110	150

LEGEND

- IZR: Injury Zone Radius : Corresponds to 1st degree burns (5 KW/sq.m) for Pool Fire/BLEVE and corresponds to 1% injuries (0.01 bar) for UVCE
- FZR: Fatality Zone Radius : Corresponds to 1 % Lethality (10 KW/sq.m) for Pool Fire/BLEVE and corresponds to 1% lethality (1 bar) for UVCE

Appendix-B

Continue...

VADODARA DISTRICT CRISIS GROUP**PRIMARY CONSEQUENCE ASSESSMENT****TABLE- B-4****Toxic Dispersion : Padra Taluka Industrial Pocket**

Sr. No.	Name of the Unit	Chemical	Largest Storage Qty. (MT)	Damage Distance (m)		Population likely to be affected
				D-3	F-1.5	
1.	Adar Chemicals	Chlorine	900Kg	1000	1400	1200
2.	Bodal Chemicals Ltd. (Unit - VII)	Ammonia	5.21	1900	2500	2500
3.	Bodal Chemicals Ltd. (Unit - VIII)	Oleum	60 MT	624	4100	5000
4.	Greenovat Organics Pvt. Ltd.	Chlorine	900Kg	1000	1400	2500
5.	Gulbrandsen Chemical Pvt. Ltd.	Chlorine	900Kg	1000	1400	1250
6.	Kadillac Chemicals Pvt. Ltd.	Chlorine	900Kg	1000	1400	1250
7.	Kiri Industries Limited Unit – III	Ammonia	4.1 MT	1900	2500	1500
		E.O.	19.9	1225	2200	1500
		Oleum	250	754	5100	3000
8.	Mayur Dyechem Intermediates LLP. Unit 3	EO	7	823	1100	1500
9.	Neogen Chemicals Limited	Bromine	18.5 KL	3500	10000	8500
10.	Prime Organic	Chlorine	900 Kg	1000	1400	1500
11.	Shimmer Chemicals Pvt. Ltd.	Chlorine	900 Kg	1000	1400	1500
12.	Shiva Pharmachem Ltd.	Sulphur Dioxide	900 Kg	1100	879	1500
13.	Silox India Private Limited	Oleum 65%	30	580	1100	1500
14.	Silox India Private Limited	Sulphur Dioxide	10	2100	2400	1500
15.	TML Industries Ltd.	Sulphur Dioxide	900 Kg	1100	879	1200
16.	Transpek Industry Limited	Chlorine	900 Kg	1000	1400	1500
		Oleum 65%	525	1600	2800	2500
		Sulphur Dioxide	900 Kg	1100	879	1500
		SO3	50	3200	3800	3000

LEGEND

- D-3 : Toxic vapour dispersion under Atmospheric Stability Class "D" (Neutral) and wind speed of 3 m/s
- F – 1.5 Toxic vapour dispersion under Atmospheric Stability Class "F" (Very Stable) with a wind speed of 1.5 m/s

VADODARA DISTRICT CRISIS GROUP**PRIMARY CONSEQUENCE ASSESSMENT****TABLE- B-5****Fire & Explosion : Savli Taluka Industrial Pocket**

Sr. No.	Name of the Unit	Chemical	Largest Storage Qty. (MT)	Damage Distance (m)							Population likely to be affected
				Pool Fire		BLEVE		UVCE			
				FZR	IZR	FZR	IZR	D-LFL	FZR	IZR	
1	2	3	4	5	6	7	8	9	10	11	12
1.	Indo Amines Ltd	Acrylonitrile	10 MT	12	17	16	235	-	-	-	500
		Ethylene Oxide	15 MT	14	20	186	328	15	7	18	700
2.	IOT Infrastructures Private Ltd Indian Oil Corporation Ltd. (MD), Vadodara White Oil Terminal, Dumad	MS	2083 KL	92	136	-	-	-	-	-	60
3.	Jubilant Ingrevia Limited	Butadiene	48	0	0	276	567	477	76	402	500
		Ethylene Oxide	23	17	24	195	387	11	3	16	300
		Trimethyl Amine	60	0	0	334	636	494	85	452	500
4.	LUBI GEL LLP	LPG	8.35	-	-	150	285	209	35	92	250
		LPG	21.9	-	-	170	341	373	57	182	400
5.	Thermax Limited	LPG	19.9	-	-	170	341	373	57	182	500
6.	Vadodara LPG Terminal	LPG	1388	-	-	-	-	373	57	182	50

Legend :

- IZR: Injury Zone Radius : Corresponds to 1st degree burns (5 KW/sq.m) for Pool Fire/BLEVE and corresponds to 1% injuries (0.01 bar) for UVCE
- FZR: Fatality Zone Radius : Corresponds to 1 % Lethality (10 KW/sq.m) for Pool Fire/BLEVE and corresponds to 1% lethality (1 bar) for UVCE

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Continue...

VADODARA DISTRICT CRISIS GROUP**PRIMARY CONSEQUENCE ASSESSMENT****TABLE- B-6****Toxic Dispersion : Savli Taluka Industrial Pocket**

Sr. No.	Name of the Unit	Chemical	Largest Storage Qty. (MT)	Damage Distance (m)		Population likely to be affected
				Toxic Dispersion		
				D-3	F-1.5	
1	2	3	4	5	6	7
1.	Anugrah In-Org Pvt. Ltd.	Chlorine	900 Kg	1000	1400	1200
2.	Base Metal Chemicals	Chlorine	900 Kg	1000	1400	1200
3.	Gurunanak Chemical Industries	Chlorine	900 Kg	1000	1400	1200
4.	Hari Orgo Chem Pvt. Ltd.	Chlorine	900 Kg	1000	1400	1200
5.	Indo Amines Ltd	Ammonia	9.4 MT	3100	2400	3000
		Ethylene Oxide	15 MT	1225	2200	2500
6.	Jubilant Ingrevia Limited	Butadiene	48	1500	1900	700
		Ethylene Oxide	23	1700	2700	800

Legend :

- D-3 : Toxic vapour dispersion under Atmospheric Stability Class "D" (Neutral) and wind speed of 3 m/s
- F – 1.5 Toxic vapour dispersion under Atmospheric Stability Class "F" (Very Stable) with a wind speed of 1.5 m/s

Appendix-C

VADODARA DISTRICT CRISIS GROUP **FIRE PROTECTION SYSTEM HELD BY MAH UNITS**

Sr. No	Name of MAH Unit	Fire Water Tank		Emergency D. G. Set		Fire Pump Set		Fire Extinguishers								Fire Tendor / Fire Trailer Pump	No. of Trained Person in fire fighting
		No.	Capacity	No.	KVA	Type	LPM	CO2		DCP / ABC		Foam		Fire Hose			
								Capacity	Nos.	Capacit y	Nos.	Capaci ty	Nos.	Length	Nos.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LCG-1: Vadodara – Nandesari - PCC																	
1.	Bharat Petroleum Corporation Limited, Koyali Installation	3	6942KL	1	160	Fire Engine	11750	4.5kg 6.8kg	4 25	9kg 25kg 75kg	81 10 8	22000	-	15	30	Nil	6
2.	Chemtech Intermediates Pvt. Ltd.	2	300 KL	01	250 KVA	Electrical Pump	1620	6 Kg	2	6 Kg	11	4 Kg	2	30 Mtr	12	-	
3.	Chloritech Industries	2 Nos.	Under ground 750KL	1 1	320 KVA 380 KVA	Jockey Electrical main Pump Diesel Pump	180.05 Lpm 2850 Lpm 2850 Lpm	4.5 Kg 2 Kg	2 1	6 Kg	32	3600 Kg	–	15 Mtr	18	---	–
4.	Deep Darshan Chemicals LLP	4	40 MT	-	-	-	-	4	-	-	3	-	-	-	-	-	-
5.	Deepak Nitrite Limited	2	2000 KL	03	625 / DG set	Main Elect (Three Nos) Diesel Pump (Three Nos) Jockey Pump (Two Nos)	6833 6833 788	2 Kg 4.5 Kg 9 Kg 22kg	240	5 Kg 10 Kg 50 Kg	307	9 Lit	46	7.5 M 15 M	360	02 / 02 / 01	198
6.	Dhiren Chemical Industries	1 1 1 1	1000 lit 45000 lit 5000 lit 10000 lit	-	-	-	-	22 7	2	7 kg 2 kg	5 1	-	-	15.2 mts.	2	-	-

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Continue....

VADODARA DISTRICT CRISIS GROUP
FIRE PROTECTION SYSTEM HELD BY MAH UNITS

Sr. No	Name of MAH Unit	Fire Water Tank		Emergency D. G. Set		Fire Pump Set		Fire Extinguishers								Fire Tendor / Fire Trailer Pump	No. of Trained Person in fire fighting
		No.	Capacit y	No.	KVA	Type	LPM	CO2		DCP / ABC		Foam		Fire Hose			
								Capaci ty	Nos .	Capacity	Nos.	Capacity	Nos.	Length	Nos.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LCG-1: Vadodara – Nandesari - PCC (Continue...)																	
7.	Farmson Basic Drugs Pvt Ltd (Unit- I)	02	1300 kl	03	1010	02 – Jockey Pump's ump's, 02-Main Electrical Pumps & 02 No's Diesel Engine Pumps	2.85, 4.5	4.5 kgs	46	6 kgs	128	9 liters	20	15 meters	67	Nil	30 Persons
8.	Farmson Basic Drugs Private Limited (Unit-II)	2	700 KL	5	6	Horizontal, Centrifugal Pumps	2833 LPM	4.5 kgs	56 Nos .	ABC 1 kgs- 05 ABC 4 kgs- 24 ABC 6 kgs- 70 ABC 9 kgs- 07	106 Nos	45 liters	01 Nos.	15 meters	35 Nos.	NA	60
9.	GAIL (India) Limited	4	10240 M3	02	1. 450 2. 1500	1. Diesel Driven Pump- 04 Nos 2. 3. Electric motor driven Pump - 02 Nos	10267 LPM each	4.5 Kg 6.8 Kg 22.5 Kg	97 54 13	9 Kg 75 Kg	261 56	50 Ltr.	01	15	187	2 Nos.	-
10.	GSP Crop Science Pvt Ltd. U-3	02 U/G 04 O/G	800 M3	02 02 01	600 500 180	Jockey Electrical Diesel	575 5833 5833	4.5 9	112	10 9 6	222	50	43	15 mtrs	139	-	120

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Continue....

VADODARA DISTRICT CRISIS GROUP
FIRE PROTECTION SYSTEM HELD BY MAH UNITS

Sr. No	Name of MAH Unit	Fire Water Tank		Emergency D. G. Set		Fire Pump Set		Fire Extinguishers								Fire Tendor / Fire Trailer Pump	No. of Trained Person in fire fighting
		No.	Capacity	No.	KVA	Type	LPM	CO2		DCP / ABC		Foam		Fire Hose			
								Capacit y	No s.	Capacity	Nos.	Capacity	Nos.	Len gth	Nos.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LCG-1: Vadodara – Nandesari - PCC (Continue...)																	
11.	Gujarat Alkalies & Chemicals Limited	3	1460 M3	21	900 ea 750	Jockey – 4 Nos.Main Pump– 4	3333 4550	4.5 Kg6.5 Kg9.0 Kg22.5 Kg	285 134 015	5.0 6.0 9.0 10.0 25.0 50.0	11 288 11 28 02 04	50 200	4 10	15	340	2 Nos.	95
12.	Gujarat Refinery (Indian Oil Corporation Limited)	07 no tanks	29500	-	-	10+ 2(jockey)	1000 each +350 M3/HR	4.5/9/6. 8/22.5 kg	117 7	9/10/25 kg	5901	50 ltr	25	30 mtr	150 nos.	12	36
13.	Gujarat State Fertilizers and Chemicals Limited Vadodara Unit	06	90416 M3	15	Rangin g from 200 to 1850	1. Jockey Pumps (12 no) 2. Main Electrical Pumps (06 no) 3. Diesel Pumps (08 no)	12 M3 410 M3	6.5 Kg	818	9 Kg 22.5 Kg	852 123	Fixed Foam Installatio ns	12 Locations – 30 750 litre capacity	30 met er	56	10	
14.	Hari Orgochem Pvt. Ltd.- Nandesari	1	50KL	1	1250	Jockey Pump Diesel Pump	10.8 M3/hr 171 M3/hr	2 kg 3 kg 4.5 kg	03 11 02	2 kg 6 kg	02 14	20 Ltr	03	15 Mtr	38	-	20
15.	INOX AIR Products Pvt Ltd.	2	300 KL	01	320	3	2850 2850 180	4.5 kg 5 kg 9kg	17 1 8	4.5 kg 5 kg 9kg	3 5 17	9 kg	5	15 mtr.	26	-	15
16.	Link Pharma Chem Ltd.	2	90 KL + 90 KL	1	175 Kgs	Diesel Pump	75 HP with jockey pump	4.5 1	5 2	10kg 25kg 50kg 5kg	3 4 5 2	50 90	11 2	20 mtr	11	-	

VADODARA DISTRICT CRISIS GROUP
FIRE PROTECTION SYSTEM HELD BY MAH UNITS

Sr. No	Name of MAH Unit	Fire Water Tank		Emergency D. G. Set		Fire Pump Set		Fire Extinguishers								Fire Tendor / Fire Trailer Pump	No. of Trained Person in fire fighting
		No.	Capacity	No.	KVA	Type	LPM	CO2		DCP / ABC		Foam		Fire Hose			
								Capa city	Nos.	Capacity	Nos.	Capacity	Nos.	Length	Nos.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LCG-1: Vadodara – Nandesari - PCC (Continue...)																	
17.	Munjal Auto Industries Ltd.	1	200000 Ltr	1	1250	3		2,3,4.5 22.5 Kg	52	2,5,6,9	30	-	-	-	-	-	-
18.	Nandesari Industries Association Secondary Treatment Plant	-	GIDC Supply	2	125 225	-	-	4.5 Kgs	01	10 Kgs	01 / 16	-	2	-	-	-	6
19.	Narayan Organics Pvt. Ltd.-Unit-III	1	250 KLD	1	500	Mono Block Pump 40 HP 30 KW	25 M3 / Per Min.	45 6.8 9	16 5 5	DCP-50 Kg ABC-10 Kgs	5 20	45 Liters	7	15 Mtr	11	-	10
20.	Oriental Aromatics Ltd.	1 2	1200 KL 550 KL	2 No 1 No	1000 KVA 2000 KVA	Main Electrical Pump Diesel Pump Jockey Pump	273M3 273M3 35M3	3 kg 4.5 kg 9 kg	10 no. 56 no. 18 no.	5 kg 6kg 9 kg 9 kg 2 kg	21 no 13 no 4 no 4 no. 1 no.	50 lit 9 lit Foam Trolley (100Lit)	2 30 2	(7.5 mtr & 15 Mtrs)	133 Nos	Mini Tender (ERV) = 1 No.	55 persons

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Continue....

VADODARA DISTRICT CRISIS GROUP
FIRE PROTECTION SYSTEM HELD BY MAH UNITS

Sr. No	Name of MAH Unit	Fire Water Tank		Emergency D. G. Set		Fire Pump Set		Fire Extinguishers								Fire Tender / Fire Trailer Pump	No. of Trained Person in fire fighting
		No.	Capaci ty	No.	KVA	Type	LPM	CO2		DCP / ABC		Foam		Fire Hose			
								Capa city	Nos.	Capacity	Nos.	Capacity	Nos.	Length	Nos.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LCG-1: Vadodara – Nandesari - PCC (Continue...)																	
21.	Panoli Intermediates (I) Pvt. Ltd Plot No. : 11 & 18, Petrochemical	01	500 KL	04	750 KVA X 01 No. 380 KVA X 03 No's	Main Pump Jockey Pump Diesel pump-	171 M3/hr. 10.8 M3/hr. 171 M3/hr.	4.5 Kg 6.5 Kg	04 14	5.0 6.0 (ABC)	10 16	9.0 25	03 01	15 Met.	28	Own Fire Tender Having Water Tank Capacity 5 Kl and Foam Tank Capacity 2 Kl (Available in group of company)	
22.	Panoli Intermediates (India) Pvt. Ltd. (Unit -III) - 156-A&B, 157	1	5200 KL	1	750 KVA	Main Pump Jockey Pump Diesel Pump	50 M ³ /Hr & 273 M ³ /hr. 10 M ³ /H. (02 Nos) 273 M ³ /hr	9.0 Kg 6.5 Kg 4.5 Kg	02 25 60	05 Kg 6.0 Kg (ABC)	09 45	06 Lit 9.0 Lit 25 Lit	35 10 02	15 M	60	01 (With group of company)	08
23.	Panoli Intermediates (India) Pvt. Ltd. (Unit –IV)	01	300 KL	01 01	500 KVA 125 KVA	Main Pump Diesel Pump Jockey Pump	173 m3/hr 173 m3/hr 10.8 m3/ hr	4.5 Kg 6.5 Kg	14 05	06 Kg (ABC)	14	9 Lit. 6 Lit	02 15	15 m	22	01 (With group of company)	05

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VADODARA DISTRICT CRISIS GROUP
FIRE PROTECTION SYSTEM HELD BY MAH UNITS

Sr. No	Name of MAH Unit	Fire Water Tank		Emergency D. G. Set		Fire Pump Set		Fire Extinguishers								Fire Tendor / Fire Trailer Pump	No. of Trained Person in fire fighting
		No.	Capaci ty	No.	KVA	Type	LPM	CO2		DCP / ABC		Foam		Fire Hose			
								Capa city	Nos.	Capacity	Nos.	Capacity	Nos.	Length	Nos.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LCG-1: Vadodara – Nandesari - PCC (Continue...)																	
24.	Rasayan Enterprise	5 Nos.	1,50,000 Ltrs	--	--	Water Pump 7.5 HP	2 Nos	--	--	10	10	-	-	15	2	-	2
25.	Ratna Nicochem Pvt. Ltd.	-	-	1	125	-	-	-	-	6 Kg. 10 Kg.	3 1	-	-	-	-	-	-
26.	Reliance Industries Limited, Vadodara Manufacturing Division	A/G (RCC reservoir) A/G (MS Tanks)	14000 (1) 5000(2) 4500(1) 8600(2) 6248(2)	1	6	Electrical Diesel	1000 (3) 710 (3) 500 (2) 300 (1) 1000 (4) 710 (3)	4.5 6.8 22.5	40 734 60	2 9 6 25 68.5	25 1786 111 3 80	NIL	NIL	22.5 M	170	8	47
27.	Schaeffler India Limited - Maneja	2	750 KL	5	500K VA-4 1000 KVA-1	Jockey Pump Main pump Diesel Pump	180 4550 4550	2 Kg 4.5 Kg 6.5 Kg 9 Kg 22.5 Kg	8 66 38 34 7	4 Kg 5 Kg 6 Kg 9 Kg 10 Kg	25 11 66 106 7	9 Ltr 50 Ltr	17 6	30 mtr	112 Nos.	1 (Trailer Pump)	174
28.	Silox India Private Limited- Atladra	05	599 KL	01	1050	1.Electrical driven 2. Diesel driven	4200 LPM 2850 LPM	3.0 4.5 6.5 9.0	25 43 6 2	1 2 4 5 6 9 10	3 1 65 11 17 4 5	9 Ltr	8	15 7.5 30	19 07 01	Foam Mobile Trolley/ Portable Diesel Fire Pump	40

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VADODARA DISTRICT CRISIS GROUP
FIRE PROTECTION SYSTEM HELD BY MAH UNITS

Sr. No	Name of MAH Unit	Fire Water Tank		Emergency D. G. Set		Fire Pump Set		Fire Extinguishers								Fire Tendor / Fire Trailer Pump	No. of Trained Person in fire fighting
		No.	Capaci ty	No.	KVA	Type	LPM	CO2		DCP / ABC		Foam		Fire Hose			
								Capa city	Nos.	Capacity	Nos.	Capacity	Nos.	Length	Nos.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LCG-1: Vadodara – Nandesari - PCC (Continue...)																	
29.	Simalin chemical Industries Pvt. Ltd	1 1 1	500 KL 250 KL 1000KL	2	1500 KVA 2000 KVA	1. Electrica l pump set- 100 m3/hr 2. Jockey Pump. 10.8 M3/Hr.	180	4.5	33	ABC 5 kg 6 kg 25 kg	02 51 2	1 kl	1	15 mt	28	-	15
30.	Styrenix Performance Materials limited	3	1200 m3	3	1500 1250 650	Electrical Diesal Jockey	273 273 20	2	11	10	127	09	12	7.5 15	20	1	20
31.	Swati Chlorides Pvt. Ltd.	1	60 KL U/G tank	1	200	Electrical driven	75 ltr/min	-	-	-	8	-	-	-	-	-	-

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VADODARA DISTRICT CRISIS GROUP
FIRE PROTECTION SYSTEM HELD BY MAH UNITS

Sr. No	Name of MAH Unit	Fire Water Tank		Emergency D. G. Set		Fire Pump Set		Fire Extinguishers								Fire Tendor / Fire Trailer Pump	No. of Trained Person in fire fighting
		No.	Capacity	No.	KVA	Type	LPM	CO ₂		DCP / ABC		Foam		Fire Hose			
								Capacit y	Nos.	Capacity	Nos.	Capacity	Nos.	Length	Nos.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LCG -2 :- PADRA																	
1.	Adar Chemicals Pvt. Ltd.	-	-	-	-	-	-	6 kg	2	4 kg	2	-	-	-	-	-	2
2.	Aroma De France	1	470 KL	1	KVA 320	3	6000 LPM	22.5 KG 6.5 KG	14 4	50 KG6 KG9 KG	223 4	45 LTR 9 LTR	220	24 FEET	40	-	12
3.	Bodal Chemicals Ltd. (Unit - VII)	02 01 01 01 02	50 KL 80 KL 381 KL 442 KL 720 KL	02 02	500 250	Electrical Pump -5	100HP x1 20 HP x1	2 4.5 9	7 93 10	1 6 9	29 171 20	45 Ltr	06	15 Mtr.	25	-	50
4.	Bodal Chemicals Ltd. (Unit - VIII)	1	100 KL	1	250 KVA	0	0	3 4.5	2 7	2 6	1 14	-	-	-	-	-	06
5.	Greenovat Organics Pvt. Ltd	2	30 KL X 1 No. 20 KL X 1 No.	1	63	Centrifugal / Submersibel	500 400	9 Kg	9	11 Kg	22	9 Ltr	6	30 mtr	1	-	-
6.	Grindly Gases & Petro. Pvt. Ltd.	1	6 Lac Ltr	1	62.5	Diesel pump	-	4.5	2	10	30	0	0	-	-	-	-
7.	Gulbrandsen Private Limited	1	1600 KL	02 01	750 380	Electrical Diesel	6833 6833	4.5 Kg 2 Kg	131 8	50 Kg 10 Kg 5 Kg	341 60 19	50 lit 9 lit	1 49	30 m	79	Fire trailer pump - 1 No	66

VADODARA DISTRICT CRISIS GROUP
FIRE PROTECTION SYSTEM HELD BY MAH UNITS

Sr. No	Name of MAH Unit	Fire Water Tank		Emergency D. G. Set		Fire Pump Set		Fire Extinguishers								Fire Tendor / Fire Trailer Pump	No. of Trained Person in fire fighting
		No.	Capacity	No.	KVA	Type	LPM	CO ₂		DCP / ABC		Foam		Fire Hose			
								Capacit y	Nos.	Capacity	No s.	Capacity	Nos.	Length	Nos.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LCG -2 :- PADRA (Continue...)																	
8.	Kadillac Chemicals Pvt. Ltd.	1	100000	1	75	-	-	1	10	2	9	6	10	-	-	-	-
9.	Kiri Industries Limited- Unit 3	01	700m3	1010 600	01 02	Jockey Pump Main Pump Diesel Pump	180 4850 4850	2 4.5 6 6.5 9 22.5	4 34 8 5 4 4	4 5 6 9	5 12 12 11	6 9 50	4 20 6	7.5 15 30 HR- 30	20 30 10 7		40
10.	Kiri Industries Limited Unit-5	01	1700 m3	01 02	350 127	Jockey Pump Main Pump Diesel Pump	180 4516, 4516	4.5	10	4	13	9	01	15 5	54 4		
11.	Mayur Dyechem Intermediates LTD (Unit - III)	1 1	3,50,000 Ltr 3,50,000 Ltr	1 1 1	1625 1445 1445	150 HP 150 HP	4551 4551	2 Kg 4.5 Kg	04 19	5 Kg 6 Kg 9 Kg 25 Kg	01 16 28 02	09 ltr 45 ltr	13 01	30 mtr 15 mtr 7.5 mtr	25 47 20	-	50
12.	Neogen Chemicals Limited	02	1900 KL	01	750 Kva	A. Jockey B. Main (Electrical) C. Diesel	73 293 273	4.5 Kg	15	5 Kg 6 Kg 10 Kg 50 Kg	15 18 06 01	9 Ltr.	9	15 mtrs.	40	-	40
13.	Prime Organic	1	10000 Ltr.	-	-	-	-	-	-	6 K.g.	6	-	-	-	-	-	4
14.	Shimmer Chemicals Ltd.	1	10000 Littr	1 1	75 125	-	-	-	-	25 06 10	01 10 11	50	04	-	-		

VADODARA DISTRICT CRISIS GROUP
FIRE PROTECTION SYSTEM HELD BY MAH UNITS

Sr. No	Name of MAH Unit	Fire Water Tank		Emergency D. G. Set		Fire Pump Set		Fire Extinguishers								Fire Tendor / Fire Trailer Pump	No. of Trained Person in fire fighting
		No.	Capacity	No.	KVA	Type	LPM	CO ₂		DCP / ABC		Foam		Fire Hose			
								Capaci ty	Nos.	Capacity	Nos.	Capacit y	Nos.	Length	Nos.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LCG -2 :- PADRA (Continue...)																	
15.	Shiva Pharmachem Ltd.	01	8 Lac Ltr.	02	600	Electrical & Diesel	273 m3/hr & 137*2 m3/hr	4.5 6.5	26 06	10 75	32 02	10	04	22	35	01 Trolley	60
16.	Silox India Private Limited - Ekalbara	2	600 each	2 1	1000 500	Jockey (2) Main (1) Diesel (1)	250 6833 6833	2 3 4.5	6 4 128	1 2 4	1 1 57	9 45 50	5 09 5	30 15 7.5	3 110 20	Available Fire trailer pump vailable	45
		2	600 each	1	2000	Jockey (2) Main (1) Diesel (1)	250 5833 5833	6.5 9.0	4 3	6 10	218 08						
17.	TML Industries Ltd. - Karkhadi	01	50 KL	01	380 KVA	2 points of Hydrents	3100	4.5 kg	13 Nos	6 kg	19 Nos	9 Kg	-	15 Mtr	01	-	06
18.	Transpek Industry Ltd.	4 Nos (2250 00 x 4)	9,00,000 Ltr.	02 Nos. 01 Nos	960 kVA - 01	Electric Hydrant Pump Diesel Engine Jocky Pump	410M 3/Hr 410M 3/Hr 30M3/ Hr	02 kg 6.8 kg 4.5 kg	11 04 174	6kg-ABC	222	9 ltr	61	15 mtr 7.5 mtr	82 26	01	50

VADODARA DISTRICT CRISIS GROUP
FIRE PROTECTION SYSTEM HELD BY MAH UNITS

Sr. No	Name of MAH Unit	Fire Water Tank		Emergency D. G. Set		Fire Pump Set		Fire Extinguishers								Fire Tendor / Fire Trailer Pump	No. of Trained Person in fire fighting
		No.	Capacity	No.	KVA	Type	LPM	CO2		DCP / ABC		Foam		Fire Hose			
								Capa city	Nos.	Capacity	Nos.	Capaci ty	Nos.	Length	Nos.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LCG -3 :- SAVLI																	
1.	Anugrah In- Org (P) Ltd.	1	25000 Ltr	1	250 KVA	-	-	4.5 Kg	1	6 Kg	10	45 Kg	1	-	-	-	-
2.	Base Metal Chemicals	-	-	1	200 KVA	-	-	-	-	25 Kg 9 Kg 6 Kg 5 Kg 1 Kg	1 3 3 2 2	-	-	-	-	-	-
3.	Chemcon Speciality Chemicals Limited	UG	350 KL	02	910 KVA	Diesel, Electrical & Jockey	171 m3/ hr & 15 m3/ hr	24.56.59	42854	56910255075	16493611	950	582	15 mtr	32	-	25
4.	Gurunanak Chemical Industries	2	60	1	82.5	-	-	-	-	-	5	-	2	-	-	-	-
5.	Hari Orgochem Pvt. Ltd., 579, Manjusar	02 Nos	3.00 Lac Liter Each Tank	01 Nos	1250 KVA	01	4.550 (273M3/HR)	4.5 Kg	18	6 Kg ABC	44	Water Cum Foam Monitor	8 Nos	15 Mtr RRL	86	-	30

Appendix-C
Continue...

VADODARA DISTRICT CRISIS GROUP
FIRE PROTECTION SYSTEM HELD BY MAH UNITS

Sr. No	Name of MAH Unit	Fire Water Tank		Emergency D. G. Set		Fire Pump Set		Fire Extinguishers								Fire Tendor / Fire Trailer Pump	No. of Trained Person in fire fighting
		No.	Capacity	No.	KVA	Type	LPM	CO2		DCP / ABC		Foam		Fire Hose			
								Capa city	Nos.	Capacity	Nos.	Capaci ty	Nos.	Length	Nos.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LCG -3 :- SAVLI (Continue...)																	
6.	Hindustan Petroleum Corporation Ltd, Village-Asoj Pilol	2	7100	3	1000	Diesel Engine	14100	2 4.5 6.5	8 55 10	9 25 75	165 33 6	30000	2 nos of Tank s	15	300	-	-
7.	IndianOil Adani Ventures Limited, Dumad	4	2500 (2) & 3000 (2) kL	3	320	6 & 2	102 &66 1250	4.5 kg	39	DCP 9,25, 75 kgs	121,14, 6	AFFF	22.5 kL	15 mtr	118	-	62
8.	Indo Amines Ltd	Over Head Under Ground	80000 550 KL	2	200 KVA & 500 KVA	4 Nos Pressurizin g system with Jockey Pump	666 LPM each	4.5 2.0	13 2	50 6 9	2 86 2	9 50	9 5	7Mtr 15 meter	6 60	-	80
9.	Jubilant Ingrevia Limited	2	1600 KL	1	1010	Electrical-Diesel-	410 273	9KG	54	9kg	47	9kg	4	15 meter	84	1 Fire Tender	34

Appendix-C
Continue...

VADODARA DISTRICT CRISIS GROUP
FIRE PROTECTION SYSTEM HELD BY MAH UNITS

Sr. No	Name of MAH Unit	Fire Water Tank		Emergency D. G. Set		Fire Pump Set		Fire Extinguishers								Fire Tendor / Fire Trailler Pump	No. of Trained Person in fire fighting
		No.	Capacit y	No.	KVA	Type	LPM	CO2		DCP / ABC		Foam		Fire Hose			
								Capacit y	Nos.	Capacit y	Nos.	Capaci ty	Nos.	Length	Nos.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LCG -3 :- SAVLI (Continue...)																	
10.	LUBI GEL LIMITED	2	250 KL (Under Ground) 250 KL (Above Ground)	2	625 & 100	Jocky Pump Mian Pump Diesel Pump	15 M³/hr 171 M³/hr 171 M³/hr	3 Kg 4.5 Kg	2 19	5 Kg 6 Kg 10 Kg	DCP-37 ABC-39 ABC-43 DCP-10 ABC-2	9 Ltr 100 Ltr (Trolley)	27 3	15 Mtr 7.5 Mtr	32 10	Nil	30 Employees
11.	National Engineering Industries Ltd.	02	200 kl + 50 kl	01	125 KVA	1. Main Electrical Pump 2. Diesel Pump 3. Jocky Pump	2850 2850 0.18	4.5 Kg 6.5 Kg 22.5 Kg	53 06 02	2 Kg 4 Kg 6 Kg 9 Kg 25 Kg 50 Kg	22 101 57 02 02	9 LTR 45 LTR 50 LTR	26 12 02	15 Mtr	61 Nos	-	70 Trained Fire Fighters
12.	Nirma Limited, Alindra	On Water GRD reser voir	12547.0 M3	01	1825	Diesel pump-03 nos. Elect. Driven - 02 Nos Jocke y-02 Nos.	6833 Each 6833 Each 667 Each	4.5 kg 9.0 kg 22.5 Kg	120 14 07	5.0 kg 6.0 kg 9.0 kg 10.0 kg 50.0 kg	141 45 05 62 09	N.A.	-	15 M	166	Fire Tendre – 02 Nos.	27

VADODARA DISTRICT CRISIS GROUP
FIRE PROTECTION SYSTEM HELD BY MAH UNITS

Sr. No	Name of MAH Unit	Fire Water Tank		Emergency D. G. Set		Fire Pump Set		Fire Extinguishers								Fire Tendor / Fire Trailer Pump	No. of Trained Person in fire fighting
		No.	Capacity	No.	KVA	Type	LPM	CO2		DCP / ABC		Foam		Fire Hose			
								Capac ity	Nos.	Capacity	Nos.	Capaci ty	Nos.	Length	Nos.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
LCG -3 :- SAVLI (Continue...)																	
13.	Schaeffler India Limited -Alindra	2	550KL + 1500KL	2	500 KVA + 800 KVA	1. Jocky pump-2 nos.2. Electrical pump - 2Nos.3. Diesel pump	180 17.64 CMH 71 +415 415	4.5kg	43	10kg 50kg 4.5kg 25kg	11 1 72 5	9lit 50lit	32 10	45mt	30	-	
14.	Thermax Limited	1	3.0 Lac lit	1	725	3	2850	4.5	22	2 5 50	23 3 1	50	1	15	30	-	174 + 45 ERT members
15.	Vadodara LPG Terminal (IOCL)	2	4000 KL X 2 No	01	250 KVA	5	615 M3/Hr	2 Kg 4.5 Kg 6.5 Kg	10 30 05	9 Kg 75 Kg	108 10	-	-	15 mtr	120	-	50

Appendix-D

VADODARA DISTRICT CRISIS GROUP PERSONAL PROTECTIVE EQUIPMENTS HELD BY MAH UNITS

Sr. No.	Name of MAH Unit	SCBA	Canister Masks	Full Body PVC Suit	Fire Suit	Chemical Splash suit	Emergency Kit	Portable Detector
1	2	3	4	5	5	6	7	8
LCG -1 : Vadodara – Nandesari - PCC								
1.	Bharat Petroleum Corporation Limited, Koyali Installation	1 No.	Nil	Nil	2	0	1	2
2.	Chemtech Intermediates Pvt. Ltd.	2	2	2	-	2	2	
3.	Chloritech Industries	5	9	02	----	01	01	01
4.	Deep Darshan Chemicals LLP	2	-	-	-	-	-	-
5.	Deepak Nitrite Limited	18	75	55	20	10	05	20
6.	Dhiren Chemical Industries	-	1	-	-	-		1
7.	Farmson Basic Drugs Pvt Ltd (Unit- I)	05	06	20	1	0	1	1
8.	Farmson Basic Drugs Private Limited (Unit-II)	8	1	4	1	1	1	1
9.	GAIL (India) Limited	06	04	6	03	02	02	10
10.	GSP Crop Science Pvt Ltd – U-3	06	08	06	02	04	01	01
11.	Gujarat Alkalies and Chemicals Limited	32	30	--	04	30	10	6
12.	Gujarat Refinery (Indian Oil Corporation Limited)	144	90	70	04	09	2	All(788)
13.	Gujarat State Fertilizers & Chemicals Limited	150	210	250		02		
14.	Hari Orgochem Pvt.Ltd.- Nandesari	7	8	2	1	1	2	1
15.	INOX Air Products Pvt. Ltd.	02	0	01	0	01	01	02
16.	Link Pharma Chem Ltd.	4	-	2	0	1	2	
17.	Munjal Auto Industries Ltd.	1	1	1	1	1	1	
18.	Nandesari Industries Association Secondary Treatment Plant	05	06	1	1	1	1	9

VADODARA DISTRICT CRISIS GROUP
PERSONAL PROTECTIVE EQUIPMENTS HELD BY MAH UNITS

Sr. No.	Name of MAH Unit	SCBA	Canister Masks	Full Body PVC Suit	Fire Suit	Chemical Splash suit	Emergency Kit	Portable Detector
1	2	3	4	5	5	6	7	8
LCG -1 : Vadodara – Nandesari - PCC (Continue...)								
19.	Narayan Organics Pvt Ltd. Unit-III	2	6	2	-	5	3	1
20.	Oriental Aromatics Ltd.	7 no	Cartridge mask- 4	20	1	NA	5 no	3 no.
21.	Panoli Intermediates (I) Pvt. Ltd., Plot No. 11 & 18	06	10	15	-	02	02	
22.	Panoli Intermediates (India) Pvt. Ltd. (Unit-III)- 156-A&B, 157	10 No	15 No	20 No	02 No	08 No	--	02
23.	Panoli Intermediates (I) Pvt. Ltd. (Unit – IV)	02	05	05	02	--	--	01
24.	Rasayan Enterprise	1 No.	6	2 Nos.	2 Nos.	--	--	
25.	Ratna Nicochem Pvt. Ltd.	3	1	-	-	-	3	
26.	Reliance Industries Limited , Vadodara Manufacturing Division	6.8 & 6 liters (250)	NIL	NIL	25	180	Cl2 kit (3 nos.)	LEL detector (40) Cl2 detector (14) HCN 6 A CN 6 EO 3
27.	Schaeffler India Limited - Maneja	3	3	NA	3	5	Yes	1
28.	Silox India Private Limited	14	90	22	02	18	02	4
29.	Simalin Chemical Industries Pvt. Ltd.	3	-	1	-	-	-	4
30.	Styrenix Performance Materials limited	8	5	5	4	10	1	2
31.	Swati Chloride Pvt. Ltd.	6	-	-	6	-	-	-

VADODARA DISTRICT CRISIS GROUP
PERSONAL PROTECTIVE EQUIPMENTS HELD BY MAH UNITS

Sr. No.	Name of MAH Unit	SCBA	Canister Masks	Full Body PVC Suit	Fire Suit	Chemical Splash suit	Emergency Kit	Portable Detector
1	2	3	4	5	5	6	7	8
LCG – 2 : PADRA								
1.	Adar Chemicals Pvt. Ltd.	04		Fire Extinguisher-04 No Helmet – 07 Safety Mask -10 No Gumboot -04 No Safety Goggles – 10 No	1		Chlorine Kit-1	Installed CL2 Storage Area
2.	Aroma De France	2	-	1	1	-	2	-
3.	Bodal Chemicals Ltd. (Unit - VII)	10	30	18	-	-	02	02
4.	Bodal Chemicals Ltd. (Unit - VIII)	2	-	5	-	-	-	-
5.	Greenovat Organics Pvt. Ltd	4 Nos.	6 Nos.	-	-	-	1 No.	
6.	Grindly Gases & Petro . Pvt. Ltd.	-	-	-	-	-	-	-
7.	Gulbrandsen Chemical Pvt. Ltd.	37	50	50	1	5	2	3
8.	Kadillac Chemicals Pvt. Ltd.	3	3	-	3	2	1	
9.	Kiri Industries Limited- Unit 3	8	Acid/ Alkali based – 36 Solvent based - 24	24	Nil	6	1	3
10.	Kiri Industries Limited Unit-5	04	Acid/ Alkali based – 6	10	Nil	3	2	3
11.	Mayur Dyechem Intermediates LTD (Unit - III)	02	05	-	-	02	01	-

Appendix-D
Continue...

VADODARA DISTRICT CRISIS GROUP
PERSONAL PROTECTIVE EQUIPMENTS HELD BY MAH UNITS

Sr. No.	Name of MAH Unit	SCBA	Canister Masks	Full Body PVC Suit	Fire Suit	Chemical Splash suit	Emergency Kit	Portable Detector
1	2	3	4	5	5	6	7	8
LCG – 2 : PADRA (Continue...)								
12.	Neogen Chemicals Limited	15 Nos.	12	20 Nos	02	10	01	1 No- Multi Gas Detector 2 Nos- Oxygen Meter
13.	Prime Organic	3	4	2	-	-	1	-
14.	Shimmer Chemicals Ltd.	6	5	1	1	2	2	
15.	Shiva Pharmachem Ltd.	09	30	10	00	00	02	04
16.	Silox India Private Limited - Ekalbara	25	50	20	5	2	3	7
17.	TML Industries Ltd.-Karkhadi	06	06	05	-	-	01	01
18.	Transpek Industry Ltd.	32 Nos.	50 Nos.	50 Nos.	02		Chlorine - 02 Nos. Sulphur Dioxide - 01 Nos	Oxygen- 03 Nos Multigas detector 02 Nos.

VADODARA DISTRICT CRISIS GROUP
LIST OF PERSONAL PROTECTIVE EQUIPMENTS WITH MAH UNITS

Sr. No.	Name of MAH Unit	SCBA	Canister Masks	Full Body PVC Suit	Fire Suit	Chemical Splash suit	Emergency Kit	Portable Detector
1	2	3	4	5	5	6	7	8
LCG - 3 : - SAVLI								
1.	Anugrah In- Org (P) Ltd.	3	3	2			1	
2.	Base Metal Chemicals	6	4	2	3 (Alumina suit)	-	3	4 (chlorine sensor)
3.	Chemcon Speciality Chemicals Limited	08	25	10	2	1	2	8
4.	Gurunanak Chemical Industries	2	-	-	-	-	1	1
5.	Hari Orgochem Pvt. Ltd., 579, Manjusar	6	12	5	1	5	1	2
6.	Hindustan Petroleum Corporation Ltd, Vadodara Terminal	6	6	2	-	-	-	-
7.	IndianOil Adani Ventures Limited, Dumad	4	4	-	2	2	2	2
8.	Indo Amines Ltd	3	10	10	2	5	5	2
9.	Jubilant Ingrevia Limited	6 Nos	22 Nos	8 Nos	2 Nos	10 Nos	4	3
10.	LUBI GEL LIMITED	2	10	5	0	5	0	2
11.	National Engineering Industries Limited	03	03	03	03	-	01	01
12.	Nirma Limited, Alindra	09	10	32	02	-	Cl2 kit - 01	05
13.	Schaeffler India Limited - Alindra	2	2	2	-	01	01	03
14.	Thermax Limited	2	0	0	2	0	-	3 LEL
15.	Vadodara LPG Terminal (IOCL)	2	2	2	1	0	1	2

Appendix-E

VADODARA DISTRICT CRISIS GROUP
EMERGENCY VEHICLES FACILITIES HELD BY MAH UNITS

Sr. No.	Name of Factories	Emergency Vehicles / Equipments						Car
		Bus	Truck	Dumper	JCB	Tractor	Crane	
1	2	3	4	5	6	7	8	9
LCG – 1 : Vadodara – Nandesari - PCC								
1.	Bharat Petroleum Corporation Limited, Koyali Installation	-	-	-	-	-	-	2
2.	Chemtech Intermediates Pvt. Ltd.	-	-	-	-	-	-	2
3.	Chloritech Industries	-	2	-	-	-	-	1
4.	Deep Darshan Chemicals LLP	-	-	-	-	-	-	1
5.	Deepak Nitrite Ltd.	04	15	05	3	4	5	5
6.	Dhiren Chemical Industries							2
7.	Farmson Basic Drugs Pvt Ltd (Unit- I)	02	--	--	--	--	--	02
8.	Farmson Basic Drugs Private Limited (Unit-II)	02	-	-	-	-	-	02
9.	GAIL (India) Limited	-	-	-	-	-	-	2
10.	GSP Crop Science Pvt Ltd- U-3	-	-	-	-	-	-	-
11.	Gujarat Alkalies & Chemicals Limited	2	0	0	1	2	1	2
12.	Gujarat Refinery (Indian Oil Corporation Limited)	22	-	-	-	4	3	-
13.	Gujarat State Fertilizers & Chemicals Ltd.	17	01	-	5	10	5	26
14.	Hari Orgochem Pvt.Ltd.- Nandesari	2	2	-	-	-	-	1
15.	INOX Air Products Pvt. Ltd.	-	-	-	-	-	-	03
16.	Link Pharma Chem Ltd.	-	-	-	-	-	-	-
17.	Munjal Auto Industries Ltd.	1	-	-	-	-	-	1
18.	Nandesari Industries Association Secondary Treatment Plant	-	-	-	-	-	-	1
19.	Narayan Organics Pvt. Ltd.-Unit-III	-	-	-	-	-	-	1
20.	Oriental Aromatics Ltd.	5	NA	NA	NA	NA	NA	2
21.	Panoli Intermediates (I) Pvt. Ltd., Plot No. 11 & 18	01	--	--	--	01	01 (Hydra)	01
22.	Panoli Intermediates (India) Pvt. Ltd. (Unit –III)-156, 157	01	-	-	-	01	01 (Hydra)	01
23.	Panoli Intermediates (India) Pvt. Ltd. (Unit –IV)	01	-	-	-	01	01	01
24.	Rasayan Enterprise	-	-	-	-	-	-	2
25.	Ratna Nicochem Pvt. Ltd.	-	-	-	-	-	-	1
26.	Reliance Industries Limited , Vadodara Manufacturing Division	--	--	--	--	--	1) Tyre mounted 08 2) Crawler 02	--
27.	Schaeffler India Limited-Maneja	-	-	-	-	-	-	Car-3, Ambulance-1
28.	Silox India Private Limited-Atladra	-	-	-	-	-	-	02
29.	Simalin chemical Industries Pvt. Ltd	-	-	-	-	-	-	4
30.	Styrenix Performance materials limited	-	-	-	-	-	-	2
31.	Swati Chlorides Pvt. Ltd.	-	-	-	-	-	-	1

VADODARA DISTRICT CRISIS GROUP
EMERGENCY VEHICLES FACILITIES HELD BY MAH UNITS

Sr. No.	Name of Factories	Emergency Vehicles / Equipments						Car
		Bus	Truck	Dumper	JCB	Tractor	Crane	
1	2	3	4	5	6	7	8	9
LCG – 2 : PADRA								
1.	Adar Chemicals Pvt. Limited	-	-	-	-	-	2	-
2.	Aroma De France	-	3	-	-	-	-	1
3.	Bodal Chemicals Ltd. (Unit - VII)	0	2	0	2	3	0	2
4.	Bodal Chemicals Ltd. (Unit - VIII)	-	-	-	-	-	-	1
5.	Greenovat Organics Pvt. Ltd	-	-	-	-	-	-	2
6.	Grindly Gases & Petro . Pvt. Ltd.	-	-	-	-	-	-	1
7.	Gulbrandsen Chemicals Pvt. Ltd.	0	-	-	-	-	2	2
8.	Kadillac Chemicals Pvt. Ltd.	-	-	-	-	-	-	2
9.	Kiri Industries Limited- Unit 3	01	0	01	01	01	01	01
10.	Kiri Industries Limited- Unit 5	01	00	-	01	-	-	01
11.	Mayur Dyechem Intermediates LTD (Unit - III)	02	-	-	03	04	0	04
12.	Neogen Chemicals Limited	02	01	-	-	01	-	05
13.	Prime Organic	-	-	-	-	-	-	-
14.	Shimmer Chemicals Pvt. Ltd.	-	-	-	-	-	-	2
15.	Shiva Pharmachem Ltd.	00	-	-	-	00	-	01
16.	Silox India Private Limited- Ekalbara	2	-	-	-	-	-	2
17.	TML Industries Ltd.-Karkhadi	0	0	0	0	0	0	1
18.	Transpek Industry Limited	No	No	No	No	02 No.	1 No	03 No.
LCG – 2 : SAVLI								
1.	Anugrah In- Org (P) Ltd.	1	-	-	-	-	-	1
2.	Base Metal Chemicals	-	-	-	-	-	-	1 (Eco for Emergency)
3.	Chemcon Speciality Chemicals Limited	2	0	0	1	0	0	7
4.	Gurunanak Chemical Industries	-	-	-	-	-	-	-
5.	Hari Orgochem Pvt. Ltd.- Manjusar	1 for G Shift	-	-	-	-	-	-
6.	Hindustan Petroleum Corporation Limited- Vadodara Terminal	-	-	-	-	-	-	-
7.	IndianOil Adani Ventures Limited, Dumad	-	-	-	-	-	-	2
8.	Indo Amines Ltd	-	-	-	-	-	-	2
9.	Jubilant Ingrevia Limited	2	0	0	0	1	0	2
10.	LUBI GEL LIMITED	1	Nil	Nil	Nil	Nil	Nil	1
11.	National Engineering Industries Limited	5	-	-	-	-	-	05
12.	Nirma Limited, Alindra	1	0	0	0	0	0	1
13.	Schaeffler India Limited-Alindra	3	-	-	-	-	-	2
14.	Thermax Limited	3	0	0	0	0	5	3
15.	Vadodara LPG Terminal (IOCL)	-	-	-	-	-	-	4

Appendix-F

VADODARA DISTRICT CRISIS GROUP
MEDICAL FACILITIES AT MAH UNITS

Sr. No.	Name	Telephone Numbers	FMO & Contact Number	Ambulance	OHC Beds
1	2	3	4	5	6
LCG – 1 : Vadodara – Nandesari - PCC					
1.	Bharat Petroleum Corporation Limited, Koyali Installation	9558804701	Dr. Milan Thakar	-	1
2.	Chemtech Intermediates Pvt. Ltd	(0265) 2840463	9824408956	1	1
3.	Chloritech Industries	9824408956, 9825771334	Dr P C Jain Dr. Kalrav Thakkar	NIA-1, Deepak Foundation -1	1
4.	Deep Darshan Chemicals LLP	9974747471, 9904222456	-	-	-
5.	Deepak Nitrite Ltd.	0265 2601333	Dr. Kartik Patel Mo:9429002017 Dr. P C Jain Mo: 9824408956	02	03
6.	Dhiren Chemical Industries	9265924259	-	0	0
7.	Farmson Basic Drugs Pvt Ltd (Unit- I)	0265-2840082	Dr. J. M. Parmar 9427075255	01	01
8.	Farmson Basic Drugs Private Limited (Unit-II)	0265-2840082	Dr. J. M. Parmar 9427075255	01	02
9.	GAIL (India) Limited	02668-267442	Dr. Sanjeeva Kumar (M) 7016893513	1	2
10.	GSP Crop Science Pvt Ltd – U-3	0265-6820423	Dr. Abhishek Rathod M. 9712921117	01	03
11.	Gujarat Alkalies and Chemicals Limited	0265-6111211	Dr. Gaurang Pathak M. 9898567989	01	04
12.	Gujarat Refinery. (Indian Oil Corporation Ltd)	02652237127/6532/6199	Dr D. Nagpure (GM-H,S&E -Med) Contact no- 9687695330	3 No of BLS Ambulance	30 bed in GR Hospital
13.	Gujarat State Fertilizers & Chemicals Limited	(0265) 2242451, 2242651, 2242751, 2242641	Dr. Manju Ramani 0265-3092968	8	1
14.	Hari Orgochem Pvt.Ltd.- Nandesari	7227049713	Dr. P. C. Jain -M. 9824408956, Dr Kalrav Thakkar - M. 9825771334	NIA-1, Deepak Foundation -1	1
15.	INOX Air Products Pvt. Ltd.	02666-235800	9898159444	--	01

Appendix-F
Continue...

VADODARA DISTRICT CRISIS GROUP
MEDICAL FACILITIES AT MAH UNITS

Sr. No.	Name	Telephone Numbers	FMO & Contact Number	Ambulance	OHC Beds
1	2	3	4	5	6
LCG – 1 : Vadodara – Nandesari - PCC (Continue...)					
16.	Link Pharma Chem Ltd.	0256-3065000	Dr. P.C. Jain, 0265-2840567	0	1
17.	Munjil Auto Industries Ltd.	9925028593	Dr. Shailesh Shah 98252 07137	1	1
18.	Nandesari Industries Association Secondary Treatment Plant	0265-280321 / 2841016 / 2840078 / 2840077	Dr. P.C. Jain Ph. 0265-2840567	Yes	-
19.	Narayan Organics Pvt. Ltd. Unit-III	Hospital Dipak Foundation, Near firebrigade, Nadesari. Vadodara. 0265 2840770/ 0265 2841455	Noddle officer: 9909942016 Smita Maniyar: 9825041649	Yes	36
20.	Oriental Aromatics Ltd.	0265-2842108	Dr. P.C. Jain	1	3
21.	Panoli Intermediates (I) Pvt. Ltd., Plot No. 11 & 18	9687772335 (Unit Head), 7383997685 (Safety Mgr)	Dr. P.C. Jain M.9824408956	-	-
22.	Panoli Intermediates (India) Pvt. Ltd. (Unit –III) - 157	(0265) 2397013, 2396751 (O)	Dr. Prakash Jain Ph. 0265-2840565	1	01
		(0265) 2424848	SSG – Incharge Doctor	1	-
23.	Panoli Intermediates (I) Pvt. Ltd. (Unit – IV)	(0265) 2397013, 2396751 (O)	Dr. Prakash Jain Ph. 0265-2840565	1	01
		(0265) 2424848	SSG – Incharge Doctor		-
24.	Rasayan Enterprise	0265-2963305 / 2840813	Kaushik Shah Saiprasad Samant	Deepak Nitrite-1	-
25.	Ratna Nicochem Pvt. Ltd.	0265 -2840519	1. Dr. P.C. Jain, Nandesari 2. Deepak Medical Foundation	Supplied on request (1) Deepak Medical (2) NIA	5 Beds
26.	Reliance Industries Limited , Vadodara Manufacturing Division	0265-3107783	Dr. Dinesh Prajapati M. 8427004621	02	18
27.	Schaeffler India Limited- Maneja	0265-6602972	Dr. Rakesh Makkar 9428426522	1	2
28.	Silox India Private Limited	0265-2680401-5	Dr. Santosh Awasthi 0265-2680401 Extn-260 9909924216	01	02
29.	Simalin Chemical Industries Pvt. Ltd	0265-2840265, 2840266	Dr. P.C.Jain M: 9824408956	-	1
30.	Styrenix Performance Materials limited	0265 2301101, 112	Dr.Milan Thakker	1	2
31.	Swati Chlorides Pvt. Ltd.	0265-2840843	Dr. P.C Jain 0265-2840567	0	-

Appendix-F
Continue...

VADODARA DISTRICT CRISIS GROUP
MEDICAL FACILITIES AT MAH UNITS

Sr. No.	Name	Telephone Numbers	FMO & Contact Number	Ambulance	OHC Beds
1	2	3	4	5	6
LCG : 2 - PADRA					
1.	Adar Chemicals Pvt. Limited	02262-244207	Dr. Agrawal Mobile No- 98242 63700		
2.	Aroma De France	9890264331	Crossroads Hospital, Dabhasa – Co-7573011524	2	-
3.	Bodal Chemicals Ltd. (Unit-VII)	9909950847	Dr.Sohel, Visiting FMO M. 9512021516	-	1
4.	Bodal Chemicals Ltd. (Unit-VII)	9909950847	Dr.Sohel, Visiting FMO M. 9512021516	-	1
5.	Greenovat Organics Pvt. Ltd	(02662) 244194, 244455	-	1	2
6.	Grindly Gases & Petro. Pvt. Ltd.	02662-242202	Dr. D. B. Sisodiya	0	0
7.	Gulbrandsen Chemicals Pvt. Ltd.	02662-229155	Dr. P. B. Sisodiya	01	2
8.	Kadillac Chemicals Pvt. Ltd.	(02662) 273376, 273286	Dr. Kailsh Agarwal 9824263700 / 9426603039	-	-
9.	Kiri Industries Limited- Unit 3	91-2662-273444	Dr. Vaishnav Tushar – Full time M – 0992503580 Dr. Kailash Agarwal – Part time, M - 09824263700	01	02
10.	Kiri Industries Limited- Unit 5	91-2662-273724 and 273725	Dr. Kailash Agarwal – Part time, M - 09824263700	-	01
11.	Mayur Dyechem Intermediates LTD (Unit - III)	9825008407, 9825048585	Dr. Kailash Agrawal M. 9824263700	1	1
12.	Neogen Chemicals Limited	02662 273329, 9727699911, 9727699922	Dr. Kailash Agarwal M. 09824263700	Yes	03
13.	Prime Organic	-	-	-	-
14.	Shimmer Chemicals Pvt. Ltd.	02662-244325	(1)Dr.Priyesh Patel M.09662607331 Hospital- NO.81411010123/L/L NO.0265- 3046000 (2) Cross Road Hospital Dabhasa	01 01	100 100
15.	Shiva Pharmachem Ltd.	(02662) 221021	Dr. Kailash Agrawal M. 9824263700	Yes	02
16.	Silox India Private Limited - Ekalbara	9909924311/813/3 13	Dr.Hitesh Fadia M. 846975288	1	3
17.	TML Industries Ltd.-Karkhadi	02662-273563	Dr. J K Vyas M.9974839368	01	01
18.	Transpek Industry Limited	02662-244309 Extn.108	Dr. Vishal Shah M. 7574811534	02 Nos.	02 Nos.

VADODARA DISTRICT CRISIS GROUP
MEDICAL FACILITIES AT MAH UNITS

Sr. No.	Name	Telephone Numbers	FMO & Contact Number	Ambulance	OHC Beds
1	2	3	4	5	6
LCG : 3 : SAVLI					
1.	Anugrah In- Org (P) Ltd.	0265 – 2773675/ 2762272	--	-	-
2.	Base Metal Chemicals	9978905311	Dr. Umang Bamania (97263696929)	1 Ecco for Emergency	-
3.	Chemcon Speciality Chemicals Limited	02676-290128	Dr. Milan Thakkar - 9558804701	0	0
4.	Gurunanak Chemical Industries	94277 84232		0	1
5.	Hari Orgochem Pvt. Ltd. - Manjusar	0265-2775217	Dr. Nilesh Bhimnathwala, M. 9825473757	-	01
6.	Hindustan Petroleum Corporation Ltd, Vadodara Terminal	-	Dr Milan Thakkar, M.9558804701	-	-
7.	IndianOil Adani Ventures Limited, Dumad	-	Dr. Avdhesh Mahto M. 9327680307	-	-
8.	Indo Amines Ltd	0265-2427780	Dr. Sharda M-9898054626	1	1
9.	Jubilant Ingrevia Limited	02667-268302	Dr. Kalpesh Khapad 02667-268388	1	2
10.	LUBI GEL LIMITED	02667-299053 / 93	Dr. Parth Joshi Mobile No.: 9662490055	1	0
11.	National Engineering Industries Limited	2667-266200	Dr. Milan Thakkar (9558804701)	01	02
12.	Nirma Limited, Alindra	02667-269100-104 Ext. 120	Dr. Alka Pagi, F.M.O. M. 9879603186	01	06
13.	Schaeffler India Limited-Alindra	91 2667-663131	Dr. Alok Vyas 02667- 663131 02667- 663145	1	2
14.	Thermax Limited	02667-266535	Dr. Jay Shah (9998107506)	1 No	1 No
15.	Vadodara LPG Terminal (IOCL)	98254 73757	Dr. Nilesh Bhimnathwala M. 98254 73757	0	1

Appendix-G**VADODARA DISTRICT CRISIS GROUP****ANTIDOTE AVAILABLE WITH MAH**

Sr. No.	Name of MAH Unit	Name of Chemical	Name of Antidote	Qty of Antidote	Supplier name and Mobile No.
1	2	3	4	5	6
LCG – 1 : Vadodara – Nandesari - PCC					
1.	Bharat Petroleum Corporation Limited, Koyali Installation	Petroleum Product MS, HSD, Ethanol, MTO, Bio-Diesel	N.A.	-----	----
2.	Chemtech Intermediates Pvt Ltd	Sodium Cyanide	Cyanide Antidote kits	2	Troikaa Pharmaceuticals Ltd.
3.	Chloritech Industries	Chlorine	1. Milk of Magnesia 2. Milk 3. ENO 4. Oxygen Cylinder in OHC Room	110 ml 3 No 05 gm X 60 Nos (Pkt) 02. Nos.	--
4.	Deep Darshan Chemicals LLP	-	-	-	-
5.	Deepak Nitrite Ltd.	Toluidine (OT/PT/MT)	Methylene blue	3 No.	
		Nitro Toluene (Ortho / Para / metra)			
		2,3/2,4/2/2,6 Xylene			
		3 NBTF, 2ABTF, 4ABTF	Calcium Lactate Milk of magnesia		
		2,6 Xylenol	PEG (Poly Ethylene Glycol)		
		Hydrated Lime powder	Water		
		DMS (D—methyl Sulphate Liquid Foam)			
		Caustic Lye (Liquor Foam)			
		2 –EHN (2-Ethylhexanol) Liq. Form			
		EHA (Ethyl hexanol)			
		Sodium Sulphate (Solid)			
		Oil (Liquid)			
		Diesel (Liquid)			
		Chlorine (Liquid & Gas)			
		Sulphur Dioxide (Liquid & Gas)			
		Ammonia (Liquid & Gas)			
		Coal (Solid)			
		MAHCL (Liq. And Solid) Methylhydroxylamine Hydrochloride)			
		RLNG (Gas) Regesstified Naturtal Gas			
		High Noise			

Appendix-G **Continue...**

VADODARA DISTRICT CRISIS GROUP **ANTIDOTE AVAILABLE WITH MAH**

Sr. No.	Name of MAH Unit	Name of Chemical	Name of Antidote	Qty of Antidote	Supplier name and Mobile No.
1	2	3	4	5	6
	LCG – 1 : Vadodara – Nandesari - PCC (Continue...)				
6.	Dhiren Chemical Industries	-	-	-	-
7.	Farmson Basic Drugs Pvt Ltd (Unit- I)	Venom	Venom Antodote	01	Mr. Bipin 8849187229
8.	Farmson Basic Drugs Private Limited (Unit-II)	Venom	Venom Antodote	01	Mr. Bipin 8849187229
9.	GAIL (India) Ltd.	LPG, Nahtha	Sodium Nitrite- (Inj- 10 MI)	2 Nos. Ampoules	Troikaa Pharmaceuticals, Talol Gujarat
			Amyl Nitrite- Inhalant	12 Nos. Vials	Troikaa Pharmaceuticals, Talol Gujarat
10.	GSP Crop Science Pvt Limitd, Unit 3	Acrylonitrile	Cynide Kit	01	Troikaa Pharmaceuticals Ltd. Ahmedabad Ph. (O)26856242/43/44/45-238
11.	Gujarat Alkalies and Chemicals Limited	Ammonium Nitrate Nitric Acid Potassium Nitrate / Nitrite Sodium Nitrate / Nitrite	Inj MethyleneBlue	05	M/s Apollo Pharmacies Limited 70430 00429
		Snake Bite /SnakeVenom	Inj Anti snake venom	03	M/s Apollo Pharmacies Limited 70430 00429
		Chlorine / Chemical/ Toxic Gas Inhalation	No specific antidote Medical Oxygen	11 Nos. of Bedside Oxygen Cylinders	M/s Honest Surgical 080 4809 3341
		Any Chemical Ingestion	Universal Antidote: Activated Charcol Powder RECOL MIX	02	M/s Apollo Pharmacies Limited 70430 00429
12.	Gujarat Refinery (Indian Oil Corporation Ltd.)	Motor Spirit, High Speed Diesel, LPG, Naptha, SKO	No specific antidote	-	-
		Sulphuric Acid	Milk of magnesia and water	-	Rajlakshi Drugs, Mob-9813057496
13.	Gujarat State Fertilizers & Chemicals Limited	Snake bite	Injection Anti Snake Venom	5	Bharat Serums and vaccines Ltd
14.	Hari Orgochem Pvt. Ltd. - Nandesari	Chlorine	Milk of Magnesia	3 Btl (250 ML each)	Ambe Medical Store
		TriChloro Acetylene Chloride	Sodium Bicarbonate	5 Btl (50 Grm each)	
15.	INOX Air Products Pvt. Ltd.	-	-	-	-
16.	Link Pharma Chem Ltd.	-	-	-	-
17.	Munjat Auto Industries Ltd.	Propane Gas			

Appendix-G **Continue...**

VADODARA DISTRICT CRISIS GROUP **ANTIDOTE AVAILABLE WITH MAH**

Sr. No.	Name of MAH Unit	Name of Chemical	Name of Antidote	Qty of Antiodte	Supplier name and Mobile No.
1	2	3	4	5	6
LCG – 1 : Vadodara – Nandesari - PCC (Continue...)					
18.	Nandesari Industries Association Secondary Treatment Plant	-	-	-	-
19.	Narayan Organics Pvt. Ltd.- Unit-III	-	-	-	-
20.	Oriental Aromatics Limited	Acetic Acid Formic Acid Sulphuric Acid	Milk Of Magnesia	05 (140 MI each)	Jiya Marketing
		Aniline	Methylene Blue Injection	01	
21.	Panoli Intermediates (I) Pvt. Ltd., Plot No. 11 & 18	(Upon exposure of SO2 person sent to Dr. P.C.Jain Clinic for treatment, anti dots are available in hospital)			
22.	Panoli Intermediates (India) Pvt. Ltd. (Unit –III) – 156, 157	Ammonia	Smelling Ethanol or Ether	-	-
		Methanol	10 mg diazepam through injection, Activated Charcol	-	-
		Thionyl Chloride	Natural oil and one table spoon sodium or magnesium sulphate with one glass of water	-	-
		Chlorine	Milk butter and mike of magnesia.	-	-
		Oleum	Sodium Hydro Carbonate (4% Conc.), Milk, Lime Juce, Milk of Magnesia.	-	-
		Sulphuric Acid	Sodium Hydro Carbonate (4% Conc.), Milk, Lime Juce, Milk of Magnesia.	-	-
23.	Panoli Intermediates (I) Pvt. Ltd. (Unit – IV)	Ethylene Oxide	No specific antidote	-	-
		Thionyl Chloride	Natural oil and one tablespoon sodium or magnesium sulphate with one glass of water.	-	-
		Sulphuric Acid	Sodium Hydro Carbonate (4% Conc.), Milk, Lime Juice, Milk of Megnesia.	-	-
		Phosphoric Acid	No Specific Antidote	-	-
		Acetic Acid	Milk of Magnesia	-	-
		Ammonia (Anhydrous)	Smealling Ethanol or Ether	-	-
24.	Rasayan Enterprise	Ethylene oxide	NA	-	-
25.	Ratna Nicochem Pvt. Ltd.	Chlorine	Immediately referring to Deepak Medical Foundaton	Conversant with chorine Gas first Aid treatment	0265-2841455 0265-2841572

Appendix-G
Continue...

VADODARA DISTRICT CRISIS GROUP
ANTIDOTE AVAILABLE WITH MAH

Sr. No.	Name of MAH Unit	Name of Chemical	Name of Antidote	Qty of Antidote	Supplier name and Mobile No.
1	2	3	4	5	6
LCG – 1 : Vadodara – Nandesari - PCC (Continue...)					
26.	Reliance Industries Limited , Vadodara Manufacturing Division	HF HCN Inj Snake Venom Antiserum (vial)	HF Antidote Jelly Cyanide antidote kit Inj Snake Venom Antiserum (vial) Inj Leucovorin (vial) Inj Methylene Blue (ampules)	18 Bottles 19 kit 20 kit 4 5	B M D Distributors 982576897 Apollo Pharmacies Ltd. 7600024645 Apollo Pharmacies Ltd. Apollo Pharmacies Ltd.
27.	Schaeffler India Limited - Maneja	NA	Antisnake Venom	2	Neo Agencies M. 9898177338
		NA	Atropine	2	Neo Agencies M. 9898177338
28.	Silox India Private Limited, Kalali road, Atladra, Vadodara.	Sulphur Dioxide (SO ₂)	Move to fresh air. If not breathing give artificial respiration & also give Oxygen.	Not applicable	Not Applicable
		Methanol (CH ₃ OH)	1)Diazepam for delirium. 2)Sodium Bi Carbonate inj. Note: Ethanol (5% solution from outside i.e. by intravenous injection. In case of acidosis then sodium bicarbonate .In case of delirium then diazepam 10 mg by IV	1-Diazepam -5 mg tablets, 50 tablets 2.Sodium bicarbonate 7.5 % w/v 15 ampoules for injection.	Dipesh Medical - 9427341940
		Formaldehyde (HCHO)	Move to fresh air.If not breathing give artificial respiration & also give Oxygen. In Eye wash with plenty of water. In skin exposure washes with soap & Water. In case of ingestion Dilute with 4 to 8 ounces (120 to 240 ml) of milk or water. Prevent absorption with gastric lavage and/or activated charcoal.	15 bottles of activated charcoal (50 gm each)	Shayona Medical store, Atladra 9998992397
		Acids	1)Histac MPS Syrup and tablets for Ingestion, Note: In case of ingestion give half to one glass of milk or water within 30 minutes of ingestion. Anti-acid like Aluminum hydroxide or milk of magnesia given. Do not induce vomiting. In case of Skin /Eye exposure wash with plenty of water or saline for 15 to 20 minutes. In case of inhalation move to fresh air give 100% oxygen. Note that do not use alkali to neutralize the acid.	20 bottles of 170 ml syrup	Dipesh Medical - 9427341940
		Alkali	In case of ingestion give one glass of water/milk. Do not induce vomiting. In case of Eye/Skin wash with plenty of water. Note: Do not induce vomiting.	Not applicable	Not applicable

Appendix-G **Continue...**

VADODARA DISTRICT CRISIS GROUP **ANTIDOTE AVAILABLE WITH MAH**

Sr. No.	Name of MAH Unit	Name of Chemical	Name of Antidote	Qty of Antidote	Supplier name and Mobile No.
1	2	3	4	5	6
LCG – 1 : Vadodara – Nandesari - PCC (Continue...)					
29.	Simalin Chemical Industries Pvt. Ltd.	FD/Methanol/Ammonia	Water, EyeWash, BodyWash	Plenty of water	-
30.	Styrenix Performance materials limited	Acrylonitrile	Amayl nitrite(Inhalant)	12	Troikaa Pharmaceuticals Ltd 079-2685624243
			Sodium nitrite	2	
			Inj.Sodium thiosulphate	1	
31.	Swati Chlorides Pvt. Ltd.	Chlorine	No specific antidote available Milk, Butter milk and Milk of magnesia.	--	--
LCG : 2 : PADRA					
1.	Adar Chemicals Pvt. Limited	-	-	-	Dr.Agrawal, M. 98242 63700
2.	Aroma De France	-	-	-	-
3.	Bodal Chemicals Ltd. (Unit-VII)	1.Acetanalide 2.Anilineoil 3.Beta 4.Naphthaline 5.Six-Nitro 6.D.A.S.A.	Methylene Blue	20	A Roy & Co. Raopura, Vadodara. PH.NO.(0265)241 1347,2421248
4.	Bodal Chemicals Ltd. (Unit - VIII)	DASA, F.C Acid & 6-Acetyl –Ophsa	Methylene Blue	20	A Roy & Co. Raopura, Vadodara, PH.NO.(0265)241 1347,2421248
5.	Greenovat Organics Pvt. Ltd.	--	--	--	--
6.	Grindly Gasses & Petro. Pvt. Ltd.	--	--	--	--
7.	Gulbrandsen Chemicals Pvt. Ltd.	HF	Calcium GluconateGel	01 (200gm)	South West Chemie, Chennai 09884044595044-22201116
		Chlorine gas	Deriphylin ampoules	15 ampoules	Shree Dutt Medical & General Store, Vadu 02662- 267967 M. 9662683824
			Dexona Vial	2 Vial	hree Dutt Medical & General Store, Vadu02662 267967M. 9662683824
8.	Kadillac Chemicals Pvt. Ltd.	-	-	-	-

Appendix-G **Continue...**

VADODARA DISTRICT CRISIS GROUP **ANTIDOTE AVAILABLE WITH MAH**

Sr. No.	Name of MAH Unit	Name of Chemical	Name of Antidote	Qty of Antidote	Supplier name and Mobile No.
1	2	3	4	5	6
LCG : 2 : PADRA (Continue...)					
9.	Kiri Industries Limited- Unit 3	Acid & Sulphur oxides or Alkalis	Milk, lemon water or milk of magnesia can be given.	Milk of magnesia – 5X200ml bottle	-
		Aniline	- Methylene Blue(1%solution), Ascorbic acid (5%solution) - Administer oxygen in case of breathing difficulty.	Methaline Blue 10 nos	-
		Ammonia	- Wash with plenty of water if eyes affected min.15 minutes put one drop of 0.4% Benzocaine (Novocaine) solution in eyes. Boric or lactic acid solution eye drops can also be given - If entered in throat than give smell through cotton dipped in ethanol or ether through nose. Administrate oxygen in case of breathing difficulty.	Suframycin – 10 tubes Dilute lactic acid	-
		Methanol	- Ethanol (30%solution from inside, 5% solution from outside) Epicake Syrup - In case of acidosis give Sodium bicarbonate - In case of delirium give Diazepam 10mg.by intravenous injection - Folinic Acid (leucovorin) 1mg/kg ,iv,4 hourly.	-	-
		Naphalene	5gm Sodium bicarbonate every 4hrs and keep urine alkaline. - Give 1ml/kg furosemide in liquid. Blood transfusion till hemoglobin become normal – 60 to80%.	-	-
		Ammonia liquor, Caustic sodium, potassium	Vingar	-	-
		Acetic Acid	Milk, White egg, lime water, milk of magnesia	Milk of Magnesia – 5x200ml bottle	-
10.	Kiri Industries Limited- Unit 5	Acid & Sulphur oxides or Alkalis	Milk, lemon water or milk of magnesia can be given.	Milk of magnesia – 5X200ml bottle Methaline Blue - 05 nos	-

Appendix-G **Continue...**

VADODARA DISTRICT CRISIS GROUP **ANTIDOTE AVAILABLE WITH MAH**

Sr. No.	Name of MAH Unit	Name of Chemical	Name of Antidote	Qty of Antidote	Supplier name and Mobile No.
1	2	3	4	5	6
LCG : 2 : PADRA (Continue...)					
11.	Mayur Dychem Intermediates LTD (Unit - III)	Aniline	Methylene Blue	5	Vatva industrial Association Dispensary Ph No: 795833496
		Ethylene Oxide	4-methyl pyrazole 15mg every 12hrs.	-	-
		Methanol	Fomepizole, Folic Acid 1mg/kg every 4hrs.	-	-
		Caustic Soda	Vinegar (food grade)	-	Easily available in general stores
		Chloro Sulphonic Acid	Milk of magnesia in case of injection for the inhalation & ocular only clean water or natural saline can be used.	-	All government Hospital & clinic
		Sulphuric Acid	Treatment consists in the prompt use of magnesia, soap chalk, lime water as antidotes. After neutralization of the acid give mucilaginous drink, milk or other bland drinks.	-	All government Hospital & clinic
		Acetic Acid	Milk, White Egg, Calcium Hydroxide	-	All government Hospital & clinic
		Oleum	Magnesia, Lime water, Milk	-	All government Hospital & clinic
12.	Neogen Chemicals Limited	Snake Bite	Anti-Snake Venom	04	Dr Agarwal – M. 9824263700
		Bromide Compound	Tube :New Clobate-GM	15	
		-	Tube :Burn Heal	25	
		-	Silver sulphadizine Cream	01 (500 gm)	
13.	Prime Organic	-	-	-	-
14.	Shimmer Chemical Pvt. Ltd.	Toluene & Chlorine	-	-	-
15.	Shiva Pharmachem Ltd.	-	-	-	-

Appendix-G **Continue...**

VADODARA DISTRICT CRISIS GROUP **ANTIDOTE AVAILABLE WITH MAH**

Sr. No.	Name of MAH Unit	Name of Chemical	Name of Antidote	Qty of Antidote	Supplier name and Mobile No.
1	2	3	4	5	6
LCG : 2 : PADRA (Continue...)					
16.	Silox India Private Limited. At & Po. Ekalbara	Sulphur Dioxide (SO2)	Oxygen	3 nos Cylinder	AIMS Oxygen,Gavasad, 9925110161,9925110157
		Methanol (CH3OH)	1. Sodium Bicarbonate, 2. Diazepam	1. 5 Ampule 2. 5 Ampule	Dipesh Medical - 9427341940
		Acids	1.Aluminum Hydroxide (Antacid liquid)	14 Bottles	Dipesh Medical - 9427341940
		Alkali	Normal Saline	5 Unit	Dipesh Medical - 9427341940
		Ethylene Oxide	Diazepam	5 Ampule	Dipesh Medical – 9427341940
		Snake Bite	Anti Snake Venom	2 Vial	Dipesh Medical – 9427341940
		Dog Bite	Anti Rabies Vaccine	2 Vial	Dipesh Medical – 9427341940
		Burns	Silver Sulpha Ointment	1 Big Jar (500 gm) & 25 small tube (15gm)	Dipesh Medical – 9427341940
17.	TML Industries Ltd.- Karkhadi	Acide Choride	Dipoterine Body Spray	01 Kit	-
			Inj.Anti-Snake Venom	01	-
			Milk of Magneia	01	-
18.	Transpek Industry Limited	Acids & Alkalies	Diphoterine Body Spray	3	HSE Solutions Pvt. Ltd.
		Acids & Alkalies	Diphoterine Eye Solution	2	HSE Solutions Pvt. Ltd.
		Dog Bite	Inj. Anti-Rabies	4	Ramkrishna Paramhans Hospital, Kalali
		Any External Injury	Inj. Tetanus Toxoid	25	Ramkrishna Paramhans Hospital, Kalali
		All Acids	Milk of Magnesia (Cremaffin)	5	Ramkrishna Paramhans Hospital, Kalali
LCG : 3 : SAVLI					
1.	Anugrah In-Org (P) Limited	-	-	-	-
2.	Base Metal Chemicals	Chlorine	-	-	-
3.	Chemcon Speciality Chemicals Limited	Tie Up with Shreeji Hospital Chani, Vadodara			
4.	Gurunanak Chemical Industries	-	-	-	-

Appendix-G **Continue...**

VADODARA DISTRICT CRISIS GROUP **ANTIDOTE AVAILABLE WITH MAH**

Sr. No.	Name of MAH Unit	Name of Chemical	Name of Antidote	Qty of Antidote	Supplier name and Mobile No.
1	2	3	4	5	6
LCG : 3 : SAVLI (Continue....)					
5.	Hari Orgo Chem Pvt . Ltd. - Manjusar	Para Cumidine	Methylene Blue	02	Dr. Nilesh Bhimnatwala Nkur Clinic, Gotri, Vadodara
		Para Cumidine	Methylene Blue	02	Dr. P .C.Jain.Nan, Village-Nandesari, Vadodara.
		Para Cumidine	Methylene Blue	02	Shreeji Hospital, Gotri Road, Gotri, Vadodara.
6.	Hindustan Petroleum Corporation Ltd, Vadodara Terminal	-	-	-	-
7.	IndianOil Adani Ventures Limited, Dumad	-	Anti snake venom	02	Bharat Serums and vaccines limited, Ambarnath (E)
8.	Indo Amines Ltd	Acrylonitrile	Cyanide Kit	3	Troikaa Pharmaceuticals Ltd.
9.	Jubilant Ingrevia Limited	-	-	-	-
10.	LUBI GEL LIMITED	Isopropyle Alcohol	Fomepizole	Nil	-
11.	National Engineering Industries Ltd	Methanol	Activated charcoal tablet	01 strip	Medifresh-9825669660
12.	Nirma Limited, Alindra	Chlorine	Inj. Soda bi- carb	10	Shreeji Medical, Ahmedabad
		Snake bite	Inj. Anti snake	01	
13.	Schaeffler India Limited - Alindra	-	Anti snake venom	01	-
14.	Thermax Limited	Propane Gas	No specific antidote required		-
15.	Vadodara LPG Terminal (IOCL)	Lyophilized	Snake Venom Antiserum I. P.	01	Bharat serums and Vaccines Ltd.

Appendix-H

VADODARA DISTRICT CRISIS GROUP
EMERGENCY EQUIPMENT SUPPLIER LIST BY MAH UNITS

Sr. No.	Name of MAH Unit	Equipment	Supplier Name	Contact No	Address
1	2	3	4	5	6
LCG – 1 : Vadodara – Nandesari - PCC					
1.	Bharat Petroleum Corporation Ltd.	JCB Hydra Truck	-	-	-
2.	Chemtech Intermediates Pvt. Ltd	JCB	Chamunda Construction	7990712721	Nandesari
		Hydra	Nistha Fabrication	7621005094	Nandesari
		Truck	Shivshakti Transport	9714322578	Nandesari
3.	Chloritech Industries	JCB	Ghanshaym Padhiyar	8238087781, 7984426750	Nandesari
		Hydra		9662046752	Nandesari
		Truck	Siddhi Vinayak Transport	9723396060	Nandesari
		Truck	Hari Traders	9227140327	Nandesari
4.	Deep Darshan Chemicals LLP	JCB Hydra Truck	-	-	-
5.	Deepak Nitrite Ltd.	JCB	M/s Ratansingh Padhiyar & M/s. G.R. Padhiyar	98254 11152 97250 22207	Radhiya Pura
		Hydra	M/s Maruti Techmec	98253 06484	Vadodara
		Tractor	M/s Rahul Road Lines	92278 45775	Vadodara
6.	Dhiren Chemicals Industries	Truck	Ashok Parmar Mukesh Parmar	7359637896 9723463296	-
7.	Farmson Basic Drugs Private Limited (Unit-I)	JCB Hydra Truck	G R Padhiyar	7575889882	Near CETP Plant, GIDC Estate, Nandesari
8.	Farmson Basic Drugs Private Limited (Unit-II)	JCB Hydra Truck	G R Padhiyar	7575889882	Near CETP Plant, GIDC Estate, Nandesari
9.	GAIL (India) Ltd.	JCB Hydra Truck	Note: Company have service contract with M/s Spanways Corporation, Kalina, Santhacruz (East), MUMBAI-400098 for providing Hydra (14 Ton), JCB, Crane (25/50 ton), Tractor Trolley on one day prior information basis.		
10.	GSP Crop Science Pvt Ltd	JCB	Sai Construction Pahaladbhai	98256 69409	Krunal Charasta, Samta Vadodara
		Hydra	Trinity Construction Yogeshbhai	98255 99402	Vijay Cross road, Navrangpura, Ahmedabad
		Truck	S M Engineering Kuttibhai	90337 06820	Ranoli, Vadodara
		Tractor	Nareshbhai	99989 75506	Village: Nandesari

Appendix-H **Continue...**

VADODARA DISTRICT CRISIS GROUP **EMERGENCY EQUIPMENT SUPPLIER LIST BY MAH UNITS**

Sr. No.	Name of MAH Unit	Equipment	Supplier Name	Contact No	Address
1	2	3	4	5	6
LCG – 1 : Vadodara – Nandesari - PCC (Continue...)					
11.	Gujarat Alkalies and Chemicals Ltd.	JCB	Shah Engineering Co.	0265-2330475	204 Alkapuri Arcade R.C.Dutt Road, Alkapuri
		Hydra	Keshav Crane Hiring Co.	0265 – 244105 /2413707	Kaptan Lane, Opp. Navrang Talkies
		Truck	Arihant EngineeringWorks	0265 – 2233090/2334382	1001, GIDC Estate Ranoli
		Crane	H.R. Crane	0265 – 2451979/2446023	A/6, Gokul Park, Ambalal Cross Rasta Kareli Baug
12.	Gujarat Refinery (Indian Oil Corporation Ltd.).	Tractor	M/s Mukhtiar Singh virk	Ravi - 9427443963	Vadodara
		Hydra	M/s Mukhtiar Singh virk	Ravi - 9427443963	Vadodara
		Crane	M/s Mukhtiar Singh virk	Ravi - 9427443963	Vadodara
13.	Gujarat State Fertilizers & Chemicals Limited	JCB	-	-	--
		Hydra	-	-	-
		Crane	Dwarkesh Transport corporation	07698991000	F-1 to F-8, Pooja Estate, Sojitra Road, V. U. Nagar, Anand
14.	Hari Orgochem Pvt.Ltd.-Nandesari	JCB	Raju Gohil	9427352042	Rupapura
		Hydra	Nistha Fabrication	7627005094	Vadodara
		Truck	Hari Traders	9558458006	Nandesari
15.	INOX Air Products Pvt. Ltd.	JCB Hydra Truck	Manish Bharward	9104130605	Karjan
16.	Link Pharma Chem Ltd.	-	-	-	-
17.	Munjal Auto Industries Ltd.	JCB	Dhairya Eng	99981 5990	Vadodara
18.	Nandesari Industries Association Secondary Treatment Plant	JCB	G. R. Padhiyar	8238097781	Nandesari
		Hydra	Bharatbahi Patel	97123 66777	Nandesari
		Truck	G. R. Padhiyar	8238097781	Nandesari
19.	Narayan Organics Pvt. Ltd.-Unit-III	JCB	Shree Jiya Construction	7567740607	Nandesari
		Hydra	Shree Sai Enterprise	9925459008	Angadh
		Truck	Shree Sai Enterprise	9327596209	Angadh
20.	Oriental Aromatics Limited	JCB Hydra Truck	-	-	-

VADODARA DISTRICT CRISIS GROUP**EMERGENCY EQUIPMENT SUPPLIER LIST BY MAH UNITS**

Sr. No.	Name of MAH Unit	Equipment	Supplier Name	Contact No	Address
1	2	3	4	5	6
LCG – 1 : Vadodara – Nandesari - PCC (Continue...)					
21.	Panoli Intermediates (I) Pvt. Ltd., Plot No. 11 & 18	Hydra	Mohanbhai	9377598680	Nandesari
22.	Panoli Intermediates (India) Pvt. Ltd. (Unit –III), 156,157	Hydra	Mohanbhai	9377598680	Nandesari
23.	Panoli Intermediates (India) Pvt. Ltd. (Unit –IV)	JCB Hydra Truck	Mohanbhai	9377598680	Panoli Intermedates (I) Pvt. Ltd. Nandesari.
24.	Rasayan Enterprise	JCB	Rajal Enterprise	9426537146	Nandesari
		Hydra	Rajal Enterprise	9426537146	Nandesari
25.	Ratna Nicochem Pvt. Ltd.	JCB Hydra Truck	Not Fixed	-	-
26.	Reliance Industries Limited , Vadodara Manufacturing Division	JCB Hydra Truck	-	-	-
27.	Schaeffler India Limited Maneja	Hydra	Sai Enterprise	Rakeshbhai Patel +91 9376211981	211, SahjanandKrupa Comp. B/h. Uma Nagar Novino-Tarsali Road, Vadodara -1
28.	Silox India Private Limited- Atladra	JCB	Prashant Construction	9724837453	Koyali, Vadodara
		Hydra	Arun Vishwakarma	9879618057	Mujmahuda, Vadodara
29.	Simalin chemical Industries Pvt. Ltd	JCB	Akshar Construction	9825058862	-
		Hydra	N.J. Engineering	9825476443	-
		Tanker	Simalin Chemical	0265-2840265	-
30.	Styrenix Performance materials limited	JCB Hydra Truck	-	-	-
31.	Swati Chloride Pvt. Ltd.	JCB	Mahendrabhai	9712319699	Nandesari
		Hydra	Kiranbhai	8128200792	Nandesari
		Truck	Mahendrabhai	9712319699	Nandesari

Appendix-H **Continue...**

VADODARA DISTRICT CRISIS GROUP **EMERGENCY EQUIPMENT SUPPLIER**

Sr. No.	Name of MAH Unit	Equipment	Supplier Name	Contact No	Address
1	2	3	4	5	6
LCG: 2 : PADRA					
1.	Adar Chemicals Pvt. Limited	JCB Hydra	Amar Engineering	97257 19188	At & Po – Mahuvad - Padra Main Road – Luna.
2.	Aroma De France	JCB	Rehan Traders	9998346523	-
		Hydra	Rehan Traders	9998346523	-
		Truck	Patel Transport	9173722205	-
3.	Bodal Chemicals Ltd. (Unit-VII)	JCB Hydra	B.R Patel	7874470034	Motani khadki, At-Alarsa, Ta-Borsad, Dist- Anand
4.	Bodal Chemicals Ltd. (Unit-VIII)	JCB	Laxmansinh Fatesinh Padhiyar	9898732195	At-Ekalabara, Ta-Padra, Dist-Vadodara
		Hydra	Shree Amar Crane Hiring Co.	9909411129	At-Mahuvad, Ta-Padra, Dist-Vadodara
		Truck	Sarojben P. Patel Transport	8347873603	At-Ekalbara, Mahuvad Ta-Padra, Dist-Vadodara
5.	Greenovat Organics Pvt. Ltd	JCB Hydra Truck	-	-	-
6.	Grindly Gases & Petro . Pvt. Ltd.	JCB Hydra Truck	-	-	-
7.	Gulbrandsen Chemicals Pvt. Ltd.	Hydra	M/s. Nayan Earth Movers & Equipments	096011 37397	107-108, 1 st Floor, Bela Chambers, Opp. M.C.High School, Salatwada, Vadodara – 390 001
		Truck	Rai Road Lines	09227131536 09824601536	512, GIDC, Makarpura, Vadodara
8.	Kadillac Chemicals Pvt. Ltd.	JCB Hydra	Amar Engineering Co.	0265-2335861 /	Plot No. 58, Mahuwad, Jambusar Road, B/h. Hanuman Temple, Padra
9.	Kiri Industries Limited- Unit 3	JCB Hydra Truck	-	-	-
10.	Kiri Industries Limited- Unit 5	JCB Hydra Truck	Koshik Patel	9726171262	-
11.	Mayur Dychem Intermediates LLP (Unit – III)	JCB	Own	9825008407, 9825048585	Factory Address
		Truck	Own	9825008407, 9825048585	Factory Address

Appendix-H

Continue...

VADODARA DISTRICT CRISIS GROUP

EMERGENCY EQUIPMENT SUPPLIER

Sr. No.	Name of MAH Unit	Equipment	Supplier Name	Contact No	Address
1	2	3	4	5	6
LCG: 2 : PADRA (Continue...)					
12.	Neogen Chemicals Limited	JCB	Jai Narayan Enterprise	9925643818	At. Hathipura, Po. Piludra, Dist. Bharuch
		JCB	Jai Vihod Earth Movers	9825635966	Village – Muval, Ta. Padra, Dist. Vadodara
		Tempo	Pravin Tempo Services	9537916146	Village – Majatan, Ta. Padra, Dist. Vadodara
		Hydra	Shri Jala Crane Services	9978905868	Village – Karakhadi, Ta. Padra, Dist. Vadodara
13.	Prime Organic	JCB Hydra Truck	-	-	-
14.	Shimmer Chemical Pvt. Ltd.	JCB	Amar Engineering	9328416457	Near Hanumanji Temple, Village Mahuvad, Tal:-Padra Dist Vadodara
		Hydra	Amar Engineering	9328416457	Near Hanumanji Temple, Village Mahuvad, Tal:-Padra Dist Vadodara
		Truck	Lalji Mulji Transport Co	9898500384	Padra Jambusar Road, Dabhasa, Tal:-Padra Dist Vadodara
15.	Shiva Pharmachem Ltd.	Hydra	Shree Raj Tractor	9898032906	Padra Jambusar Road, Padra, Baroda.
		Truck	Shiva Shakti Transporter	9638413841	2, Goverdhan Complex, Khaswadi, Bahucharaji, Baroda.
16.	Silox India Private Limited - Ekalbara	JCB	Mr. Khuman Sinh Padhiyar	9879761038	Khuman Sinh, Ekalbara, Padra, Vadodara
		Hydra	Mr. Arun Vishwakarma	0265 2335861	Amar Engineering Company, Plot No.15/B, Shree Sahajanand Kutir, Laghuodhyogit Vasahat, Munjmahuda, Vadodara
		Truck	Mr. Sunilbhai Patni	9974337321	Anil Roadlines, Chokhandi, Char Rasta, Vadodara
17.	TML Industries Ltd.- Karkhadi	JCB Hydra Truck	Amar Crane Services	91- 7567300351	15-B & LguadyogikVsaht Mr. Sahajananda Saraswati cottage, Munjmahudaa, Vadodara
18.	Transpek Industry Limited	JCB	--	---	--
		Truck	--	--	--
		Kalmaar	Ravi Chawla	9619336384	17, Maruti Chambers, Kalamboli, Navi Mumbai
		Hydra	Haridas	9998474493	88, LIG Quarters, P. Nandesari. Vadodara
		Water Tanker	Mahalaxmi Roadways	9979396195	Village Ekalbara, Taluka Padra, Dist Baroda
		Water Tanker with pump	Mahalaxmi Roadways	9979396195	Village Ekalbara, Taluka Padra, Dist Baroda

Appendix-H **Continue...**

VADODARA DISTRICT CRISIS GROUP

EMERGENCY EQUIPMENT SUPPLIER

Sr. No.	Name of MAH Unit	Equipment	Supplier Name	Contact No	Address
1	2	3	4	5	6
LCG : 3: SAVLI					
1.	Anugrah In-Org Pvt. Ltd.	Jcb	Gunj Enterprise	9925640897	Manjusar
		Hydra	Gunj Enterprise	9925640897	Manjusar
		Truck	Kgn Transport	9723578686	Manjusar
2.	Base Metal Chemicals	JCB Hydra Truck	-	-	-
3.	Chemcon Speciality Chemicals Limited	Hydra	Gunj Enterprise	9925640897	Manjusar
		Truck	Khodiyar Transport	9376239628	Manjusar
		Bus	Shah Travel	9824034130, 9712133555	Vadodara
4.	Gurunanak Chemical Industries	JCB Hydra Truck	Sanjay Patel	9924683196	Village : Manjusar
5.	Hari Orgochem Pvt. Ltd. – Manjusar	Hydra	Jayshree Transport	Dipak Patel M. 9925640897	Shankar Bhai Ind. Estate, Near Maruti Tiles, At. Manjusar, Ta.Savli, Dist-Vadodara
6.	Hindustan Petroleum Corporation Limited	JCB	Kirti Engineers	9427539113	Vadodara
		Hydra	Pooja Engineers	9558109143	Vadodara
		Truck	Pooja Engineers	9558109143	Vadodara
7.	IndianOil Adani Ventures Limited, Dumad	JCB Hydra Truck	-	-	-
8.	Indo Amines Ltd	JCB Hydra Truck	M/s. Samir S.Rana	8000390754	Tundav
9.	Jubilant Ingrevia Limited	JCB Hydra Truck	Jiva Bhai	9773476516	Savli
10.	LUBI GEL LLP (Formally Name as Lubrizol Advance Material India Private Ltd.)	JCB	D N Transport	Mr. Pintu Solanki 9725407957	Manjusar, Ta: Savli, Dist: Vadodara
		Hydra	Sai Enterprise	Mr. Jayesh Patel 9974579709	Manjusar, Ta: Savli, Dist: Vadodara
		Truck	Sadguru Transport	Mr. Rakesh Patel 9825845743	Manjusar, Ta: Savli, Dist: Vadodara
11.	National Engineering Industries Ltd	JCB Hydra Truck	Suresh Panchal	8347482455	GF-34, Prestige Complex, Manjusar G.I.D.C Savli, Vadodara 391775
12.	Nirma Limited, Alindra	JCB Hydra Truck	As and when required	-	Savali, Vadodara

Appendix-H
Continue...

VADODARA DISTRICT CRISIS GROUP
EMERGENCY EQUIPMENT SUPPLIER

Sr. No.	Name of MAH Unit	Equipment	Supplier Name	Contact No	Address
1	2	3	4	5	6
LCG : 3: SAVLI (Continue...)					
13.	Schaeffler India Limited-Alindra	JCB Hydra	S.R Construction	9408486718	-
14.	Thermax Limited	JCB	-	-	-
		Hydra	Sai Enterprises	9723938682	Tarsali, Vadodara
		Truck	-	-	-
15.	Vadodara LPG Terminal (IOCL)	JCB Hydra Truck	Maruti Engineering	9265031172	Jalaram Society, Asoj, Vadodara-391745

Appendix-I

VADODARA DISTRICT CRISIS GROUP
POPULATION DETAILS SORROUNDING MAH UNITS

Sr. No.	Name of MAH Unit	Telephone No	Name of nearby Village	Population
1	2	3	4	5
LCG – 1 : Vadodara – Nandesari - PCC				
1.	Bharat Petroleum Corporation Limited, Koyali Installation	6358751402	Karachiya	4000
2.	Chemtech Intermediates Pvt. Ltd	9925459008	Nandesari / Damapura	15000
3.	Chloritech Industries	0265-2841454, 2840367, 2840003, 7227049703	Radhiyapura Damapura Rupapura	1500 Approx 2500 Approx 3500 Approx
4.	DEEP Darshan Chemicals LLP	9974747471, 9904222456		
5.	Deepak Nitrite Ltd.	0265-2840639, 2840104		
6.	Dhiren Chemical Industries	9427320533	Nandesari	-
7.	Farmson Basic Drugs Pvt Ltd (Unit- I)	0265-2840082	Nandesari	3679
8.	Farmson Basic Drugs Private Limited (Unit-II)	0265-2840082	Radhiyapura	1300
9.	GAIL (India) Ltd.	02668-267442	Someshwarpure & Narmada Vasahat VAGHODIA Dattapur Kamalapura Limda Madodhar Vejalpur Khanda Tavara	134 17184 30 310 2620 4634 189 3200 3160
10.	GSP Crop Science Pvt Ltd	0265-2841517	Nandesari & Rupapura	8000
11.	Gujarat Alkalies and Chemicals Limited	TEL No. :(0265) 6111000, 7119000	Karachiya Bajwa Nandesari Padamla Dhanora Ranoli	7000 15000 15000 9000 4106 15000
12.	Gujarat Refinery (Indian Oil Corporation Ltd.)	0265-2237160	Koyali Koyli (OG) WARD NO.- 0022 (Rural MDDS CODE:519920) Karachiya Karachiya (CT) Bajwa (CT) Undera (CT) Karodiya (OG) WARD NO.- 0014 (Rural MDDS CODE:519913)	55,000
13.	Gujarat State Fertilizers & Chemicals Limited	(0265) 2242451, 2242651, 2242751, 2242641	Bajwa, Dashrath, Karachiya, Chhani	-

Appendix-I
Continue...

VADODARA DISTRICT CRISIS GROUP
POPULATION DETAILS SURROUNDING MAH UNITS

Sr. No.	Name of MAH Unit	Telephone No	Name of nearby Village	Population
1	2	3	4	5
LCG – 1 : Vadodara – Nandesari - PCC (Continue...)				
14.	Hari Orgochem Pvt. Ltd. -Nandesari	7227049713	Radhiyapura Damapura Rupapura	1500 Approx 2500 Approx 3500 Approx
15.	INOX Air Products Pvt. Ltd.	02666-235800	Juni Jithardi	1800
16.	Link Pharma Chem Ltd.	0256-3065000	Nandesari	8000
17.	Munjali Auto Industries Ltd.	99250 28593	Waghodia	13480
18.	Nandesari Industries Association Secondary Treatment Plant	0265-280321 / 2841016 / 2840078 /2840077	Nandesari	8000
19.	Narayan Organics Pvt. Ltd. Unit-III	0265-2991477	Nandesari	9000
20.	Oriental Aromatics Limited	0265-2840220	Nandesari	7,000
21.	Panoli Intermediates (I) Pvt. Ltd., Plot No. 11 & 18	9687772335 (Unit Head), 7383997685 (Safety Mgr)	Ranoli	15000
22.	Panoli Intermediates (India) Pvt. Ltd. (Unit-III), 156,157	(0265) 2397013, 2396751 (O)	Nandesari	8000
23.	Panoli Intermediates (I) Pvt. Ltd. (Unit – IV)	(0265) 2397013, 2396751 (O)	Nandesari	8000
24.	Rasayan Enterprise	0265-2963305 /2840813	Nandesari	8000
25.	Ratna Nicochem Pvt. Ltd.	0265-2840519	Nandesari	8000
26.	Reliance Industries Limited , Vadodara Manufacturing Division	0265-6696000 0265-6696151	Anagadh Dhanora Dasharath Koyli Nandesari Ranoli Karachiya Bajwa Undera Damapura	14780 4006 11438 10691 8290 15000 7103 9611 16902 2000
27.	Schaeffler India Limited - Maneja	0265-6602222	Maneja	15000 Appro.
28.	Silox India Private Limited	0265-2680401-5	Kalali	1500
29.	Simalin Chemical Industries Pvt. Ltd.	0265-2840265, 2840266	Nandesari	8000
30.	Styrenix Performance Materials limited	0265 2301100	Nandesari	8000
31.	Swati Chlorides Pvt. Ltd.	0265-2840843	Nandesari	8000

Appendix-I
Continue...

VADODARA DISTRICT CRISIS GROUP

POPULATION DETAILS SURROUNDING MAH UNITS

Sr. No.	Name of MAH Unit	Telephone No	Name of nearby Village	Population
1	2	3	4	5
LCG - PADRA				
1.	Adar Chemicals Pvt. Limited	02262-244207	Luna	2000
2.	Aroma De France	9662529776	Ranu, Ta.Padra, Vadodara	6092
3.	Bodal Chemicals Ltd. (Unit - VII)	9909950852 /53 / 54 /9 9	Dudhwada	1,854
4.	Bodal Chemicals Ltd. (Unit - VIII)	9909950847	Ekalbara	4435
5.	Greenovat Organics Pvt. Ltd	(02662) 244194, 244455	Ekalbara	3500
6.	Grindly Gases & Petro . Pvt. Ltd.	02662-242202	Mobha	
7.	Gulbrandsen Chemicals Pvt. Ltd.	02662-229100	Mujpur Mahuvad Ekalbara Gambhira	9410 2564 4435 9500
8.	Kadillac Chemicals Pvt. Ltd.	(02662) 273376, 273286	Chokari Karkhadi Majatan	-
9.	Kiri Industries Limited- Unit 3	91-2662-273444	Dudhawada	2100
10.	Kiri Industries Limited- Unit 5	91-2662-273724 and 273725	Dudhawada	2100
11.	Mayur Dyechem Intermediates LTD (Unit - III)	9825008407, 9825048585	Dudhwada	2100
12.	Neogen Chemicals Limited	02662 273329, 9727699911, 9727699922	Karakhadi	6000
13.	Prime Organic	-	Luna	2000
14.	Shimmer Chemicals Pvt. Ltd.	02662-244325	Mujpur	12000
15.	Shiva Pharmachem Ltd.	(02662) 221021	Luna	2739
			Jaspur	7658
			Dajipura	750
16.	Silox India Private Limited - Ekalbara	6359914912, 9909924311/813/313	Ekalbara	6000
17.	TML Industries Ltd -Karkhadi	02662-273563	Chokari - Fatepura	2000
			Karakhadi	5500
18.	Transpek Industry Limited	912662-244444 ,244289, 244309, 244318	Ekalbara	5250
			Umaraya	5000
			Mujpur	12500
			Mahuvad	5000
			Dabhasa	8000
			Luna	4500

VADODARA DISTRICT CRISIS GROUP**POPULATION DETAILS SURROUNDING MAH UNITS**

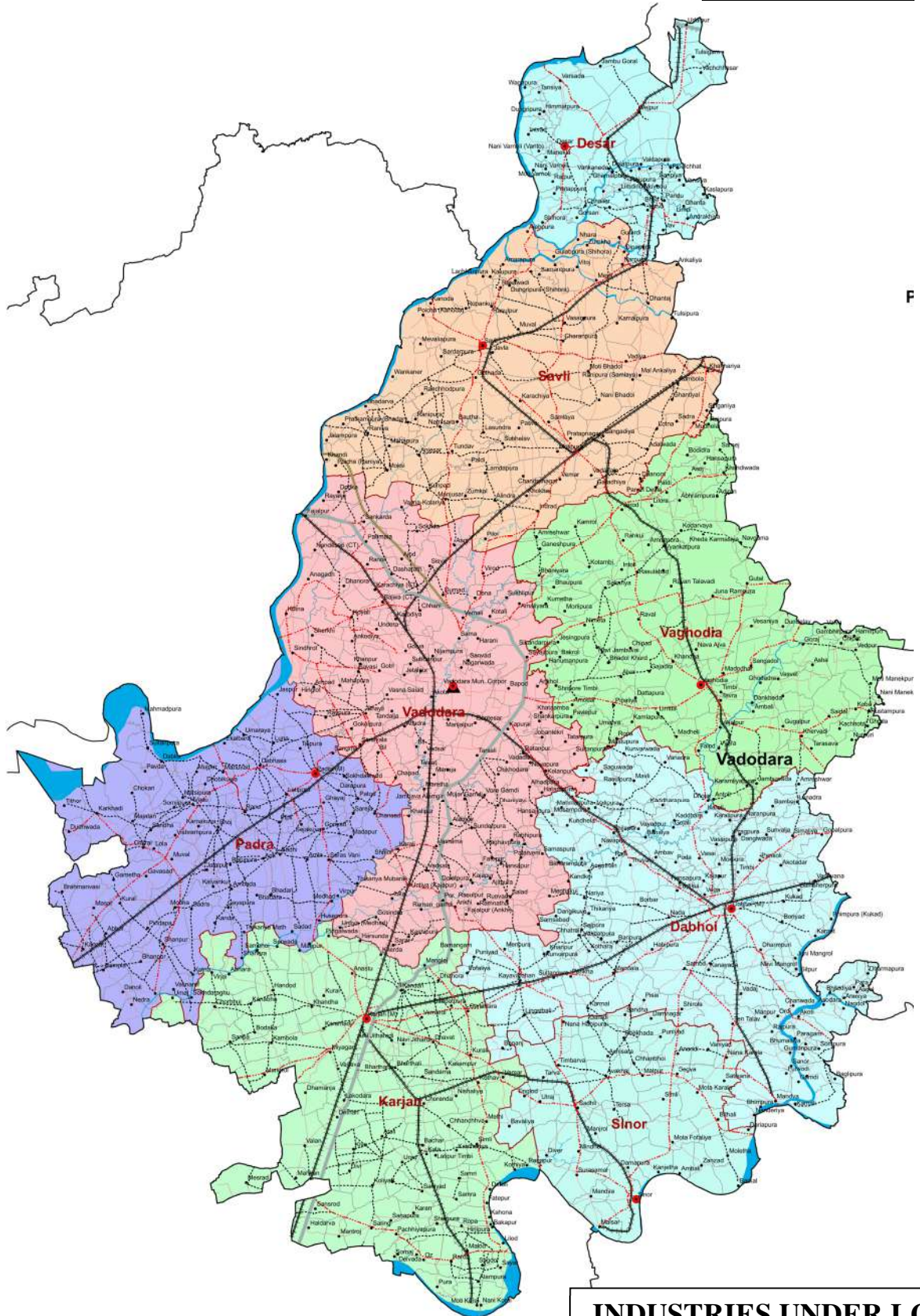
Sr. No.	Name of MAH Unit	Telephone No	Name of nearby Village	Population
1	2	3	4	5
LCG - SAVLI				
1.	Anugrah In- Org (P) Ltd.	0265 – 2773675 / 2762272	-	-
2.	Base Metal Chemicals	9978905311	There is no population except surrounding industries	-
3.	Chemcon Speciality Chemicals Limited	02676-290128	Kunpad Manjuser	Approx – 3000-4000 5000-7000
4.	Gururanak Chemicals	9427784232	Lamdapura	1000
5.	Hari Orgochem Pvt. Ltd. - Manjuser	-	Manjuser	Yes
6.	Hindustan Petroleum Corporation Ltd, Vadodara Terminal	-	Asoj, Pilol	7642
7.	IndianOil Adani Ventures Limited, Dumad	-	Dumad / Asoj	9500
8.	Indo Amines Ltd	7574863071	Tundav	8,000
9.	Jubilant Ingrevia Limited	02677-268302	Karachiya	7732
10.	LUBI GEL LIMITED	02667-299053 / 93	Manjuser	5000 (Approx)
11.	National Engineering Industries Limited	2667-266200	Alindra Lamdapura	622 880
12.	Nirma Limited, Alindra	02667-269100-104 Ext. 131	Alindra Chandranagar Lamdapura Khokhar	780 317 837 1082
13.	Schaeffler India Limited-Alindra	(912667) 663131	Manjuser Alindra	-
14.	Thermax Limited	02667-266535	Manjuser	10,000
15.	Vadodara LPG Terminal (IOCL)	70690 40804	Dumad Asoj	8000 (Approx.) 8000 (Approx.)

VADODARA DISTRICT OFF - SITE EMERGENCY PLAN 2025

ANNEXURE SECTION

Prepared by
**VADODARA DISTRICT CRISIS GROUP
VADODARA
2025**

Vadodara District Industrial Area **ANNEXURE – 1**



INDUSTRIES UNDER LCG

LCG-1 : Vadodara – Nandesari - PCC	34
LCG-2 : Padra	18
LCG-3 : Savli	15

VADODARA DISTRICT CRISIS GROUP
OFF-SITE
EMERGENCY PLAN

VADODARA DISTRICT CRISIS GROUP
EMERGENCY TELEPHONE NUMBERS

Sr. No.	Designation / Post	Telephone - Office
A.	CONTROL ROOMS	
1.	District Emergency Response Center, Vadodara	+91 265 1077
2.	Off Site Industrial Emergency Control Room, Petrochemicals, Vadodara	0265 - 2232327, 2230556, 2616230
3.	Central Fire Station, VMSS	101, 2413635, 2413753
4.	Police Control Room	100, 0265-2414300, 2415111, 2435000
5.	Railway Control Room & Help line (Hospital)	0265 - 2641385
6.	Emergency Ambulance Cell	108
7.	Department of Emergency Medicine - SSG Hospital	0265 - 2424848
8.	Commissioner of Rescue & Relief	+91 265 1070
B.	COLLECTORALAY – VADODARA:	
1.	Collector & District Magistrate	0265 - 2433000, M. 9978406224
2.	Resident Additional Collector	0265 2419700, M. 99784 05196
3.	District Supply Officer	0265- 2418900
4.	SDM (City)	0265-2434402
5.	SDM (Rural)	0265-2427325
6.	SDM – Savli	02667-223132
7.	SDM – Karjan	02666-233168
8.	SDM – Dabhoi	02663-254777
9.	Mamlatdar, Disaster Cell	0265-2427592
C	POLICE	
1.	Office Police Commissioner, Jail Road, Vadodara	0265 - 2431515, 2431414
2.	Police Commissioner, Vadodara.	0265 - 2431414, 2431515, Dr. Shamshersinh, M. 9978406273
3.	Superintendent of Police, (Rural), Vadodara	2412255, M. 99784 06094 (Mr. Rohan Anand)
4.	District Commandant – Home Guards	0265 - 2433400
5.	Police Station – Makarpura.	0265 - 2651915
6.	Police Station, Chhani.	0265 - 2773394
7.	Police Station – Jawahar Nagar.	0265 - 2232382

ANNEXURE –2

Continue...

VADODARA DISTRICT CRISIS GROUP
EMERGENCY TELEPHONE NUMBERS

Sr. No.	Name of Agencies	Telephone – Office
D.	FIRE	
1.	Chief Officer (Fire & Emergency Services), VMSS	0265 - 2413635, 2413753
2.	Central Fire Station	0265-2413635
3.	Fire Station, GIDC Makarpura.	0265-2631444
4.	Vadiwadi, Fire Station.	0265-2343545
5.	Panigate, Fire Station.	0265-2513014
6.	Gajarawadi, Fire Station	0265-2580908
7.	Main Flood Control Centre	0265-2413439, 2413639
8.	Fire Station, Mahuvad	9879833707
9.	Fire Station, Savli GIDC Industrial Estate, Manjuar	02667-264466, 9427304059
E	VADODARA MAHANAGAR SEVA SADAN	
1.	Municipal Commissioner, Vadodara	0265 – 2433344, M : 99784 08744
2.	Dy. Municipal Commissioner (Admn.)	0265 – 2433233, M : 99099 19529
3.	City Engineer, VMSS	0265 – 2433399, M : 98258 01934
F.	MEDICAL	
1.	Medical Supdt, S S G - Hospital, Vadadara	0265–2459614
2.	Civil Surgeon, Jamnabai Hospital, Mandvi	0265-2518134
3.	Narhari Amin Arogya Kendra	0265-2794413-14, 2783732
4.	Bhailal Amin General Hospital- Gorwa	0265 - 2282255 2280300, 2281301
5.	Yogini Vasantidevi Arogya Mandir, Pratapnagar	0265 - 2433300
6.	Railway Hospital, Pratapnagar	0265 – 2641385
7.	ESI General Hospital, Gotri	0265 - 2336422-23, 2336421
8.	Deepak Medical Foundation, Nandesari	0265-2840423, 2841455
9.	Ramkrishna Paramhansa Hospital , C/o Shroff Foundation, Kalali	9737708333, 7201000290
10.	Baroda Heart Institute & Research Centre, Vadodara	0265 – 2322021
11.	Sterling Hospital, Race Course	0265 - 2354488, 2354455-66
12.	Jalaram Hospital, Varsia	0265 - 2565867, 2564785
13.	Pramukhswami Hospital, Atladara	0265 – 2681144
G.	PANCHAYAT	
1.	Jilla Panchayat Office, Rajmahel Road, Vadodara	0265 - 2433875, 2431595, 2431029, 2431046
2.	DDO (District Development Officer), Vadodara	0265 - 2432027
3.	Dy. DDO Panchayat	0265 - 2431037
4.	Exe. Engineer, Building Division (Panchayat)	0265 - 2432643, 2431827, 2411582
5.	Chief District Officer (DHO)	0265-2432383
6.	Exe. Engineer, (Irrigation)	0265-2431075
7.	TDO (Taluka Development Officer), Taluka Panchayat	0265-2560427

ANNEXURE –2

Continue...

VADODARA DISTRICT CRISIS GROUP
EMERGENCY TELEPHONE NUMBERS

Sr. No.	Designation / Post	Telephone Number
H.	STATE GOVERNMENT OFFICES	
1.	Joint Director, Industrial Safety and Health, Vadodara	0265 - 2434464, 2432543
2.	Dy. Director, Industrial Safety and Health, Vadodara	0265 - 2434464, 2432543
3.	Director, Industrial Safety and Health, Gujarat State, Ahmedabad	079- 25502349, 25502357
4.	Regional Officer, GPCB, Vadodara	0265-2354850, 2331928
5.	Joint Director of Information, Raopura	0265-2423358, 2458760
6.	Executive Engineer, (R & B), Vadodara (City)	0265 655 4302
7.	Executive Engineer, (R & B), (District)	062821 04099
8.	Dy. Commissioner of Labour, Vadodara	0265-2424185 / 2437092
9.	Boiler Inspector,	0265-2435115
10.	Supdt. Engineer, MGVCL (O&M Circle Vadodara)	0265-2355520
11.	Executive Engineer, MGVCL O&M Circle, Vadodara	9925208113
12.	Executive Engineer, MGVCL, Vadodara City	9925208255
13.	DGM (Admn.) BSNL, Vadodara Telecom, Karelbaug	0265-2467000
14.	Divisional Controller, GSRTC, Vadodara	91-6359919030
15.	RTO Officer, Darjipura, Vadodara	0265-2540016
16.	Jt. Director, Agriculture, Vadodara	0265-2458760
17.	ESIC Office	0265-2324442-43
18.	Asstt. Director, Fisheries	0265-2429888
19.	General Manager, District Industries Centre	0265-2420391 / 2433817
I.	Central Government	
1.	Labour Enforcement Officer	0265 - 2433894
2.	Deputy Chief Controller of Explosive	0265-2225159, 2361035
3.	Exe. Engineer Central Public Work	0265-2784941
4.	DRM – Western Railway	0265-2641414, 97240 91000

ANNEXURE –2*Continue...*

VADODARA DISTRICT CRISIS GROUP
EMERGENCY TELEPHONE NUMBERS

Sr. No.	Designation / Post	Telephone Number
K.	Nagar Seva Sadan	
1.	Chief Officer – Nagar Seva Sadan, Padra	02662-222590, 222337
2.	Chief Officer – Nagar Seva Sadan Savli	02667-222353
3.	Chief Officer – Nagar Seva Sadan, Karjan	02666-232012
4.	Chief Officer – Nagar Seva Sadan, Dabhoi	02663-257342, 257033
L.	Taluka Panchayat	
1.	Taluka Development Officer – Taluka Panchayat Office, Rajmahel Road, Vadodara	0265-2417559, 2417556
2.	Taluka Development Officer – Padra	02662-222536, 224525
3.	Taluka Development Officer - Waghodia	02668-262227
4.	Taluka Development Officer - Karjan	02666-231288, 232038 M.9265201456
5.	Taluka Development Officer - Dabhoi	02663-256293
J.	News Media	
1.	Akashwani, Vadodara	0265 – 2643876, 2643796-97
2.	Gujarat Samachar, Vadodara	0265 - 2464848, 2462324, 2462425
3.	Sandesh	0265 - 2464749-50
4.	Loksatta	0265-2787181
5.	Indian Express	0265 235 2851-52-53
6.	Divya Bhaskar	0265 - 3988885
7.	Gujarat Mitra	0265 - 2464702, 2462584
8.	Times of India	0265-6194431
K.	TV Media	
1	Sandesh News Channel	M : 85111 69626
2	GSTV	M : 98250 94654
3	Zee 24 Hours	M : 98985 64950
4	ABP-Asmita	M : 99250 17029
5	India TV	M : 98252 09565
L.	WEATHER & FLOOD CONTROL	
1	Weather Information	0265 - 2482228

ANNEXURE -3

VADODARA DISTRICT CRISIS GROUP
COMPOSITION OF VADODARA DISTRICT CRISIS GROUP

Sr. No.	Designation	Position in DCG	Address Office	Telephone Numbers	
				Office	Residence/ Mobile
1.	District Collector	Chair Person	Collector Office, Nr. Vaccine Institute, Diwalipura, Padra Road, Vadodara	0265-2433000	M. 99784 06224
2.	Dy. Director, Industrial Safety & Health	Member Secretary	Jt. Director, Industrial Safety & Health, 7th Floor, I Block, Kuber Bhavan, Vadodara.	2432543, 2434464	M. 9998034709
3.	Police Commissioner	Member	Police Commissioner, Police Bhavan, Jail Road, Vadodara.	2431414, 2431515	M. 9978406273
4.	Superintendent of Police	Member	Superintendent of Police (Rural), Kothi, Vadodara.	2412255	2412975 M. 9978406094
5.	Medical Superintendent	Member	S.S.G. Hospital, Jail Road, Vadodara	2424848, 2422406	M: 9427322493
6.	Municipal Commissioner	Member	Vadodara Mahanagar Seva Sadan, Khanderao Market, Vadodara.	0265-2433344	M. 99784 08744
7.	Deputy Director of Information	Member	District Information Office, Kothi, Vadodara.	2458761 2458760 2423358	M: 9879961441
8.	Regional Transport Officer	Member	Regional Transport Office, N. H. No. 8, Golden Chowkdi, Darjipura, Vadodara.	2540016 2540026	M.7567029299
9.	Chief District Health Officer	Member	District Development Office, Rajmahel Road, Vadodara.	2432383	M. 8980039101, 8980039103
10.	Executive Engineer (R&B) (City)	Member	The Executive Engineer (R&B), West Wing, Kothi, Vadodara.	2439100/200	M.9879275036
11.	Jt. Director of Agriculture	Member	Jt. Director Agriculture Office, Kothi, Vadodara.	2429496	M. 9825206598
12.	Jt. Chief Controller of Explosives	Member	8th Floor, Yash Kamal Building, Sayajigunj, Vadodara	2421299 2420512	2343078
13.	Regional Officer GPCB	Member	Gujarat Pollution Control Board, GERI Compound, Race Course, Vadodara.	2331928, 2354850	M.9825306713
14.	Supdt. Engineer, MGVCL (O&M), Vadodara	Member	MGVCL, Gotri Road, Vadodara.	2436121	M.9925208622
15.	Chief Officer (F&E) VMSS	Member	Fire Station VMSS, Dandia Bazar	2420881 2413754 2631444	M: 9879615036
16.	Chief Civil Defense	Member	Chief Civil Defense, Kothi, Vadodara.	2431410 2434092	M. 9825274407

ANNEXURE –3*Continue...*

VADODARA DISTRICT CRISIS GROUP
COMPOSITION OF VADODARA DISTRICT CRISIS GROUP

Sr. No.	Designation	Position in DCG	Address Office	Telephone Numbers	
				Office	Residence/ Mobile
17.	Secretary, Majoor Mahajan Mandal	Member	Majoor Mahajan Mandal, Raopura, Vadodara.	0265-2425841	M: 9426066750
18.	Chairman, Local Crisis Group-1, 2, 3	Member	Subdivisional magistrate SDM Office 6TH Floor, 'C' Block, Narmada Bhavan, Vadodara	0265-2424402 Fax. 2417286	(0265) 2427592 M: 9978405226
19.	Civil Surgeon	Member	Jamnabai Hospital, Mandvi, Vadodara	0265-2517400,2518134	M. 82380 12033
20.	Mamlatdar, Disaster Management	Member	Disaster Management Branch, Emergency Operation Centre, Collector Office, Kothi, Vadodara	0265-2427592	M. 9998816905, M. 98792 44992
21.	Member Secretary of OIECR	Member	Off Site Industrial Control Room, Material Bhavan (RILVMD), Petrochemicals	0265-2232327, 2230556, 2616230	M. 99989 53963
Technical Expert					
1.	Shri. Mr. Jay Shah Head operations Shri. Ramesh Solanki, Head HSEF	Member	RIL, Petrochemicals, Vadodara.	0265-3107830	M. 7574822348 M. 9998954068
2.	Shri. Mr. Prabhakar Kumar, DGM (F&S)	Member	Gujarat Refinery, IOCL, P.O. Jawaharnagar, Dist.Vadodara.	0265-2237441, 2238441	M. 7573019360
3.	Shri. V. S. Bhatt VP (P-A-IV & Methanol, SA-III & IV), S & FS Shri. V. B. Mishra VP (Safety & Fire Services)	Member	Gujarat State Fertilizers & Chemicals, Fertilizernagar, Dist.Vadodara	0265-3093123 0265-3092258	M. 9909965858 M. 9979853450
4.	Dr. Navin Kishor Barthwal, Unit Head Mr. A.K.Singh, Head (Maintenance)	Member	Nirma Ltd., Alindra, Tal. Savli Dist. Vadodara	02667-269100 - 104	M. 9879618697 M. 9879618693
5	Mr. N R Bhargava, AGM (ES, TS, S&E, F& Security, ESG, Factory Manager, Expert Mr. Amit Patel, DGM (O), Expert	Member	GACL, Petrochemicals, Dist. Vadodara	0265 – 6111000, 7119000	M. 9909029496 M. 8980037736

VADODARA DISTRICT CRISIS GROUP
SALIENT PROPERTIES OF CERTAIN HAZARDOUS CHEMICALS

Sr. no.	Name of Chemicals	State	Colour	Odour	Sp. Gravity	Vapour Density	Melting Point °C	Boiling Point °C	Flash Point °C	Explosive limit		TLV ppm	Solubility in Water	Hazchem	NFPA Code			Hazards
										LEL	UEL							
										%	%				H	F	R	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	16	18	19
1.	Acetic Acid	Liquid	Colourless	Pungent Odour	1.05	2.07	16.7 °C	118.1	44.44	5.4	16	10	Miscible	2 Y E	2	2	1	Combustible & Corrosive
2.	Acrylonitrile	Liquid	Clear Colourless liquid	Pungent	0.807	1.83	-83.6	77.3	0.55	3.1	17	2	Slightly Soluble	3 W E	4	3	2	Flamable & Toxic
3.	Acetone	Liquid	Colourless	Fragrant Mint	0.791	2	-94.7	56.48	-20	2.6	12.8	500	Miscible	2YE	1	3	0	Flammable & Toxic
4.	Ammonia	Liquified Compr. Gas	Colourless	Strong Pungent	0.771	0.6	-77.77	-33.4	-	16	25	25	Very Soluble	2 P E	3	1	0	Toxic & Explosive
5.	Aniline	Liquid	Colourless	Amine Odour	1.02	3.22	-6.2	184.4	75.55	1.3	-	2	Soluble	3 X	2	2	0	Combustible & Toxic
6.	Benzene	Liquid	Colourless	Aromatic Odour	0.879	2.77	5.51	80.09	11.1	1.4	8	10	Not Soluble	3 W E	1	3	0	Flammable & Carcinogen
7.	Bromine	Rhombic Crystal or Heavy red-brown fuming liquid	Dark reddish-brown fuming liquid	Pungent Odour	3.119	5.51	-7.27	58.73	Not Pertinent	Not Pertinent	Not Pertinent	0.1	Slightly Soluble	-	3	0	0	Toxic & Corrosive
8.	Carbon Tetrachloride	Liquid	Colourless, Watery	Sweet	1.59	5.3	-22.6	76.8	-	-	-	5	Not Soluble	2 Z	3	0	0	Flammable
9.	Chlorine	Liquified Compr. Gas	Greenish Yellow	Irritating, Bleach like Choking	1.47	2.49	-101	-34	-	-	-	1	Slight Soluble	2 X E	4	0	0	Toxic
10.	Ethylene Oxide	Liquified Gas	Colourless	Sweet	0.87	1.52	-111.3	10.7	-20	3	100	1	Soluble	2 P E	3	4	3	Flammable, Combustible & Explosive
11.	Ethyl alcohol (Ethanol)	Liquid	Colourless	Alcohol Odour	0.7893	1.59	-	78.32	17.77	3	19	1000	Soluble	2 S * E	0	3	0	Fire
12.	Ethylene Dichloride	Liquid	Colourless	Pleasant Sweet	1.26	3.35	-35.7	83.5	15.5	6.2	15.9	10	Not Soluble	2 Y E	2	3	0	Corrosive & Flammable

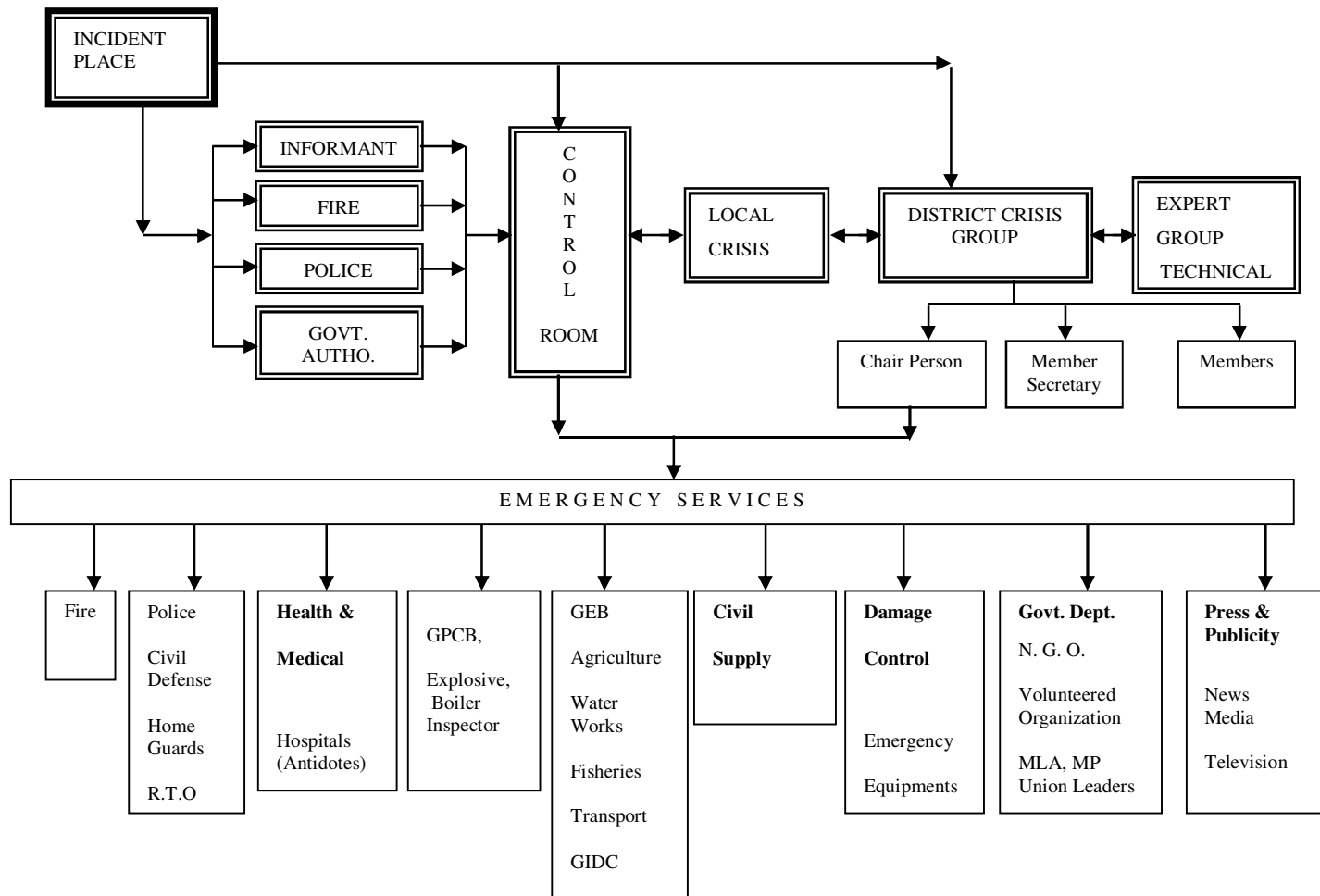
VADODARA DISTRICT CRISIS GROUP
SALIENT PROPERTIES OF CERTAIN HAZARDOUS CHEMICALS

Sr. no.	Name of Chemicals	State	Colour	Odour	Sp. Gravity	Vapour Density	Melting Point °C	Boiling Point °C	Flash Point °C	Explosive limit		TLV ppm	Solubility in Water	Hazchem	NFPA Code			Hazards
										LEL	UEL							
										%	%				H	F	R	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17	16	18	19
13.	Isopropyl Alcohol	Liquid	Colourless	Unpleasant Alcohol Odour	0.785	2.07	-88.5 to -89.5	82.3	18.5	2.5	12.5	400	Miscible	2 S * E	1	3	0	Flammable & Combustible
14.	Liquified Petroleum Gas (LPG)	Gas	Colourless	Mercaptan added for Odour Warning	0.51-0.58	1.5	-	> - 40	104.4,-60	1.9	9.5	1000	Floats	2 W E	1	4	0	Flammable & Explosive
15.	Methanol (Methyl Alcohol)	Liquid	Colourless, watery.	Alcoholic Odour	0.79	1.1	-97.8	64.5	16.1	6	36.5	200	Soluble	2 PE	1	3	0	Flammable & Poison
16.	Oleum	Hygroscopic Viscous Solution	Colourless to cloudy	Sharp Choking Odour	1.9-1.97	3.39	-	Decomposes	-	-	-	1	Highly Reactive	4 W E	3	0	2	Corrosive & Oxidiser
17.	Sulphuric Acid (H2SO4)	Liquid	Colourless, Oily	Odourless	1.84	-	10.49	290	-	-	-	1 mg/m3	Miscible	2 P	3	0	2	Corrosive & Oxidiser
18.	Sulphur Dioxide (SO2)	Liq./Liqfd. Comp. Gas	Colourless	Sharp Pungent Odour	1.45	2.264	-75.5	-10	-	-	-	2	Sinks & Boils	2 R E	3	0	0	Toxic
19.	Thionyl Chloride	Liquid Fuming	Colourless to Yellow	Suffocating	1.64	-	-105	78.8	-	-	-	1	Hydrolyses	4 W E	-	-	-	Corrosive
20.	Toluene	Liquid	Colourless	Pleasant	0.817	3.14	-95 to -94.5	110.4	12.7	1.2	7	100	Slightly soluble	3 Y* E	2	3	0	Flammable, Toxic

VADODARA DISTRICT CRISIS GROUP

COMMAND & CONTROL CHART

COLLECTORATE



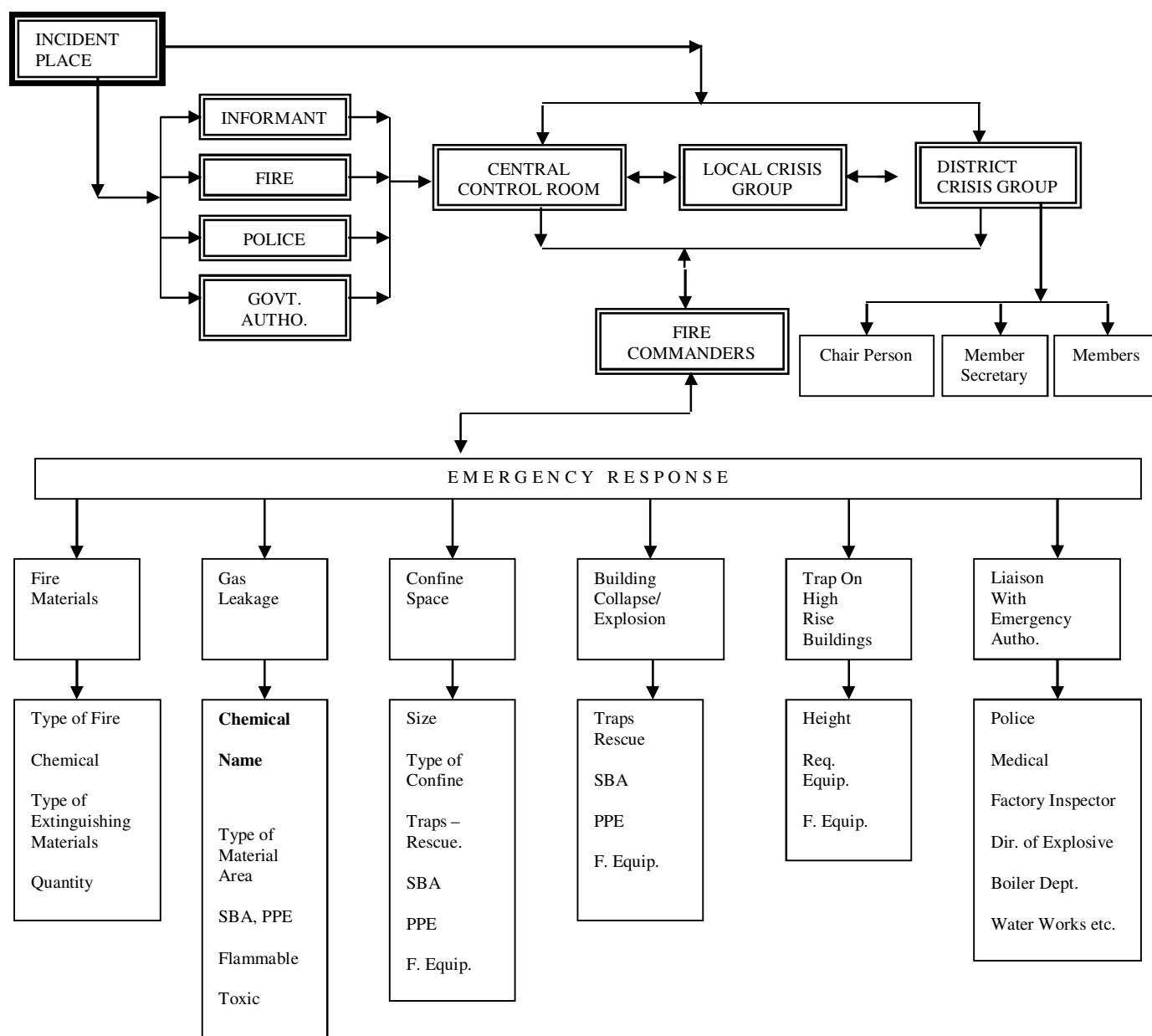
OFF-SITE EMERGENCY PLAN

VADODARA DISTRICT CRISIS GROUP

ANNEXURE –6

VADODARA DISTRICT CRISIS GROUP

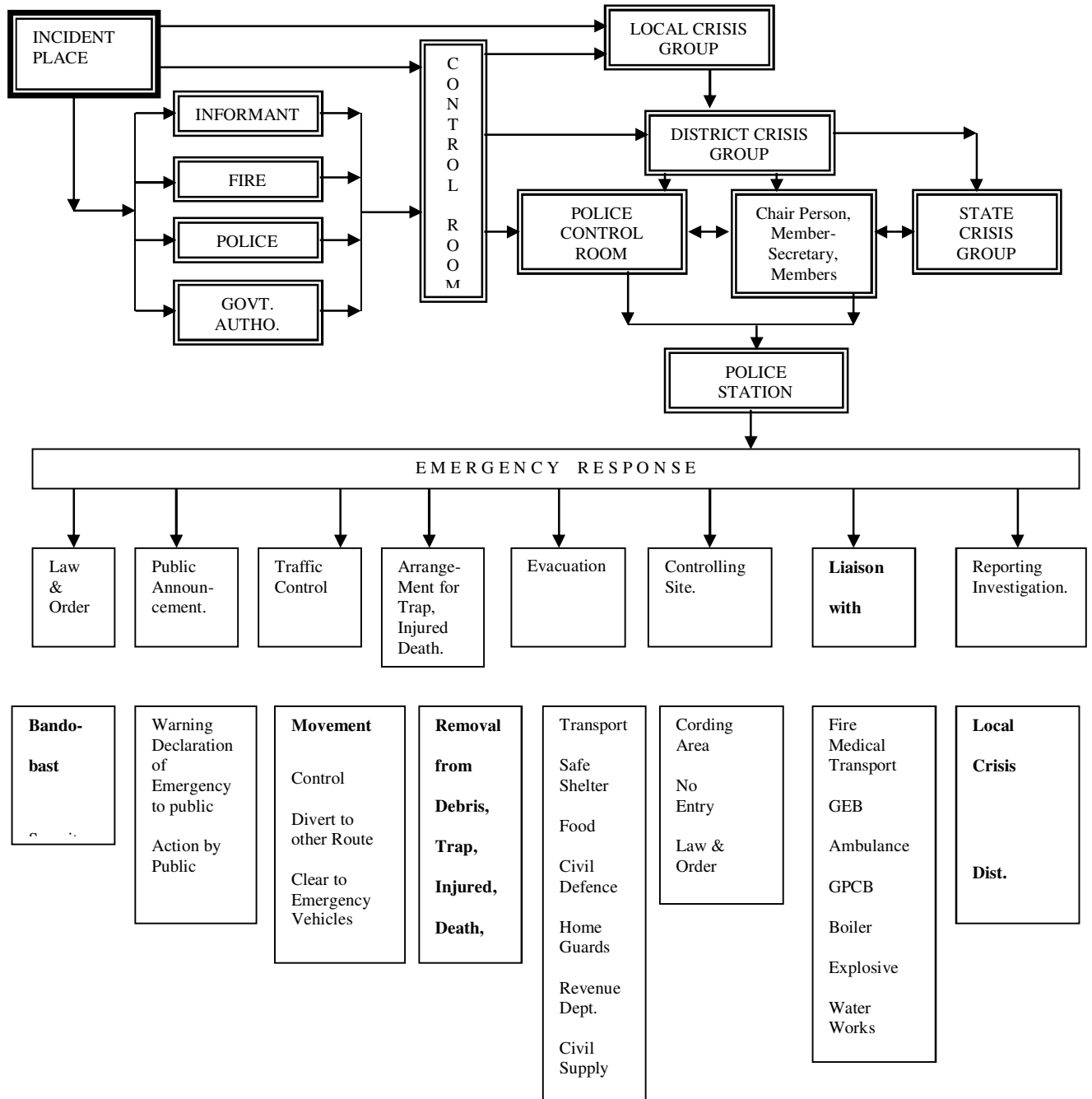
CHART FOR
FIRE - SERVICES - (RESPONSE)



OFF-SITE EMERGENCY PLAN
VADODARA DISTRICT CRISIS GROUP

VADODARA DISTRICT CRISIS GROUP

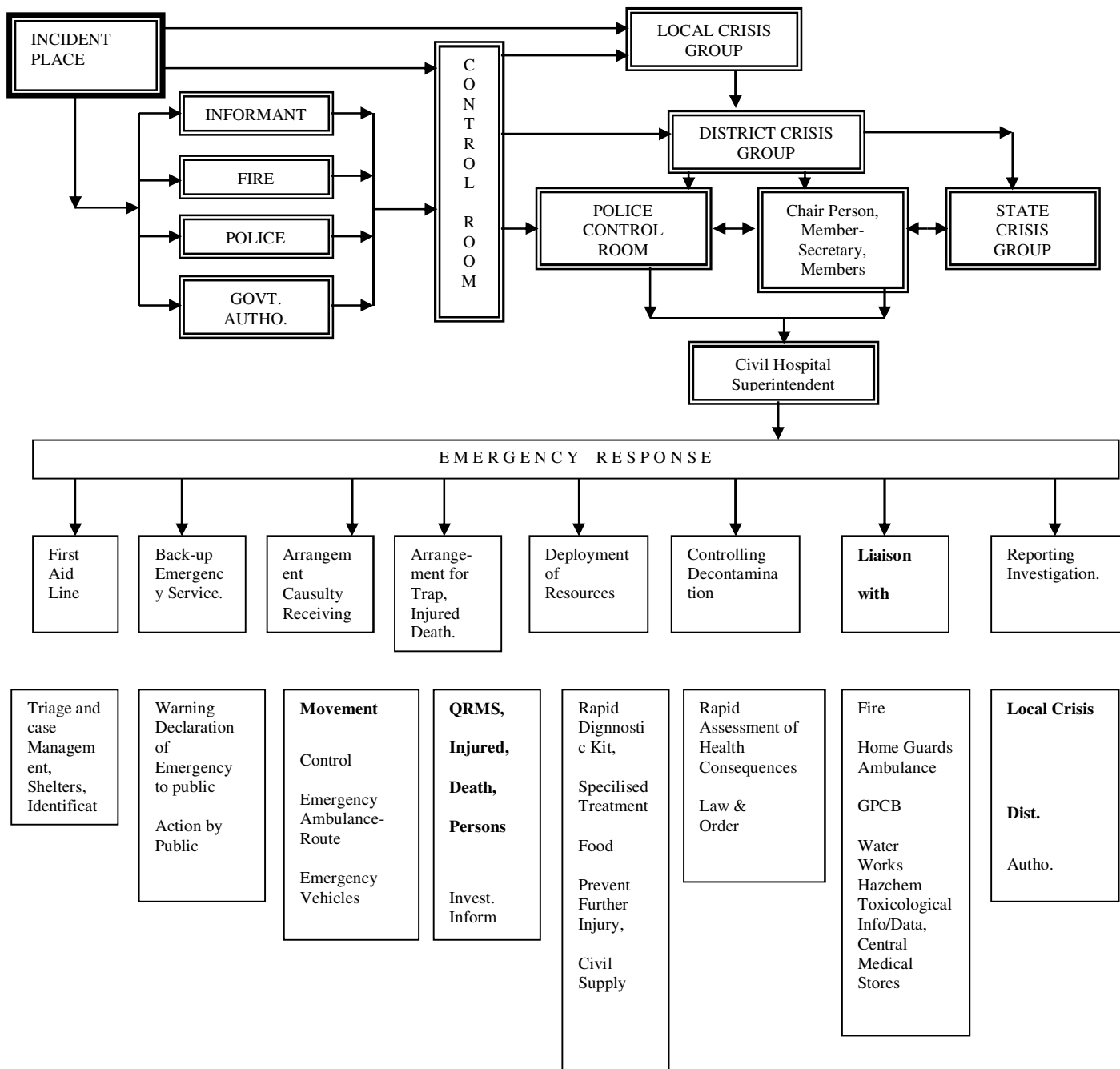
CHART FOR POLICE DEPARTMENT (RESPONSE)



OFF-SITE EMERGENCY PLAN
VADODARA DISTRICT CRISIS GROUP

VADODARA DISTRICT CRISIS GROUP

CHART FOR HEALTH & MEDICAL (RESPONSE)



OFF-SITE EMERGENCY PLAN
VADODARA DISTRICT CRISIS GROUP

ANNEXURE –9

VADODARA DISTRICT CRISIS GROUP
LIST OF FIRE STATIONS WITH FACILITY

Sr. No.	Name	STD Code	Phone	Man power	Number of Fire Tenders	Ambulance	Fire Suits	SCBA
A.	VADODARA MAHANAGAR SEVA SADAN							
1.	Fire Station Control Room	0265	101					
2.	Dandia Bazar	0265	2413635	72	5	7	2	14
3.	Panigate	0265	2513014	65	5	2	1	12
4.	Gajarawadi	0265	2580908	20	1	1	0	8
5.	GIDC, Makarpura	0265	2631444	45	3	2	0	9
6.	Vadi Wadi	0265	2343545	57	4	5	1	12
B.	OTHERS							
7.	GIDC Nandesari	0265	2840300	13	1	1	1	2
8.	Fire Station Savli GIDC, Manjusar	02667	264466, 9427304059		1+1			
9.	Fire Station, Mujpur (Muval)	-	9879833707		1+1			

Other Fire Stations Telephone Numbers

Sr. No.	Name	STD Code	Phone
C.	VADODARA -INDUSTRIES		
1.	GSFC, Fertilizer Nagar	0265	2242451
2.	RIL, PCC Area	0265	2616000 / 7000
3.	GIPCL, PCC Area	0265	2232768 / 2230159, 2234308
4.	GACL, Ranoli	0265	2232981
5.	IOCL (GR) PCC Area	0265	2233301
D.	SAVLI TALUKA		
1.	Nirma Ltd., Alindra	02667	251385/86, 251365
E.	WAGHODIA TALUKA		
1.	Gas Authority of India Ltd., GIDC, Waghodia	02668	267316
F.	KARJAN TALUKA		
1.	Khetiwadi Utpann Bajar Samiti, Karjan	02666	232042
G.	OUT SIDE OF VADODARA DISTRICT		
1.	Nagar Seva Sadan, Halol	02676	235339
2.	General Motors Ltd., Chandrapura, Halol	02676	221000
3.	Nagar Seva Sadan, Nadiad	0268	2550106
4.	Nagar Seva Sadan, Kapadvanj	02691	252365
5.	Nagar Seva Sadan, Balasinor	02690	266188, 267939
6.	Nagar Seva Sadan, Dakor	02699	246638
7.	Thermal Power Station, Vanakbori	02699	235604, 235680
8.	ONGC, Khambhat	02688	229869
9.	Thermal Power Station, Dhuvaran	02698	242815

ANNEXURE – 10**VADODARA DISTRICT CRISIS GROUP****LIST OF POLICE STATIONS**

Sr. No	Name	Phone No.
A.	POLICE DEPARTMENT	
1.	Control Room- ACP	24588300
2.	Control Room	100, 2414300 2415111,2411751,2435000
3.	Police Commissioner	2431515, 2431414
4.	Jt. Police Commissioner	2432020 / 2414996
5.	DCP (North)	2432424
6.	DCP (South)	2432626
7.	Additional Police Commissioner (Control Room)	2458600
B.	POLICE STATIONS	
1.	Rural	2562600
2.	City	2561310
3.	Fatehgunj	2771500
4.	Gorwa	2281313
5.	Gotri	2373750
6.	J. P. Road	2358132
7.	Karelibaug	2432592
8.	Makarpura	2651915
9.	Manjalpur	2635856
10.	Navapura	2459461
11.	Panigate	2562899
12.	Raopura	2459991
13.	Sayajiguj	2362400
14.	Wadi	2431400
15.	Chhani	2773394
16.	Jawahar Nagar	2232382

ANNEXURE – 11

VADODARA DISTRICT CRISIS GROUP
LIST OF WATER TANK AT VADODARA (VMSS)

Sr. No	Name	Phone No.
1.	Gajrawadi	2580139
2.	Panigate	2562144
3.	Channi	2773981
4.	Harni	2460205
5.	(Gayatri Nagar) Gotri	2371141
6.	Karelibaug	2481828
7.	Warasia	2574114
8.	Sayajigunj	2794310
9.	Jail	2410954
10.	Lalbaug	2417709
11.	GIDC (Jambuva)	2643503
12.	Sevasi - Gotri	2341434
13.	Akota	2344585
14.	Waghodia Road(Nalanda)	2514896
15.	East Zone (Kalupura)	2410950
16.	Sama	2795156
17.	Vadi wadi	2344347
18.	Gorwa	2280570
19.	Tarsali	2641859
20.	Tandalja	2314714

ANNEXURE – 12**VADODARA DISTRICT CRISIS GROUP****LIST OF MAJOR HOSPITALS, AMBULANCE SERVICES, BLOOD BANK****A. HOSPITALS**

Sr. No.	Name	Location	Phone No.	Beds	Burn Ward	Chemical Poisoning Treatment Facility	Ambulance
1.	SSG Hospital	Jail Road, Vadodara	2459641, 2423122, 2424848	1100	Yes	Yes	3
2.	Government General Hospital	Chhani		30	No	Yes	1
3.	GMERS Medical College & Gen.Hospital	Gotri	2398008				
4.	ESI Gen. Hospital	Gotri	2336421, 2336422-23	175	No	No	1
5.	Deepak Medical Centre	Nandesari	2841455	15	Yes	Yes	1
6.	Community Health Center	Padra	222314	30	No	Yes	1
7.	Bhailal Amin General Hospital	Gorwa	2285555	100	No	Yes	3
8.	Jamnabai Gen. Hospital	Mandvi	2518134	213	No	Yes	1
9.	Narhari Arogya Kendra	Fatehgunj	2794413/14, 2783732	191	No	No	2
10.	Sahyog Hospital	Refinery Road, Gorwa	2280201	11	Yes	Yes	0
11.	Yogini Vasantidevi Arogya Mandir	Goya Gate	2433300				
12.	Sterling Hospital	Race Course	2354488, 2354455-66/88	126	Yes	Yes	3
13.	Amish Hospital & Burns Centre		2337895, 2337795				
14.	Ayurved Hospital	Pani Gate	2561872, 2563687				
15.	BAPS Shastriji Maharaj Hospital	Atladara	2681144				
16.	Balaji Hospital	Subhanpura	2282111, 2282112, 2283233				
17.	K.G.Patel (Children's Hospital)	Karelibaug	2460779				
18.	Baroda Heart Institute & Reserch Centre	Old Padra Road	2322021, 2325444				
19.	Premdas Jararam Hospital, Varsia	Varsia	2565867, 2564785				
20.	Railway Hospital	Pratapnagar	2641385				

ANNEXURE – 12*Continue...*

VADODARA DISTRICT CRISIS GROUP
LIST OF MAJOR HOSPITALS, AMBULANCE SERVICES, BLOOD BANK

B. LIST OF AMBULANCE SERVICES

Sr. No.	Name	Phone No.	Sr. No.	Name	Phone No.
1.	SSG Hospital	2424848	6.	Sardar Patel Hospital	2658111 / 2558333
2.	Ambulance Service	108	7.	Premadas Jalaram Hospital	256586 / 3 2564785
3.	Bhailal Amin General Hospital	2286666	8.	Baroda Heart Institute & Research Centre	2322021
4.	Indian Red Cross Society	2413382	9.	Maharani Shantadevi Hospital	2436655
5.	Mr. Arvind Vaishnav Ambulance Service	2424646			

C. LIST OF MAJOR BLOOD BANKS

Sr. No.	Name	Phone No.	Sr. No.	Name	Phone No.
1.	Alakh Blood Bank	2435232, 2437587	8.	Pathological Laboratory	2437676
2.	Citizen Blood Bank	2427640	9.	SSG Hospital, Blood Bank	2424848, 2422406
3.	Cleanipath Laboratory	3114851, 2426794	10.	Suraktam Blood Bank	2602035, 2363660
4.	Dr. Shailesh Patel	2415564	11.	Bhailal Amin General Hospital, Blood Bank	2307038, 2307039
5.	Indian Red Cross		12.	Amin Blood Bank	7698285508, 2432933, 2435635
6.	Indu Voluntary Blood Bank & Laboratory	2411477, 2437676	13.	Dr. Monali Desai	2323941
7.	Shri Jalaram Blood Bank	2413906, 2464130	14.	Narhari Hospital Blood Bank	2750792

D. LIST OF MEDICAL SHOPS (24 HOURS)

Sr. No.	Name	Phone	Sr. No.	Name	Phone
1.	SSG Hospital - Stores	2436682	11.	Pragna Chemist	2388612
2.	Atmajyoti Medical Stores	2387920	12.	Dinbandhu Chemist	2411179
3.	Yogini Vasantidevi	2433300	13.	Gulsan Medicine	2350076
4.	A Roy & Co – Raopura	2411347	14.	India Medicine	2657954
5.	Shah Brothers - Raopura	2792887	15.	Royal chemist	2431335
6.	Narhari Arogy Kendra, Fatehgunj	2794414	16.	Sheetal Medical Stores	2653070
7.	Bhailal Amin Hospital, Gorwa	2285555	17.	Alpha Medico	2429509
8.	Khushalchand Charitable Trust – Sayaji Hospital	2427780	18.	Valaji Medico, Kothi	2425521
9.			19.	Western Chemist	2410621
10.	Our lady Pillar Hospital, Fatehganj	2791038			

VADODARA DISTRICT CRISIS GROUP
LIST OF MAJOR SAFE SHELTERS

Sr. No.	Name	Telephone Numbers	Sr. No.	Name	Telephone Numbers
A.	Marriage Hall		E.	Gujarati Medium High School	
1.	Shri Saurashtra Patel Seva Samaj (Nizampura)	2761510, 2710964	1.	Panchsheel Vidhyalaya	2662622
2.	Shri Revatat Audity Brahman Mandal Trust Ghnati Bhavan	2439890	2.	Panchratna Vidhyalaya	2661020
3.	Shri Gurjar Suthar Prajapati Mandal	2461267	3.	Narayan Vidhyalaya	2524142
4.	Shri Kutch Gurjar Kshatriy Seva Samaj Wadi	2463565	4.	Jeevan Sadhna High School	2429042
5.	Kala Vatika Marriage Hall	2384463	5.	Adarsh Hindi School	2786854
6.	Alkapuri Club	2355428	6.	Adarsh Vidhyalaya	2532026
7.	Nootan Bharat Club	2353150	7.	Ambe Vidhyalaya	2714166, 2414569
8.	Shri Mahavir Hall	2464091	8.	G. N. V. High School	2561036
9.	Ashirvad Marriage Hall	2656651	9.	Nalanda Vidhyalaya	2513831
B.	English Medium High School		10.	Navyug High School	2782782, 2794055
1.	The Mothers School, Gotri Road	2333950	11.	Pratap High School	2361431
2.	Delhi Public School	2681571	12.	Alembic Vidhyalaya	2280401
3.	Gujarat Public School	2680215	13.	Utkarsh Vidhyalaya, Gotri Road	2352065
4.	Sent Basil School, Tandalja	2649218	14.	Zenith High School	2580054
5.	Sent Joseph, High School	2791765	15.	Vidhyut Board Vidhyalaya	2335828
6.	Sent Marry School, Manjalpur	2645830	16.	Shri Vidhya Vihar School, Arunachal	2390388
7.	Oxilium Convent High school	2655010	E.	Educational Organizations	
8.	Don Bosco High School	2655010	1.	Principal, Government Technical High School	2413935
9.	GEB	2335828, 2355624	2.	M. S. University of Baroda	2795521
C.	English & Gujarati Medium High School		3.	Railway Staff Collage	Fax: 2638267
1.	Little Flower School	2431222	4.	Post & Telegraph Collage	2482686
2.	Bright Day School	2251151	5.	Ayurvedic Collage	2562004
3.	Rosary High School	2792055	6.	Arykanya Vidhyalaya	2462661
4.	Baroda high School	2433284	7.	ITI, Tarsali	2641491
D.	C. B. S. E. High School		8.	ITI, Gorva	2280413
1.	Bhavans School	2644222, 2634163	9.	Gujarat Agri. Uni. Model Farm	2343984
2.	Navrachna School	2791643	10.	Takshshila Vidhyapith Sansthan	2466980
3.	New Era High School	2643239			
4.	American School of Baroda	5545155			
5.	Kendriy Vidhyalay	2492577			
6.	Kendriy Vidhyalay, Makarpura	2481551			
7.	Kendriy Vidhyalay, ONGC	2632452			
8.	Urmi School & Hostel, Sama	2712611, 2710291, 2710309			
9.	Gujarat Public School (Residential)	2680215			

ANNEXURE – 14**VADODARA DISTRICT CRISIS GROUP****METEOROLOGICAL DETAILS-VADODARA**

Month	Average Temperature		Wind Data				
	Max. °C	Min. °C	No of days for 1-19 kmph	Wind Direction for % No. of Days* from			
				NE	SW	W	N
January	30.1	10.8	18	31	2	2	13
February	32.4	12.7	13	18	5	4	7
March	36.6	16.6	16	10	13	5	6
April	39.9	21.7	21	4	25	12	4
May	40.7	26.1	28	1	50	19	2
June	37.2	27.1	28	1	52	23	0
July	32.4	25.4	26	0	56	18	0
August	31.5	24.8	26	0	51	20	0
September	32.6	24.1	20	1	31	17	2
October	35.0	19.9	13	12	6	2	5
November	33.4	14.3	12	21	1	1	5
December	31.0	11.4	14	28	1	0	9

VADODARA DISTRICT CRISIS GROUP

CARE FOR SAFE HANDLING OF SOME CHEMICALS

1. PRECAUTION IN FLAMMABLE AREA

Mobile vehicles without exhaust muffles (spark arrester) should not be allowed, where flammable gas / vapour is suspected. No open flame, lighter, bidi / cigar or hot substance will be permitted.

Wind direction, velocity should be ascertained sufficient water pressure with required range, hydrants, intact hose pipes with connections trained personnel and proper PPE are essential.

2. FIRE EXTINGUISHERS

Fires are classified in Five Groups. The portable fire extinguishers of various types as explained below are being installed. Sand buckets also have been installed. They are used to extinguish fires as soon as they are detected. The type of each extinguishers to be used in each class of fires have been described below Using the wrong kind of fire extinguishers could be dangerous. For example, using water on some solvents or odour can actually spread the fire or flames. Even if you have the right extinguisher, you must use it correctly to be effective.

Class of Fire	Description	Extinguishing Media	I. S. No.
A	Fires involving ordinary combustible materials like wood, paper, textiles etc. The quenching and cooling effect of water or of solutions containing larger percentage of water are of first importance in extinguishing these fires.	Water Water (Gas Pressure) Water (Constant air pressure) Water – Soda – Acid type	--- 940 6234 934
B	Fires occur in the vapour-air mixture over the surface of flammable liquids such as petrol, oil, grease, naphtha, paints, thinners, varnishes etc. They are controlled by limiting the supply of air (Oxygen), blanketing effect is essential.	Dry Chemical Powder Carbon-di-oxide Foam	2171 4308 2878 933
C	Fires involving gaseous substances under pressure, where it is necessary to dilute the burning gas at a very fast rate with an inert gas or powder.	Dry Chemical Powder Carbon-di-oxide	2178 4308 2878
D	They occur in combustible metals such as magnesium, titanium, sodium, aluminum, zinc, potassium etc. where the burning metal is reactive to water.	Dry chemical Powder special dry powder for metal fire	2171 4861
E	Fires involving electrical equipments where the electrical non-conductivity of extinguishing media is of first important	Carbon-di-oxide Dry Chemical Powder	2171 4308

3. EXPLOSION HAZARDS

The following factors may lead to explosion due to presence of flammable mixtures in the atmosphere. Therefore, due care should be taken to avoid such factors, while handling flammable gas or liquid during emergency.

VADODARA DISTRICT CRISIS GROUP
CARE FOR SAFE HANDLING OF SOME CHEMICALS

- | | |
|-------------------------|--|
| 1. Electrical | 9. Overheated materials |
| 2. Smoking | 10. Lubricants |
| 3. Friction | 11. Flammable metals |
| 4. Hot surfaces | 12. Inflammable Solids / Liquids / Gases |
| 5. Welding sparks | 13. Lightening Strokes |
| 6. Gas Cylinders | 14. Mobile Vehicles |
| 7. Spontaneous ignition | 15. Mobile Phone |
| 8. Static Electricity | |

4. PRECAUTION FOR EXPLOSION

There must be following attack in preventing an explosion.

- a. Development & accumulation of explosive mixture.
- b. To lower down the lower explosive limit of explosive mixture
- c. To eliminate the source of ignition
- d. Proper ventilation, which will prevent excessive accumulation of gases or vapour under certain conditions.
- e. Changes in the temperature will also change its density
- f. To provide exhaust or sucking system Care should be taken to use flameproof or explosion proof electrical equipment.
- g. Use of inert gases such as Carbon-di-oxide, nitrogen, flue gas or other non-combustible gases. Their function is to keep the concentration of oxygen below the point at which it will not support the combustion.
- h. Winter poses potential hazards because of colder and drier weather create more static electricity and flammable vapour concentration attains its explosive limits easily. Further hazards increases doubly when the doors and windows of the building where such flammable substances are used, are kept closed in order to conserve heat for human comfort during cold weather.

5. TOXIC HAZARD

Harmful chemical in form of gas, vapour, dirt, fumes, mists, powder etc. can exert its toxic effect only when they come in contact with body cells. Their routes of entries are inhalation, skin. Most of the harmful chemicals get entry during inhalation. The self-contained breathing apparatus, canister mask, fresh air mask like personnel protective equipment are to be used.

VADODARA DISTRICT CRISIS GROUP
CARE FOR SAFE HANDLING OF SOME CHEMICALS

6. WATER REACTIVE CHEMICALS

Certain chemicals, which are highly reactive with water, therefore, do not use water during their spillages, leakages, overflowing etc. The Oleum, Chlorine, Phosphorus etc. have affinity with the water. The sand, dry earth or soda ash, lime etc. can be used, instead of water.

7. SPECIALIZED RESOURCES

These resources are those specifically designed to deal with oil and hazardous material spills. They may range from simple containment booms to elaborate trailer-mounted incinerators and unit processes to deal with hazardous material spills. A typical list follows:

a) Booms and Barriers:

A wide variety of floating barriers are manufactured of different sizes, shapes and materials to contain spilled materials, divert spilled material or exclude spilled materials from sensitive areas.

b) Skimmers:

A wide range of skimmers use one or more of such processes as weirs, oleophilic drums, belts or ropes, inclined planes, vortices or suction to remove oil or hazardous materials from the water surface for transport to receiving facilities.

c) Sorbents:

Absorbent or adsorbent materials selectively absorb oil or hazardous materials for removal and disposal. These sorbents are made from a wide range of natural and manufactured materials.

d) Chemicals:

Specialized chemicals are used to disperse oil and hazardous materials after surface tension and thus spreading, make and break emulsions and neutralize or alter hazardous materials.

e) Chemical Spreading Equipment:

A wide range of chemical spreading equipment, ranging from hand sprayers and truck sprayers to vessel and aircraft spraying equipment, disperse the special chemicals.

f) Storage Facilities:

Emergency storage facilities, range from fast erecting tanks to rubber and plastic pillows and liners for pits and reservoirs.

VADODARA DISTRICT CRISIS GROUP

CARE FOR SAFE HANDLING OF SOME CHEMICALS

g) Special Treatment Units:

A wide variety of special treatment units have been developed (but not widely distributed) for oil-water separation, chemical processing, incineration and the like.

h) Instrumentation / Safety Equipment:

A wide range of safety equipment in the form of breathing equipment, protective clothing, protective footwear and so on, is needed, particularly for hazardous material spills. Similarly, a wide range of analysis equipment, including explosion meters, gas-measuring equipment and organic vapour analyzers is needed to measure hazard characteristics.

i) Unit Operations and Processes:

The traditional and specialized resources are utilized together to achieve components of the cleanup process. The terms “unit operations” and “unit processes” are borrowed from chemical and environmental engineering to describe the collection of the individual unit operations (single activities) into unit processes (groups of activities) to achieve a purpose in the cleanup operation.

8. DEALING WITH SPILLAGES OF COMMON HAZARDOUS CHEMICALS

1. Aromatic Amines:

These are toxic and readily absorbed through skin. Washing with water effects immediate removal of spills or skin or clothing. Vapours are toxic too.

2. Halogenated Amines and Nitro Compounds:

These are toxic via inhalation or skin penetration. Remove spills with water.

3. Chlorosulfonic Acid:

In moist air HCL and H₂SO₄ are formed. Avoid breathing in fumes. In Spillage area spray lime solution instead of water.

4. Cyanides and Nitriles:

Toxic, if inhaled, swallowed or absorbed through skin. Liquid nitriles and HCN are flammable. Use CO₂ extinguishers. Clean up cyanide spills with water. Flush small amounts down the sink the copious quantities of water.

5. Peroxides:

70% H₂O₂ may spontaneously explode. Organic peroxides such as benzoyl peroxide are flammable as dry solids and may explode by shock. Use trays for storage. Use vermiculite or sand to clean up spills.

6. Aniline

Use mixture of sand and soda ash.

VADODARA DISTRICT CRISIS GROUP
CARE FOR SAFE HANDLING OF SOME CHEMICALS

9. Leak Detection, Neutralisation & Disposal

Sr. No.	Leak Detection	Neutralisation & Disposal
1.	CHLORINE To detect the chlorine leak an ammonia spray or swab is used. Chlorine gives white dense fumes of ammonium chloride is greenish yellow gas with pungent and irritating odour.	Emergency disposal of chlorine is done by absorbing it in the solution of caustic soda, soda ash or hydrated lime slurry. Chlorine can't be vented off as it is toxic gas. Cylinder of any part of cylinder should not be immersed in the tank holding caustic or other solutions. Don't use rubber hose or polyethylene pipe connection for neutralising chlorine gas. Do not pour water on the leak.
2.	AMMONIA Ammonia leak can be detected easily due to its specific pungent odour. The exact location of leak can be found out by hydrochloric acid swab in suspected region. This will give white vapours of ammonium chloride. Another method used in the detection of ammonia leak is by the use of sulphur dioxide gas, which also forms white fog or cloud in contact with ammonia.	As it is toxic gas it cannot be vented to atmosphere. Ammonia leakage can be absorbed in water in a suitably designed system, as its solubility in water is very high. Mild steel is used as material of construction.
3.	SULPHUR DIOXIDE Sulphur dioxide leak can be detected by odour as it has characteristic odour. But the exact location of the leak can be found out by ammonia vapours from a swab or squeeze bottle. Sulphur dioxide will produce dense white fumes with ammonia vapours. Leak may also be detected by applying soap solution. Soap solution in case of leakage will give bubbles.	Sulphur dioxide leak can be absorbed in caustic solution. For this purpose scrubber should be preferably fabricated of polypropylene backed by FRP. Do not use water on the leak.
4.	BROMINE Bromine spillage can be found out as it has intensely irritating odour. Bromine leak can be detected by using ammonia swab or spray. Bromine gives white dense fumes with ammonia solution.	As bromine is toxic, and fuming liquid, it can't be vented to atmosphere. Water should not be directly poured over the spillage with mud or earth and mop up with plenty of water.
5.	ETHYLENE OXIDE Ethylene oxide leak can be detected by using soap solution. Leak will produce bubble with soap solution.	As the gas is extremely flammable, all the ignition sources should be shut off. Leaking gas can be slowly vented off in a safe and open area. Put water spray to cool down, if necessary. The gas can be burnt off in a suitably designed burner.
6.	BUTADIENE Butadiene leak can be detected by its mild aromatic odour. Butadiene leak can also be detected by using soap solution, which will produce bubbles.	Leaking gas should be slowly vented off to air in a safe open area or can be burnt off in a suitable burner. Put water spray for cooling, if necessary.

VADODARA DISTRICT CRISIS GROUP
CARE FOR SAFE HANDLING OF SOME CHEMICALS

10. Leak Detection, Neutralisation & Disposal (Continue...)

Sr. No.	Leak Detection	Neutralisation & Disposal
7.	BENZENE As benzene is flammable gas, flame should not be used to detect the leak. Leak will produce bubbles with soap solution.	As the gas is highly inflammable, shut off all the sources of ignition. Apply non-flammable dispersing agent. Run the waste diluting greatly with running water. Due to non-availability of dispersant, this can be absorbed on sand. Site of spillage should be thoroughly washed with water and soap or detergent.
8.	VINYL CHLORIDE Vinyl chloride leak can be detected due to its characteristic odour. Leak can also be detected with soap solution, which will produce bubbles.	Leaking gas can be vented slowly to air in a safe open area or gas should be burnt off in a suitable burner.
9.	CAUSTIC SODA Detect the leak of caustic soda with wet litmus paper; caustic will change the colour of the paper from red to blue.	Caustic soda should be scrubbed in water scrubber made of MS or neutralize it with dilute HCl acid.
10.	SULPHURIC ACID Detect the leakage of oleum with its sharp penetrating odour. Leakage can also be detected by using wet blue litmus which when coming in contact turns red.	Sulphuric acid should be scrubbed in lime or caustic or water scrubber made up of MSRL or PVC/FRP. Do not put water directly on the leak. Content the leak by mixing it with earth/sand and lime sludge slowly. Neutralise by pouring water and dilute alkali.
11.	HYDROCHLORIC ACID Detect the leak with its sharp pungent odour. Leak can also be detected by using wet litmus paper. Hydrochloric acid will change the colour of the paper from blue to red.	Hydrochloric acid should be scrubbed in lime or caustic or water scrubber made of MSRL. Do not put water directly on the leak. Content the leak by mixing it with earth/sand and lime sludge. Slowly neutralize by pouring water and dilute alkali.
12.	NITRIC ACID Detect the leak of nitric acid with wet litmus paper. Nitric acid will change the colour of the paper from blue to red.	Nitric acid should be scrubbed in lime or caustic or water scrubber made of MS or SS. Do not put water on the leak. Content the leakage by mixing it with earth/sand and lime sludge. Slowly neutralize by pouring water or dilute alkali.
13.	PHOSPHORIC ACID Detect the leak of phosphoric acid with wet litmus paper, which will change the colour of litmus paper from blue to red.	Spread soda ash liberally over the spillage and mop up cautiously with plenty of water. Dilute the waste greatly with running water.

ANNEXURE – 16

VADODARA DISTRICT CRISIS GROUP
SPECIAL MEDICAL & BURNS TREATMENTS & ANTIDOTS

A. SPECIAL MEDICAL TREATMENTS & ANTIDOTS

Sr. No.	Name of Chemicals	Medical Treatment / Antidotes	Neutralizing /Inactivating Media	TLV ppm	LD ₅₀ mg/kg	Solubility in Water
1	2	3	4	5	6	7
1.	Acetonitril	Very Careful treatment of cobalt E.D.T.A. (calocynor) and if that is not effective give Nitrite / Sodium Thio Sulphate treatment	Alcoholic Sodium Hydroxide & Calcium Hypochlorate	40	6500	Miscible
2.	Ammonia	If skin is affected then wash with plenty of water for 15 min. and then wash with dilute lactic acid and apply soframycin cream. If eye is affected then wash by eye fountain with plenty of water for 15 min. Put one drop of 0.4% Benzocaine (Novocaine) solution in eye. Boric or lactic acid solution eye drops can also be given. If entered in throat then give smell through cotton dipped in ethanol or ether through nose. Administer oxygen in case of breathing difficulty.	Hydrochloric Acid	50	350 mg/kg	Good
3.	Aniline	Methylene Blue (1% solution), Ascorbic Acid (5% solution) Administer Oxygen in case of breathing difficulty.	Mixture of Sand and Soda Ash	5	450	Poor
4.	Benzene	Skin is affected then wash with plenty of water. Administer Oxygen or shift to fresh air. Diazepam 0.1 mg/kg.(iv), bed rest.	Incineration	10	3400	Poor
5.	Bromine	Skin is affected then wash with plenty of water. Apply sodium bicarbonate and again wash with water. Eye is affected then flush eye in eye fountain. Put 2-3 drops in eye of Pontocaine 0.5% solution or Benzocaine (Novocain) 0.4% solution. If inhaled then give smell through ethanol or ether dipped cotton. Give milk, buttermilk or lemon water. Give O ₂ in case of breathing difficulty.	Sodium Thiosulphate, Soda Ash	0.1	-	Poor
6.	Carbon Tetra Chloride	N-acetyl-L-cysteine		5	2800	Not Soluble
7.	Chlorine	Skin is affected then wash with plenty of water. Apply sodium bicarbonate and again wash with water. Eye is affected then flush eye in eye fountain. Put 2-3 drops in eye of Pontocaine 0.5% solution or Benzocaine (Novocain) 0.4% solution. If inhaled then give smell through ethanol or ether dipped cotton. Give milk, buttermilk or lemon water. Give O ₂ in case of breathing difficulty.		1	-	Poor
8.	Dimethyl Sulphate	Skin is affected then apply Magnesium Oxide paste and give injection of Corticosteroid. In case of breathing difficulty administer Oxygen.	Alcoholic Sodium Hydroxide & Calcium Hypochlorate	1	440	Poor
9.	Dichloro Methane	Hydro cortisone (200 mg every 4 hours). In case of aspiration pneumonia give antibiotics.	Hydrochloric Acid	-	-	-
10.	Ethyl Alcohol	2 gm of Sodium bicarbonate in 250 ml water, Diazepam 10 mg by intravenous. Skin or eye is affected then wash with plenty of water.		1000	7060	Soluble
11.	Ethylene Oxide	Artificial respiration. Treatment by physician.	Dissolve in Solvent	50	270	Good
12.	Ethylene Dichloride			10	-	Not Soluble
13.	Formaldehyde	Milk, activated charcoal or Water.		3	300	Soluble
14.	Hydrogen Cyanide	Give inhalation of 0.2 ml amyl nitrite dipped cotton. Sodium nitrite (1% solution), Sodium thiosulphate (30% solution), Cromosmon (1% methylene blue in 25 % glucose solution)		4.7	-	Miscible
15.	Iodine and Compositions	Milk, Fine starch Solution, 100 ml of 1% Sodium Thiosulphate by mouth.				Insoluble
16.	Lead Compounds	CaNa ₂ EDTA, D-Penicillamine (oral), BAL (with CaEDTA), Induce vomiting, then give Magnesium sulphate in water.				
17.	LPG	Wash with water Remove affected person to fresh air.	Prevent source of ignition	1000	-	Floats
17.	Methyl Alcohol	Ethanol (30% solution from inside, 5% solution from out side i.e. by intravenous injection), Epicake Syrup. In case of acidosis give Sodium bicarbonate. In case of delirium give Diazepam 10 mg. by intravenous injection. Folinic acid (Leucovorin), 1 mg/kg, iv, 4 hourly.	200	4100	Good	

ANNEXURE – 16

Continue...

VADODARA DISTRICT CRISIS GROUP
SPECIAL MEDICAL & BURNS TREATMENTS & ANTIDOTS

A. SPECIAL MEDICAL TREATMENTS & ANTIDOTS

Sr. No.	Name of Chemicals	Medical Treatment / Antidotes	Neutralizing /Inactivating Media	TLV ppm	LD ₅₀ mg/kg	Solubility in Water
1	2	3	4	5	6	7
18.	Mercury	Give white of egg in water. Later give milk, then include vomiting. BAL, D-Penicillamine, n-Acetylcysteine, Dimercaptopropane-1 sulfonate (DMPS)		0.1 mg/m ³		Insoluble
19.	Nitrobenzene	Methylene blue, 1-2 mg/kg, iv, over 5 min.				
20.	Nitrogen Oxides (NOx)	Prednisone or Prednisolone 5 mg. every 6 hrs interval.				
23.	Nitric Acid	Administer oxygen, morphine injection for severe aches.	Sodium Carbonate or Soda Ash or Slacked Lime	2	-	Good
24.	Oleum	Wash contaminated area with water and soap. 5% soln of sodium bicarbonate. Artificial respiration	Dry Sand, Earth	1	-	Highly Reactive
25.	Oxalic Acid	Milk, lemon Water, chalk or calcium lactate, calcium chloride or calcium gluconate with liquid. 10% calcium gluconate or chloride 10 ml. by intravenous injection.		1mg/m ³	1000	Soluble
26.	Phenol & Derivatives	Shift in fresh air, activated charcoal and 240 ml. milk. If skin or eye is affected then wash with plenty of water for 15 min. if skin is affected then wash with Polyethylene glycol (PEG).		5	414	Soluble
27.	Phosgene	Cortisone acetate 1 mg/kg by mouth – thrice a day. In case of breathing difficulty administer Oxygen.		0.1	-	Hydrolyzed
28.	Phosphorus	10 ml calcium gluconate (10%) by intravenous injection, 5% glucose in water. Traver (10% invert sugar) by intravenous injection.		0.1	3030	Insoluble
29.	Organics Phosphorous Insecticides (e.g. Malathion, Parathion, Monocrotophos, Phorate)	Atropine injection, Atropine (0.1% solution), Nalorphine hydrochloride (0.5 %solution), Trimedoxim bromide (15%solution), Pyridine Aldoxy Methyodate, Diperoxim, Biodexim and Isonitrocin (40%solution), Pralidoxi, PAM, TOXOGONIN.				
30.	Sulphur Dioxide	Treat burns as usual. Oxygen with intermittent positive pressure breathing apparatus.	Cover with ash or sodium bicarbonate and Calcium Hydrochlorite	2	-	Sinks & Boils
31.	Sulphuric Acid	Wash thoroughly with water followed by 5% soln of sodium bicarbonate.	Cover with Sodium Carbonate or Soda Ash or Slacked Lime	1 mg/m ³	2140	Reactive
32.	Toluene	Wash Completely with. Remove exposed Person to Fresh Air, Artificial Respiration.		100	1640	Poor
33.	Thionyl Chloride	Administer oxygen. 5% soln of sodium bicarbonate may be used.	Cover with sodium bicarbonate	5	-	Decomposes (Hydrolyses)
34.	Vinyl Chloride	Skin is affected, wash with plenty of water. Eye is affected then keep eye open and allow material to vaporise. Don't apply any eye drops. In case of breathing difficulty, administer oxygen. If injected then include vomiting. Give one spoon mineral oil and after that give sodium /magnesium sulphate (one Spoon) in a glass of water. Give strong tea or coffee of feeling exhausted.		1	500	Slightly Soluble
35.	Xylene	Skin is affected then wash with plenty of water. Administer Oxygen or shift to fresh air. Diazepam 0.1 mg/kg.(iv), bed rest.		100	4300	Not Soluble

VADODARA DISTRICT CRISIS GROUP

B. DETAILS ON BURNS AND THEIR TREATMENT

1. CAUSES OF BURNS

Under the category of burns, several environmental injuries are included. They are: thermal burns, burns from electrical current, chemical burns, burns resulting from radiant energy and systemic reactions to heat.

2. SEVERITY OF THERMAL BURNS

The seriousness of the thermal burns depends upon the degree of the burn (depth of the skin injured) and the amount of body surface involved.

2.1 Degree of Burns:

Burns can be classified in degrees from one through six. A first-degree burn is limited to the most superficial layer of the epidermis and results only in erythema (reddening) of the skin. A second-degree burn causes damage into but not through the dermis and characteristically results in the appearance of vesicles (blisters) in the skin. A third degree burn is one in which the full thickness of the skin is destroyed down to the subcutaneous fat. In this burn the skin may appear pale, dry and white; it may even be brown or charred. Clotted blood vessels may be seen through the skin as though one were looking at them through parchment. A fourth degree burn involves destruction of the skin and the subcutaneous fat. A fifth degree burn involves destruction of the skin, the fat and the underlying muscle. A sixth degree burn involves destruction through all the structures, including the supporting bone.

With burns more serious than second degree, there is destruction of the sensory nerve endings of the skin. The burned area is consequently insensitive. However, the area surrounding the burn will not have all nerve endings destroyed and may frequently be extremely painful.

2.2 Body Surface Involved:

The amount of body surface that is burned is very important in determining the seriousness of the injury. A very rough but reasonably accurate estimate of the amount of body surface burned is determined by the rule of nine. This rule, which applies specifically in adults and older children, divides the body into sections, each of which constitutes approximately 9 % of the total area. The body sections and the respective percentage assigned to them are:

Head, Face, i.e. area involving neck and above	9%
Each arm	9%
Front torso	18%
Each leg	18%
Back	18%
Genitals	1%

By knowing the degree of burn, the approximate percentage of the body that has been burned, accompanying complications, and the age of the patient, one can classify the severity of thermal burns as critical, moderate, or minor. Such classification is essential in a disaster where many injured patients are involved and where the triage separates the patients into emergency cases and cases for whom treatment may be delayed. A summary of the three classes follows.

2.3 Critical (Severe) Burns:

This category includes:

- ❖ All burn of whatever degree and extent if they are complicated by respiratory tract injury and other major injuries or fractures
- ❖ Third degree burns involving critical areas such as face hands or feet
- ❖ Third degree burns which involve more than 10% of the body surface
- ❖ Second degree burns which involve more than 30% of the body surface

VADODARA DISTRICT CRISIS GROUP
SPECIAL MEDICAL & BURNS TREATMENTS & ANTIDOTS
B. DETAILS ON BURNS AND THEIR TREATMENT

2.4 Moderate Burns:

This category includes:

- ❖ Third degree burns of 2 to 10 percent of the body surface which do not involve the face, hands or feet
- ❖ Second degree burns which involve 15 to 30 percent of the body surface
- ❖ First degree burns Involving 50 to 75 percent of the body surface

2.5 Minor Burns:

This category includes:

- ❖ Third degree burns of less than 2 percent of the body surface if no critical areas are involved
- ❖ Second degree burns involving less than 15 percent of the body surface
- ❖ First degree burns of less than 20 percent of the body surface

In evaluating a patient who has sustained a burn, age and general condition must also be considered. A moderate burn In an aged patient who is chronically ill should be classified as critical in terms of the immediate treatment required because of the patient's general condition apart from the burns.

3. THE CARE OF THERMAL BURNS

The care of thermal burns depends on the percentage of burned body surface involved. In no instance should grease (butter, lard, Vaseline, mineral oil or other ointments) be applied to a burn. For the first or second-degree burns, the emergency medical treatment should be to:

- ❖ Remove any burning/smoldering clothing as necessary
- ❖ Immerse the burned part in ice water for five to ten minutes and periodically continue to add ice to keep the temperature low. If area cannot be immersed, cover with clean, porous cloth of nay kind and keep continuously wet with ice water (or the coldest water available)
- ❖ Use cool wet applications for relief of pain.
- ❖ Transport the patient to the emergency department, continuing cool applications en- route.

For extensive first or second degree burns and for all third degree burns the procedure set forth below should be followed.

- ❖ Examine for and relieve any respiratory distress. Always anticipate respiratory difficulty when there are burns around the face and neck or when the patient has been exposed to hot gases or smoke.
- ❖ Clothing that adheres to the skin should be cut around and left in place.
- ❖ Cover the burned area with a sterile dressing or a clean sheet. Use cool wet applications for pain relief.
- ❖ Treat the patient for shock if it is apparent.
- ❖ Transport the patient to the emergency department, continuing cool applications en- route.

Severe pain, which may accompany first or second degree burns or may exist at the edges of third degree bums, is best relieved by injected analgesic medication. These drugs must be given by a qualified person or on doctor's order.

Local treatment with cool compress remains the best emergency treatment for burn pain. Third degree bums, which destroy nerve endings, are often not painful enough to require such treatment before the patient reaches the hospital. In burns of this degree and increasing severity, initial efforts are best directed at general support and resuscitation of the patient.

VADODARA DISTRICT CRISIS GROUP
RESPONSE ACTIONS IN CASE OF CHLORINE LEAKAGE/ DISPERSION

1. Symptoms:

Being Irritant causes conjunctivitis and damage to cornea. Asphyxia. Affection of respiratory tract, may lead to Bronchitis, Bronchospasm, Pulmonary Oedema.

2. First Aid:

Prompt treatment is essential. Remove the patient to the area where fresh air is available. DO NOT give anything to an unconscious patient by mouth, It may choke him.

- a. If chlorine gas inhalation is mild and the patient is only coughing, the following line of treatment may be given:
 - Loosen the clothes and remove the shoes. Give ammonia by Inhalation.
 - Place the patient on his back with head and back elevated. Keep the patient warm with blanket to avoid chilling.
 - Rest is a must.
 - Milk, buttermilk, coffee can be given for relief from throat irritation.
 - Cough syrups like Hitadrine, Coughrol, Linctus, Codeine, etc., and common throat lozenges such as Vox, Vicks tablets, Halls, etc., can also be given to soothen the throat Irritation.
 - 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/mm. may also be given.
 - In case breathing has ceased start artificial respiration.
- b. If Gaseous or Liquid Chlorine has come in contact with eyes:
 - Flush eyes immediately with running water or normal saline water for about 15 minutes.
 - Hold eyelids apart to ensure complete neutralization with water.
 - Do not try to neutralize with chemicals.
 - Administer 2 - 3 drops of 0.5 % solution of Pontocaine or other effective topical anesthetic in the eyes.
 - Do not use oils or oily ointments in the eyes.
- c. If Gaseous or Liquid Chlorine has come into contact with the skin:
 - Remove contaminated clothes.
 - Flush the affected portion with copious amount of running water. a Wash skin with copious amount of soap and water.
 - Do not apply greases.
- d. If liquid chlorine is by chance swallowed:

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

 - Ask the patient to drink copious quantity of limewater, ammonia water (1 ml in 60 ml of water), milk of magnesia or fresh water.
 - No attempt should be made to induce vomiting.
 - Keep the patient under observation and call for immediate medical help.

3. Treatment

- a. Pulmonary Oedema
 - Administer 60 to 100 % oxygen at 6 Lit/mm.
 - Intermittent positive pressure breathing apparatus, set to deliver positive pressures of 5 - 15 cm of water in the inspiratory cycle, is valuable in reducing the formation of edema
 - Symptomatic treatment. Lasix is suggestive.
 - Administer Aminophyllene intravenously.
- b. Bronchospasm
 - 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.
 - Broncho dilators nebulized into the intermittent positive pressure gas stream are often beneficial.

ANNEXURE – 18**VADODARA DISTRICT CRISIS GROUP****COLOUR CODE SYSTEM FOR PIPE LINES****COLOUR CODE FOR GENERAL SERVICES (UTILITY)**

Table – 2 [IS 2379 : 1990 (Clauses 7.5 and 9.1)]

Sr. No.	Contents	Ground Colour	First Colour Band	Second Colour Band
WATER :				
1.	Boiler Feed Water	Sea Green	Gulf Red	-
2.	Central Heating Below 60°C	Sea Green	Canary Yellow	-
3.	Central Heating 60°C To 100°C	Sea Green	Dark Violet	-
4.	Central Heating Above 100°C	Sea Green	Dark Violet	Signal Red
5.	Chilled Water	Sea Green	Black	Canary Yellow
6.	Condensate	Sea Green	Light Brown	-
7.	Cooling	Sea Green	French Brown	-
8.	Filtered Water	Sea Green	Light Brown	-
9.	Fire water	Fire Red	Crimson Red	-
10.	Hydraulic Power	Sea Green	Black	-
11.	Treated	Sea Green	Light Orange	-
12.	Waste Water	Sea Green	Canary Yellow	Signal Red
AIR :				
13.	Compressed Up to and including 15 kg/cm ²	Sky Blue	-	-
14.	Compressed to over 15 kg/cm ²	Sky Blue	Signal Red	-
15.	Dry Vacuum	White	-	-
16.	High Pressure Steam	Aluminium to IS 2339	French Blue	-
17.	Medium Pressure Steam	Aluminium To IS 2339	Gulf Red	-
18.	Low Pressure Steam	Aluminium To IS 2339	Canary Yellow	-
19.	Instrument Air	Sky Blue	French Blue	-
20.	Drainage	Black	-	-
OILS :				
1.	Furnace Oil	Light Brown	French Blue	-
2.	High Speed Diesel Fuel	Light Brown	-	-
3.	Hydraulic Power	Light Brown	Dark Violet	-
4.	Light Diesel Fuel	Light Brown	Brilliant Green	-
5.	Lubricating Oil	Light Brown	Light Grey	-

INDUSTRIAL GASES (For Pipelines)					HYDROCARBON AND NAPHTHA (PETROLEUM PRODUCTS)				
Sr. No.	Contents	Ground Colour	First Colour Band	Second Colour Band	Sr. No.	Contents	Ground Colour	First Colour Band	Second Colour Band
1.	Acetylene	Canary Yellow	Service Brown	-	1.	Acetone	Dark Admiralty Grey	Black	Canary Yellow
2.	Ammonia	Canary Yellow	Dark Violet	-	2.	Benzene	Dark Admiralty Grey	Canary Yellow	-
3.	Butane	Canary Yellow	Signal Red	-	3.	Butadiene	Dark Admiralty Grey	Black	-
4.	Chlorine	Canary Yellow	Dark Violet	Light Orange	4.	Ethylene Di-Chloride	Dark Admiralty Grey	Gulf Red	-
5.	Ethylene Oxide	Canary Yellow	Dark Violet	Brilliant Green	5.	Methanol	Dark Admiralty Grey	Deep Bull	-
6.	Hydrogen	Canary Yellow	Signal Red	French Blue	6.	Naphtha	Dark Admiralty Grey	Light Brown	Black
7.	Hydrogen Sulphide	Canary Yellow	Gulf Red	-	ACIDS :				
8.	Methane	Canary Yellow	Signal Red	Light Brown	1.	Hydrochloric Acid	Dark Violet	Silver Grey	-
9.	Methyl bromide	Canary Yellow	Fresh Blue	Black	2.	Hydrofluoric Acid	Dark Violet	Signal Red	French Blue
10.	Nitrogen	Canary Yellow	Black	-	3.	Nitric Acid	Dark Violet	French Blue	Light Orange
11.	Oxygen	Canary Yellow	White	-	4.	Phosphoric Acid	Dark Violet	Silver Grey	-
12.	Phenol	Canary Yellow	Dark Violet	Smoke Grey	5.	Sulphuric Acid	Dark Violet	Brilliant Green	Light Orange
13.	Phosgene	Canary Yellow	Black	White	CHEMICAL & ALLIED PRODUCTS				
14.	Propane	Canary Yellow	Signal Red	Black	1.	Brine	Black	White	-
15.	Sulphur Dioxide	Canary Yellow	Dark Violet	Golden Brown	2.	Carbon Disulphide	Black	Light Orange	-
					3.	Caustic Solution	Smoke Grey	Light Orange	-
					4.	Lime	Smoke Grey	White	Canary Yellow
					5.	Sodium Sulfide	Black	Brilliant Green	Canary Yellow

ANNEXURE – 19

VADODARA DISTRICT CRISIS GROUP
SOME MAJOR ACCIDENT IN INDIA

Sr. No.	Name of Unit	Date of Accident	Source	Death / Injury / Missing; losses	Sr. No.	Name of Unit	Date of Accident	Source	Death / Injury / Missing; losses
1.	M/s GACL, Vadodara	05.09.2002	Chlorine Gas - Explosion	4/20/nil	14.	Ranbaxy Laboratories Ltd Mohali, Punjab	30.10.2004	Fire in dryer room	1/2/nil
2.	M/s IPCL, Gandhar	20.12.2002	Chlorine Gas - Release	Nil/18 workers & 300 villagers in Jageshwar affected /nil	15.	Matrix Laboratory Ltd. Unit 1 Kazipally, Medak District Andhra Pradesh	05.03.2005	Sodium hydride	8/nil/nil
3.	M/s IOC Refineries, Digboi, Assam	07.03.2003	Fire in motor spirit tank	Nil; Product loss Rs11.55crore	16.	Gujarat Refinery, Gujarat	15.06.2005	Fire	Nil
4.	Ranbaxy Laboratories Ltd., Mohali, Punjab	11.06.2003	Toluene	2/19/nil	17.	M/s Coromondal Fertilizer Ltd, Ennore, Tamil Nadu	22.07.2005	Ammonia	Nil/5/nil
5.	BPCL Bottling Plant, Dhar , Madhya Pradesh	05.10.2003	LPG leak from tank lorry	Nil	18.	Gulf Oil Corporation Ltd Sanathnagarn, Hyderabad, Andhra Pradesh	04.10.2005	Explosion/fire	2/2/nil
6.	Orient Paper Mills, Amla, Shahdol, Madhya Pradesh	13.10.2003	Liquid chlorine	Nil/88/nil, 5 m pipe affected	19.	Orchid Chemicals and Pharmaceuticals Ltd Alathur, Kancheepuram District, Tamil Nadu	03.11.2005	Explosion with fire	2/4/nil
7.	IDL Gulf Oil, Kukkatpally , Hyderabad, Andhra Pradesh	25.11.2003	Explosion	8/5/1	20.	Aurobindo Pharma Ltd Unit-V, IDA Pashamylaram Medak Dist., Andhra Pradesh	28.11.2005	Explosion while drying cloxaciline sodium	1/4/nil
8.	Anil Enterprises, Zakhira, Rohtak, Haryana	28.04.2004	Fire in LPG fired oven	6/2/nil	21.	Indian Oil Corporation Ltd Mathura Refinery, Mathura Uttar Pradesh	29.12.2005	Fire	1/nil/nll
9.	HIL Udyogmandal, Kerala	06.07.2004	Toluene fire	Nil	22.	Kanoria Chemicals and Industries Ltd. Renukoot, Sonbhadra, Uttar Pradesh	29.03.2006	Chlorine release	6/23/nil
10.	Shyamlal Industries, GIDC, Vatva, Ahmedabad	12.04.2004	Benzene Hexane release fire	Nil	23.	Anjana Explosives Ltd Peddakaparth, Nalgonda District, Andhra Pradesh	18.07.2006	Spillage of hazchem	5/nil/nil
11.	Chemical Factory, Dombivilli Maharashtra	31.05.2004	Hexane release - Fire	1/8/Nil	24.	Ravi Organics Ltd, Muzzaffarnagar, Uttar Pradesh	19.09.2006	Gas release	1/nil/nil
12.	Chemplast, Mettur, Tamil Nadu	18.07.2004	Chlorine leak	Nil/27/nil	25.	Reliance Industries Refinery Jamnagar, Gujarat	25.10.2006	Leaked hot vaccum gas oil catches fire in air	2/nil/nil
13.	Gujarat Refinery, Vadodara	29.10.2004	Explosion in slurry settler	2/13/nil					

**Source : Annexure A (Page 68, 69), National Disaster Management Guidelines – Chemical Disaster – April 2007*

Sr. No	Dealing Person		Action		Communication			Reporting Date & Time
	Primary Requirement	Alternate Requirement	Act	Help / Resource	Whom	How	What	
1	2	3	4	5	6	7	8	9
1								
2								
3								
4								
5								
6								
7								
8								

VADODARA DISTRICT CRISIS GROUP
FORMAT FOR EXERCISE / MOCK DRILL / REHEARSAL

1	AIM / PURPOSE	:	
2	AUTHORIZED BY	:	
3	PARTICIPANTS	:	1. ☐ Original Industry 2. ☐ Surrounding Factories 3. ☐ Mutual Aiders 4. ☐ Emergency Services 5. ☐ Government Departments 6. ☐ Experts / Observers / Umpires / Invitees 7. ☐ Surrounding Public 8. ☐ N. G. O. / Volunteer Organizations 9. ☐ Other Essential Persons / Teams
4	CODE NAME	:	
5	NATURE	:	1. ☐ Origin 2. ☐ Date & Time of Commencement 3. ☐ Locations / Site.
6	DATE, TIME AND DURATION OF EXERCISE	:	
7	CO-ORDINATION COMMITTEE (APEX CRISIS GROUP)	:	1. ☐ Chair Person – Collector & D. M. 2. ☐ Member Secretary – DISH Officer/ Factory Inspector 3. ☐ Member Fire Fighting Commandant 4. ☐ Member Police Commandant 5. ☐ Member Medical & Health Commandment 6. ☐ Member Expert Panel 7. ☐ Member Representation from Industries 8. ☐ Member I/C Off site Control Room
8	WORKING COMMITTEE	:	1. ☐ Chair Person District Development Officer (District Panchayat) 2. ☐ Member : Fire Brigade Services 3. ☐ Member : Police Force, Civil Defence + Home Guard 4. ☐ Member : Medical Services, Health Department, Hospitals, Private Doctors 5. ☐ Member : Incident Controllers from MAH Units Safety Officers 6. ☐ Member : Safe Shelters – Activities, Govt. Officials, N.G.O., Volunteer Organisations, Public Relations 7. ☐ Members : Transport Activities : RTO, S. T. Services, Emergency Equipment Suppliers, Private Transporters, Telephone Departments, GIDC Authorities

VADODARA DISTRICT CRISIS GROUP**FORMAT FOR EXERCISE / MOCK DRILL / REHEARSAL**

8.	WORKING COMMITTEE	:	8. ☐ Members : Monitoring Services: GPCB Authorities, Explosive Authorities, Boiler Inspectorate, Technical Persons
			9. ☐ Members : Observers / Reporters
9.	AFFECTED ZONES	:	1. ☐ Critical Zone (Max. Damage Area)+ No of Persons affected+ injured+ Death+ Evacuated
			2. ☐ Semi-Critical Zone (Moderately Affected Area)
			3. ☐ Alert Zone (Warn Area)
10.	CONTROL ROOM	:	1. ☐ Off Site Control Room, Shadow Control Room,
			2. ☐ Emergency Control Centre
11.	SEQUENTIAL ACTIONS	:	1. ☐ Meeting of Apex Crisis Group
			2. ☐ Meeting of Working Group / Industries
			3. ☐ Public Education
			4. ☐ Table – Exercise
			5. ☐ Preparation Stage
			6. ☐ Actual Exercise / Stimulation
			7. ☐ De-brief Meeting
			8. ☐ Conclusion Report
12.	FACILITIES	:	1. ☐ Communication System and Arrangements.
			2. ☐ Transport Arrangement / Vehicles.
			3. ☐ Identification Badges / Passes / Uniforms.
			4. ☐ Mass-Education Arrangements.
			5. ☐ Selection of Event / Place & Training
			6. ☐ Training / Preparedness to all participants
			7. ☐ Maps / Charts / Stationary / Banners
			8. ☐ Arrangement of Various Meetings
			9. ☐ Photographs / Video
			10. ☐ Arrangement for Tea, Refreshment, Lunch etc.
			11. ☐ Manpower / Vehicles / Telephones / Equipments
			12. ☐ Action Plan , Technical Details / M.S.D.S., etc.
			13. ☐ Pen, Pencils, Papers, Folders, Files, Pins, etc.
			14. ☐ Tables, Chairs etc. furniture
			15. ☐ No. of Participants:Govt+Pvt+FactoryOwners+ Workers+Outside Persons+Others
13.	RECOMMENDATIONS	:	

ANNEXURE –22

VADODARA DISTRICT CRISIS GROUP
LIST OF CONDUCTED MOCK DRILL

Sr. No.	Date of Off Site Drill	Code Name	Type of Simulation	Place
1	2	3	4	5
1.	29.12.1988	BAZZ	Road Tanker Accidents	R I L, Vadodara
2.	12.03.1990	SAVDHAN	Air Defense	R I L, Vadodara
3.	13.10.1990	CHEETAH	Toxic Leakage Ammonia	R I L, Vadodara
4.	07.09.1991	CRAVE	Toxic Leakage	GSFC, Vadodara
5.	22.09.1993	DHOOMKETU	Chlorine Leakage	GACL, Vadodara
6.	03.01.1997	THUNDER	LPG Leakage	Gujarat Refinery, Vadodara
7.	22.03.1999	NAVDEEP	Ammonia Leakage	Deepak Nitrite Ltd. Nandesari
8.	29.12.1999	COLLIDE	LPG Leakage from Road Tanker	NH. No.8, Near Sankheda
9.	12.2000	LOGI-1	LPG Leakage	GAIL, Vadodara
10.	04.12.2001	BUDIP	Leakage of Butadiene	R I L, Vadodara
11.	25.10.2002	INOVIATION	LPG Leakage	Gujarat Refinery, Vadodara
12.	23.07.2003	LOGI-2	LPG Leakage	GAIL, Vadodara
13.	24.12.2003	KARO	Kerosene Leakage from Road Tanker	NH. No.8, Near GSFC
14.	20.08.2004	SAFAL	LPG Leakage	Nirma Ltd. Alindra Tal.Savli
15.	29.04.2005	ALERT VADODARA-1	Leakage of Liquid Ammonia	GSFC, Vadodara
16.	21.01.2006	CHLORISAFE	Leakage of Chlorine	GACL, Vadodara
17.	09.02.2007	TOXISAFE	H ₂ S Leakage	Gujarat Refinery, Vadodara
18.	07.03.2008	LPG SAFE	LPG Leakage	GAIL, Vadodara
19.	05.03.2009	AMMONISAFE	Ammonia Gas Leakage	Reliance Refinery, Vadodara
20.	22.02.2010	AGNIKAWACH	Fire-Naphtha Tanker	Road Emergency, Nr. GSFC
21.	04.04.2011	CHLORISAFE	Leakage of Chlorine	GACL, Vadodara
22.	29.09 .2012		LPG Leakage & Fire	IOCL Depot, Dumad Chokdi.
23.	26.03.2013	SACHET	FIRE	HPCL Depot, Nandesari.
24.	06.02.2014	SATARK	FIRE	RIL Terminal of GAIL, Ranoli.
25.	13.03.2015	SANKET	LPG Leakage & Fire	GAIL India Ltd, Waghodia
26.	31.08.2016	-	FIRE	Vidyavihar School,Old Pardra Road,Vadodara
27.	01.02.2017	-	FIRE	IOCL-Pipe Line,Western Region,Fazalpur Village
28.	06.03.2019	-	Heavy NG Leakage	GAIL India Ltd, Waghodia
29.	11.10.2019	Off Site Mock Drill	Ammonia Gas leakage from Ammonia Gas Line from Ammonia storage Tank	Gujarat State Fertilizers & Chemicals Limited, Vadodara
30.	27.08.2020	Off Site Mock Drill	PSV of Propylene filled tanker was activated (operated) resulting into heavy leakage of propylene	Reliance Industries Ltd, VMD, P.O.Petrochemicals, dist.: Vadodara.
31.	20.12.2021	Off Site Mock Drill	heavy methanol was leaked from upstream flange joint of outlet line isolation valve of methanol storage tank and caught fire in a tank farm.	Gujarat State Fertilizers & Chemicals Limited, on National Highway-08, P.O. Fertilizernagar, Vadodara.
32.	23.03.2022	Off Site Mock Drill	heavy Natural gas was leaking from a GAIL gas pipeline and caught fire	Undera - GIPCL natural gas GAIL pipeline, near: ankodiya charo and village ankodiya, between village Koyali and ankodiya, Dist. Vadodara.
33.	24.03.2023	Off Site Mock Drill		Shiva Pharmachem Ltd., Village Luna, Tal.Padra
34.	21.03.2024	Off Site Mock Drill		Styrenix Performance Materials Ltd., 51, GIDC, Nandesari
35.	07.06.2024	Off Site Mock Drill		GAIL (India) Ltd. Waghodia

VADODARA DISTRICT CRISIS GROUP**LIST OF RELEVANT STATUTES ON HAZARDOUS SUBSTANCES**

Sr. No.	Statute	
1.	The Factories Act, 1948(1987) and The Gujarat Factories Rules 1963(2004)	
2.	The Petroleum Act, 1934 & The Petroleum Rules-2002	
3.	The Explosive Act, 1984 & The Explosive Rules-1983	
4.	The Motor Vehicles Act 1988(2001)	
5.	The Gas Cylinder Rules 2004	
6.	The Static & Mobile Pressure Vessels (Unfired) Rules 1981	
7.	The Indian Boilers Act 1923 & Rules 1961, Gujarat Boiler Rules 1966	
8.	The Mines Act 1952 & Rules 1955	
9.	The Insecticide Act, 1968(2000)	
10.	The Disaster Management Act -2005 & Rules 2006	
11.	National Disaster Management guide lines – Chemical Disaster (NDMG-CD)	
12.	The Gujarat State Disaster Management Act -2005 & Rules 2006	
13.	The Environment (Protection) Act, 1986(1991) and following Rules there under	
	13.1	The Environment (Protection) Rules, 1986 (2004)
	13.2	The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 (1994, 2000)
	13.3	The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996
	13.4	The Hazardous Wastes (Management and Handling) Rules, 1989 (2003)
	13.5	Environment Impact Assessment Notification 1994
	13.6	Bio-Medical Wastes (Management & Handling) Rules, 1989
	13.7	The national Environment Tribunal Act, 1995
14.	Weapons of mass Destruction and their Delivery Systems (Prohibition of Unlawful Activities) Act, 2005	
15.	The Public liability insurance act, 1991(1992)	
16.	The Workman's Compensation Act 1923 & Rules 1924	
17.	Employees State Insurance Act 1948 & Rules 1950	

VADODARA DISTRICT CRISIS GROUP
GLOSSARY OF TERMS AND DEFINITIONS

1. **ACCIDENT**
An accident may be defined as “an undesirable and unplanned event with or without or major or minor damage consequence to life and/or property.”
2. **ACGIH**
American conference of governmental Industrial Hygienists
3. **ACUTE**
SEVERE but of the short duration. ACUTE health effects are those that occur immediately after exposure to hazardous chemical.
4. **AEROSOL**
Particles (Solid or Liquid) that remains suspended in air for a period of time. (Mists, Smokes, Fumes, Dusts etc.)
5. **AIRBORNE RELEASE**
Release off any chemical into the air.
6. **AMBIENT**
ambient temperature is temperature of the surrounding area.
7. **AMORPHOUS**
Non-crystalline, having no definite form or shape.
8. **AN INCIDENT**
An incident is emergent situation of any critical deviation in the process control or otherwise that may lead to a major accident / potential emergency and disaster.
9. **ANEMOMETER**
A device used to measure speed of wind or any other moving gas.
10. **ANSI**
American National Standards Institute
11. **ATMOSPHERIC STABILITY**
Atmospheric Stability is defined in terms of vertical temperature gradient in the atmosphere. It is usually described using the system of categories developed by Pasquill. The categories of stability class are identified by the letter A to F (or sometimes A-G)

Neutral stability occurs typically, when there is total cloud cover and is designed by category D (The temperature gradient = adiabatic lapse rate) Unstable conditions occur when the sun is shining. The unstable conditions are designated by the letters A-C with A is the least stable condition stable conditions occur on clear, calm nights, when the air near the ground is stratified and free from turbulence and are designated by the letter E & f. Some times an additional category G is used for exceptionally stable conditions. Neutral conditions correspond to a rate of decrease in temperature with height of about 1 Deg C per meters, vertically. For the dispersion study D & C stability class has been considered.
12. **BLEVE (BOILING LIQUID EXPANDING VAPOUR CLOUD EXPLOSION)**
The event may have two folds, one; flammable liquid under pressure rapidly spread in to the open area in form of vapour cloud, two; if this spreading vapour cloud gets any source of ignition, then violently explosion took place produce missiles effect with secondary fires and create heavy damages to the surrounding area. The phenomena is called as BLEVE.
13. **BUND/DYKE**
Raised ground or a wall built around a tank or tank farm, to retain spills and prevent their spread, thus reducing hazards.
14. **BURNING RATE**
The value is the rate (in millimetres per minute) at which the depth of a pool of liquid decreases as the liquid burns.
15. **CAS (CHEMICAL ABSTRACT SERVICE REGISTRY NUMBER):**
The unique identification number assigned each compound/chemicals registered with the Chemical Abstract Service (CAS) is listed to aid in quick identification of the compound.
16. **CARCINOGEN**
A substance capable of producing cancer (carcinoma).

GLOSSARY OF TERMS AND DEFINITIONS

17. **CHRONIC**
Of long duration or having frequent recurrence. Chronic health effects are those that become apparent or continue for some time after exposure to hazardous chemicals.
18. **COMBUSTION PRODUCT**
Material produced or; generated during the burning or oxidation of a material.
19. **CONTAMINANT**
A harmful, irritating or moisture material that is foreign to the normal atmosphere.
20. **DANGEROUS OCCURRENCE**
Dangerous Occurrences include bursting of vessel collapse of crane, derrick, hoist, explosion, fire, leakage, escape of any molten metal / hot liquid, explosion of receiver /container, collapse of building/ structure, as specified under schedule of Rule 103 of GFR 1995 and provision under section 88-A of the Factories Act 1948, where in a factory any dangerous occurrence as specified occurs whether causing any bodily injury or disability or not.
21. **DENSITY**
The mass of Unit Volume of a substance e.g. kg/M³
22. **DISASTER**
A disaster is catastrophic consequence of a major emergency / accident that leads to, not only extensive damage to life and property but also disrupts all normal human activity for a pretty long time and requires a major national and international effort for rescue and rehabilitation of those affected.
23. **DISTRICT CRISIS GROUP(DCG)**
"District Crisis Group" means
 - a. The District Crisis Group is the apex body in the district to deal with major chemical accidents and to provide expert guidance for handling chemical accidents.
Ref; Schedule 7 of Rule 8 of Chemical Accidents (Emergency Planning, Preparedness & Response) Rule, 1996.
24. **DOMINO EFFECT**
An effect by which a small hazardous incidence in a unit can escalate to surrounding area causing heavy damages to man, properties & environment.
25. **DOW Index**
Dow index is system of indexing fire, explosion & toxicity level so as to categorized plant/ section into different hazard zones involving fire, explosion & toxicity hazards.
26. **EMERGENCY**
Emergency means a situation leading to a circumstance or set of circumstances in which there is danger to the life or health of persons or which could result in big fire or explosion or pollution to the work and outside environment, affecting the workers or neighbourhood in a serious manner, demanding immediate action. (Ref. Para 2(j) of Part I of Schedule XIX of Gujarat Factories Rules 1963(1995).
27. **EMERGENCY INFORMATION PANEL**
Every Goods carriage used for transporting any dangerous or hazardous goods shall be legibly and conspicuously marked with an emergency information panel in each of three places of the carriage.
28. **ENDOTHERMIC PROCESS**
A process accompanied by the absorption of heat.
29. **EVACUATION**
Removal of residents and other persons from an area of danger.
30. **EXOTHERMIC PROCESS**
A process, in which energy in the form of heat is released.
31. **FIRE BALL**
The burning of a flammable gas cloud, the bulk of which is initially over-rich i.e. (U.F.L.). The whole cloud appears to be on fire as combustion is taking place at eddy boundaries, when air is entrained.
32. **FLAMMABILITY LIMITS (UFL- LFL)**
In fuel-air system a range of composition exists outside which a flame will not propagate a substantial distance from a ignition source. The limiting fuel concentration are termed the upper flammable limit (UFL) and lower Flammable Limit (LFL)

GLOSSARY OF TERMS AND DEFINITIONS**33. FLASH FIRE**

A burning of a flammable vapour cloud at very low flame propagation speed.

34. FLASH POINT

This is defined as the lowest temperature at which vapours above a combustible substance will ignite in air when exposed to a flame.

Depending on the test method used, the values given are either Tag closed cup (C. C.) or Cleveland open cup (O, C.) The values, along with those in 6.2 and 6.5 give an indication of the relative flammability of the chemical. In general, the open cup value is about 10o to 15oF higher than the closed cup value.

35. HAZARD

Hazard may be defined as “the potential of an accident.” Hazard exists in man and the system of materials and machines.

36. HAZARDOUS CHEMICALS

Any substance or material in a quantity or form which may be harmful to humans, animals, crops, water systems, or other elements of the environment if accidentally released. Hazardous chemicals include, explosives, gases (compressed, liquefied or dissolved), flammable or combustible liquids, flammable solids substance, toxic, corrosives,

oxidizing substance, poisonous and insecticides substances.

“Hazardous Chemicals” means

- a. Any Chemical, which satisfies any of the criteria, laid down in Part I of Schedule I and is listed in column 2 of Part II of the schedule.
- b. Any Chemical listed in Column 2 of Schedule 2.
- c. Any Chemical listed in Column 2 of Schedule 3, as per provisions given below;
 - Rule 68J 1 (a) of GUJARAT FACTORIES RULES 1963 (Amended-1995)
 - Rule 2(e) of MANUFACTURE, STORAGE AND IMPORT OF HAZARDOUS CHEMICAL RULES, 1989.
 - Rule 2(b) of Chemical Accidents (Emergency Planning, Preparedness & Response) Rule, 1996.

37. HAZARDOUS PROCESS

Any process or activity in relation to an industry specified in the First Schedule under the Section 2(cb) of the Factories Act 1948 (1987).

38. HAZCHEM CODES

The HAZCHEM code system was developed by the British Fire Service for use on vehicles transporting dangerous substances. It consists of either two or three characters. The first character is a numeral in the range of 1 to 4.

1 – Jets, 2 – Fog, 3 – Foam, 4 – Dry Agent

The second character is a letter selected from the range P, R, S, T, W, X, Y, Z.

Personal Protection – 1. The letter P, R, W or X indicate that a full chemical suit and breathing apparatus should be worn. 2. The letters S, T, Y & Z indicate that breathing apparatus need only be worn if the substances are involved in a fire.

Contain or Dilute – The letters P, R, S, & T indicate dilution while W, X, Y & Z indicate containment.

The third character when appearing is E indicates that evacuation of persons in the neighbouring areas must be taken into consideration.

39. IC (INCIDENT CONTROLLER)

He has to tackle the situation of operations on process/storage/event/occurrence by taking technical decisions to control the emergency by responding the requisite experienced persons.

40. INDUSTRIAL ACTIVITY

“Industrial Activity” means

- i. An operation of process carried out in an industrial installation referred to in Schedule 4 involving or likely to involve one or more hazardous chemicals and includes on-site storage or on-site transport which is associated with that operation or process, as the case may be, or
- ii. Isolated Storage, or
- iii. Pipeline.

GLOSSARY OF TERMS AND DEFINITIONS

Industrial activities are given in following;

- a. Rule 68(J)(1)(b) of GUJARAT FACTORIES RULES 1963 (Amended-1995)
- b. Rule 2(h) of MANUFACTURE, STORAGE AND IMPORT OF HAZARDOUS CHEMICAL RULES, 1989.
- c. Rule 2(c) of Chemical Accidents (Emergency Planning, Preparedness & Response) Rule, 1996.

41. IDLH (IMMEDIATELY DANGEROUS TO LIFE AND HEALTH)

The level of concentration immediately dangerous to life or health from which a worker could escape without any impairing symptoms or any irreversible health effect (NIOSH/OSHA). The concentrations are reported either parts per million (ppm) or milligrams per cubic meter (mg/m³).

42. IGNITION TEMPERATURE

This is the minimum temperature at which the material will ignite without a spark or flame being present. Along with the values in 6.1 and 6.2 above, it gives an indication of the relative flammability of the chemical. It is sometimes called "auto ignition temperature".

43. LC₅₀ (LETHAL CONCENTRATION)

Lethal Concentration level for air Borne toxic substance.

44. LD₅₀ (LETHAL DOSE)

The term LD₅₀ signifies that about 50% of the animals given the specified dose by mouth will die. Thus for a grade 4 chemical (below 50 mg/kg) the toxic dose for 50% of animals weighting 70 kgs (150 lb) is $70 \times 50 = 3,500$ mg = 3.5 gr or less than 1 tea spoonful, it might be as little as a few drops. For a Grade 1 chemical (5 to 15 g/kg) the LD50 would be between a pint and a quart for a 150 lb man.

45. LOCAL CRISIS GROUP (LCG)

"Local Crisis Group" means

- a. It is body constituted by Government, in the industrial pocked to deal with chemical accidents and co-ordinate efforts in planning, preparedness and mitigation of chemical accidents.

Ref.: Schedule 8 of Rule 8 of Chemical Accidents (Emergency Planning, Preparedness & Response) Rule 1996.

46. MAJOR ACCIDENT

Major Accident means an incident involving loss of the life inside or outside the site or ten or more injuries inside and/or one or more injuries outside or release of toxic chemical or explosion or fire of spillage of hazardous chemical result in 'On Site' or 'Off Site' emergencies or damage too equipments leading to stoppage of process or adverse effects to the environment. (Ref. 1. Rule 68(J)(1)(d) of Gujarat Factories Rules 1963(2004), 2. Rule 2(j) of Manufacture, Storage and Import of Hazardous Chemical Rules, 1989. 3. Rule 2(f) of Chemical Accidents (Emergency Planning, Preparedness & Response) Rule, 1996).

47. MAJOR ACCIDENT HAZARDOUS (MAH) INSTALLION

"MAH installation" means

- a. Isolated storage and industrial activity at a site, handling (including transport through carrier or pipeline) of hazardous chemicals equal to or in excess of the threshold quantities specified in column 3 of Schedule 2 and 3 respectively.

Ref: Rule 2(g) of Chemical Accidents (Emergency Planning, Preparedness & Response) Rule 1996.

48. MANOMETER

An instrument that measures gaseous pressure, especially, it is an U-tube partially filled with water / mercury / light oil. The difference in level of the liquid between two sides of tubes indicates the pressure.

49. MORBIDITY

Ability to cause illness of diseases.

50. NFPA

National Fire Protection Association-USA

51. NGO (NON GOVERNMENT ORGANIZATIONS):

Voluntary and social services agencies such as Salvation Army, Red Cross society, Social worker groups, Church Group etc., who provide community support services particularly during emergencies and natural calamities.

GLOSSARY OF TERMS AND DEFINITIONS

52. **NIOSH**
National Institute for Occupational Safety & Health-USA
53. **ODOUR THRESHOLD**
The lowest concentration of an air contaminant that can be detected by smell.
54. **OFF-SITE EMERGENCY PLAN**
The objective of an Off Site Emergency Plan is to protect the life and property of the neighbourhood areas of the industrial unit . Off Site Emergency Plan shall be prepared by Government Authorities as per Rule 14 of MSIHC Rules 1989 and follow the instruction under provision of CA(EPPR) Rules 1996.
55. **ON SITE EMERGENCY PLAN**
On Site Emergency Plan is to be prepared by occupier of industrial Units as per Schedule 8A under Rule 68(J)(12) of Gujarat Factories Rules 1963(2004). Ref: Section 41(B)(4) of The Factories Act 1948 , Schedule XI under Rule 13 of MSHIC Rules 1989, and Rule 5,7, & 9 of CA(EPPR) Rules 1996.
56. **OSHA**
Occupational Safety and Health Administration – U. S. Federal Agency
57. **OVER PRESSURE**
Maximum pressure above atmosphere pressure experienced during the pressure of a blast wave from an explosion.
58. **PLUME**
Hazardous gas / vapour / cloud resulting from a continuous source release.
59. **PUFF**
Plum is instantaneous release of a gas / vapour from the source.
60. **POLYMERIZATION**
A few chemicals can undergo rapid polymerization to form sticky, resinous materials, with the liberation of much heat. The containers may explode.
61. **POOL FIRE**
A pool of flammable liquid burning with a stationary diffusion flame.
62. **PPM (PARTS PER MILLION)**
63. **PYROLYSIS**
Chemical decomposition by the action of heat.
64. **QRA (QUANTITATIVE RISK ASSESSMENT)**
QRA is identifying, quantifying & computer modelling of all the potential emergency scenarios.
65. **RESPONSE**
The efforts to minimize the risks created in an emergency by protecting the people, the environment and the property, and the efforts to return the scene to normal pre-emergency conditions. Persons who perform the various response functions are termed “RESPONDERS”.
66. **RISK**
Risk of an accident may be defined as “the chance or probability or likelihood of an accident being caused in a given man-material-machine system.
67. **SENSITIVE POPULATIONS**
Groups of people that may be more susceptible than the general population to the toxic effects of the release due to pre-existing health condition (patients in hospitals, pregnant women etc.) or age (elderly people infants, handicaps).
68. **SPILL**
Spill is large liquid releases from a bulk storage tank/process vessel.
69. **SEVERITY RATING**
1. The Severity rating of 1, would be termed as most sever which would call for complete evacuation of public at large and would hold potential for sever damage both to life as well as property.
 2. The severity rating of 2, would be terms as grave for it would have potential to cause damage to life and a portion of property.
 3. The severity rating of 3, would be termed as high i.e. it has potential effect on life and extensive damage in terms of property.

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4. The severity rating of 4, would be terms as moderate i.e. would call for partial evacuation as well as activation of material aid.
 5. The severity rating of 5, would be terms as low. This would have both localized effect mostly in terms of property damage and would call for declaration of local emergency.
70. **SMC : SITE MAN CONTROLLER**
He is overall responsible for directing operations & decide the actions, consulting with incident controller & seniors, and handle & control the emergency.
 71. **SHORT – TERM INHALATION LIMIT (STEL)**
The parts of vapour (gas) per million parts of contaminated air by volume at 25oC (77oF) and at one atmosphere of pressure is given. The limits are given in milligrams per cubic meter for chemical that form a fine mist or dust. The values given are the maximum permissible average exposures for the time periods specified.
 72. **SPECIFIC GRAVITY**
The specific Gravity of a chemicals is the ratio of the weight of the solid or liquid to the weight of an equal volume of water at 4oC (or at some other specified temperature) If the specific gravity is less than 1.0 (or less than 1.03 in sea water) the chemical will float, if higher it will sink.
 73. **TLV (THRESHOLD LIMIT VALUE)**
TLV refer to airborne concentration of substances. There are three categories of TLV.
TLV – TWA - Time Weighted Average.
TLV - STEL – Short term Exposure limit
TLV - for gases and vapour is usually expressed in PPM. (Part of the gas/vapour/million parts of air) mg/m³ : milligram/cubic meter.
 74. **Toxic Cloud**
Air borne mass of gases, vapours, fumes, dust or aerosols of toxic materials.
 75. **Toxicity**
The ability of a substance to cause damage to living tissue, impairment of the central nervous system, serve illness or death when ingested, inhaled or absorbed by the skin.
 76. **VAPOUR CLOUD**
Air borne dispersing hazardous vapours, which may or may not be visible as a “Cloud”
 77. **VULNERABILITY**
It can be defined as “the zone of influence of an emergency in and around the facility concerned.
 78. **WATER FOG**
A finely divided mist produced by either a high or low velocity fog nozzle. It is used for knocking down flames and cooling hot surfaces.

CHEMICAL ACCIDENTS (EPPR) RULES-1996

THE GAZETTE OF INDIA EXTRA ORDINARY
PART – II SECTION – 3(1)

Schedule-2;

Ministry of Environment & Forests

Notification

New Delhi, the 01st August, 1996

Rules on Emergency planning,
Preparedness and Response for
Chemical Accidents

G.S.R. 347 (E). – In exercise of the powers conferred by Sections 6,8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules, namely :-

1. Short Title and Commencement.--

a. These rules may be called the Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996.

b. They shall come into force on the date of their publication in the Official Gazette.

2. Definitions :- In these rules unless the context otherwise requires, -

a. "Chemical accident" means an accident involving a fortuitous or sudden or unintended occurrence while handling any hazardous chemicals resulting in continuous, intermittent or repeated exposure to death, or injury to, any person or damage to any property but does not include an accident by reason only of war or radio-activity.

b. "Hazardous chemical" means, -

1. any chemical which satisfies any of the criteria laid down in Part 1 of Schedule 1 or is listed in Part 2 of the said schedule;
2. any chemical listed in Column 2 or Schedule 2;
3. any chemical listed in Column 2 of Schedule 3.

c. "Industrial activity" includes an operation or process,-

1. carried out in an industrial installation referred to in Schedule – 4 involving or likely to involve one or more hazardous chemicals;
2. On-site storage or on-site transport, which is associated with that operation or process as the case may be;
3. Isolated storage;
4. Pipeline.

d. "Industrial pocket" means any industrial zone earmarked by the Industrial Development Corporation of the State Government or by the State Government.

e. "Isolated storage" means – storage of a hazardous chemical other than storage associated with an installation on the same site specified in Schedule – 4 where that storage involves at least the quantities of that chemical set out in

f. "Major chemical accident" means, -- an occurrence including any particular major emission, fire or explosion involving one or more hazardous chemicals and resulting from uncontrolled developments in the course of industrial activity or transportation or due to natural events leading to serious effects both immediate of delays, inside or outside the installation likely to cause substantial loss of life and property including adverse effects on the environment;

f. "Major Accident Hazards (MAH) Installations", -- means, isolated storage and industrial activity at a site, handling (including transport through carrier or pipeline) of hazardous chemicals equal to or, in excess of the threshold quantities specified in column 3 of Schedules 2 and 3 respectively;

h. "Manufacture, Storage and Import of Hazardous Chemicals Rules" means – the Manufacture, Storage and import of Hazardous Chemicals Rules, 1989, published in the notification of Government of India in the Ministry of Environment & Forests No. S.O.966 (E) dated 27th November, 1989.

i. "Off-site emergency plan" means, - the off-site emergency plan prepared under rule 14 of the Manufacture, Storage and Import of Hazardous Chemicals Rules;

j. "Pipeline" means, -- a pipe (together with any apparatus and works associated therewith) or system of pipes (together with any apparatus and works associated therewith) for the conveyance of a hazardous chemical other than a flammable gas as set out in column 2 of Part II of Schedule 1, at a pressure of less than 8 bars absolute;

k. "Site" means, -- any location where hazardous chemicals are manufactured or processed, stored, handled, used, disposed of and includes the whole of an area under the control of an occupier and includes pier, jetty or similar structure whether floating or not;

i. "Transport" means, -- movement of hazardous chemicals by any means over land, water or air.

3. Constitution of Central Crisis Group:

a. The Central Government shall constitute a Central Crisis Group for management of Chemical accidents and set up a Crisis Alert system in accordance with the provisions of Rule-4 within thirty days from the date of commencement of these rules.

b. The composition of the Central Crisis Group shall be as specified in Schedule-5.

ANNEXURE – 25*Continue...*

- c. The Central Crisis Group shall meet at least once in six months and follow such procedure of transaction of business as it deems fit.

- d. Notwithstanding anything contained in sub-rule (2) the Central Crisis Group may co-opt any person whose assistance or advice is considered useful in performing any of its functions to participate in the deliberations of any of its meetings.

4. Constitution of Crisis Alert System, - the Central Government shall,

- a. set up a functional control room at such place as it deems fit.
- b. set up an information net working system with the state and district control rooms.
- c. appoint adequate staff and experts to man the functional control room.
- d. publish a list of Major Accident Hazardous installations;
- e. publish a list of major chemical accidents in chronological order;
- f. publish a list of members of the Central State and District Crisis Groups;
- g. take measures to create awareness amongst the public with a view to preventing chemical accidents.

5. Functions of the Central Crisis Group, -

- a. The Central Crisis Group shall be the apex body to deal with major chemical accidents and to provide expert guidance for handling major chemical accidents.
- b. Without prejudice to the functions specified under sub-rule(1), the Central Crisis Group shall –
 - 1. continuously monitor the post-accident situation arising out of a major chemical accident and suggest measures for prevention and to check recurrence of such accidents;
 - 2. conduct post-accident analysis of such major chemical accidents and evaluate responses;
 - 3. review district off-site emergency plans with a view to examine its adequacy in accordance with the manufacture, storage, and import of hazardous chemicals, rules and suggest measures to reduce risks in the Industrial pockets;
 - 4. review the progress reports submitted by the State Crisis Groups;
 - 5. respond to queries addressed to it by the State Crisis Groups and the District Crisis Groups;
 - 6. publish a state-wise list of experts and officials who are concerned with the handling of chemical accidents;
 - 7. render, in the event of a chemical accident in a State all functional and infrastructural help as may be necessary.

6. Constitution of State Crisis Group, --

- a. The State Government shall constitute a State Crisis Group for management of chemical accidents within thirty days from the date of commencement of these rules.
- b. The composition of the State Crisis Group shall be as specified in Schedule 6.
- c. The State Crisis Group shall meet at least once in three months and follow such procedure for transaction of business as it deems fit.
- d. Notwithstanding anything contained in sub-rule(2) the State Crisis Group may co-opt any person whose assistance or advice is considered useful in performing any of its functions, to participate in the deliberation of any of its meetings.

7. Functions of the State Crisis Group, --

- a. The State Crisis Group shall be the apex body in the State to deal with major chemical accidents and to provide expert guidance for handling major chemical accidents.
- b. Without prejudice to the functions specified under sub-rule(1), the State Crises Group shall, --
- c. review all district off-site emergency plans in the State with a view to examine its adequacy in accordance with the manufacture, storage and import of Hazardous chemicals, Rules and forward a report to the Central Crisis Group once in three months.
- d. assist the State Government in managing chemical accidents at a site.
- e. assist the State Government in the planning, preparedness and mitigation of major chemical accidents at a site in the State;
- f. continuously monitor the post accident situation arising out of a major chemical accident in the State and forward a report to the Central Crisis Group;
- g. review the progress report submitted by the District Crisis Groups;
- h. respond to queries addressed to it by the District Crisis Groups;
- i. publish a list of experts and officials in the State who are concerned with the management of chemical accidents.

8. Constitution of the District and Local Crisis Group, --

- a. The state Government shall cause to be constituted within thirty days from the date of commencement of these rules, --

1. District Crisis Group,
2. Local Crisis Group,

- b. The composition of the District Crisis Group and the Local Crisis Groups shall be as specified in Schedules 7 & 8 respectively.
- c. The District Crises Group shall meet every forty five days and send a report to the State Crisis Group.
- d. The local Crisis Group shall meet every month and forward a copy of the proceedings to the District Crisis Group.

3. train personnel involved in chemical accident management;
4. educate the population likely to be affected in a chemical accident about the remedies and existing preparedness in the area;
5. conduct at least one full scale mock-drill of a chemical accident at a site every six months and forward a report to the District Crisis Group;
6. respond to all public inquiries on the subject

9. Functions of the District Crisis Group, --

- a. The District Crisis Group shall be the apex body in the district to deal with major chemical accidents and to provide expert guidance for handling chemical accidents;
- b. Without prejudice to the functions specified under rule (1) the District Crisis Group shall, --
- c. assist in the preparation of the district off-site emergency plan.
- d. review all the on-site emergency plans prepared by the occupier of Major Accident Hazards installation for the preparation of the district off-site emergency plan;
- e. assist the district administration in the management of chemical accidents at a site lying within the district.
- f. continuously monitor every chemical accident;
- g. ensure continuous information flow from the district to the Center and State Crisis Group,
- h. forward a report of the chemical accident within fifteen days to the state crisis group;
- i. conduct at least one full scale mock-drill of a chemical accident at a site each year and forward a report of the strength and the weakness of the plan to the State Crisis Group.

10. Functions of the Local Crisis Group, --

The Local Crisis Group shall be the body in the industrial pocket to deal with chemical accidents and co-ordinate efforts in planning, preparedness and mitigation of a chemical accident;

- a. Without prejudice to the functions specified under sub-rule (1) the Local Crisis Group shall, --
 1. prepare local emergency plan for the industrial pocket.
 2. ensure dovetailing of the local emergency plan with the district off-site emergency plan;

11. Powers of the Members of the Central, State and District Crisis Groups, --

The Members of the Central Crisis Group, State Crisis Groups and District Crisis Groups shall be deemed to be persons empowered by the Central Government in this behalf under sub-section (1) of section 10 of the Environment (Protection) Act, 1986.

12. Aid and assistance for the functioning of the District and Local Crisis Groups, --

- a. The Major accident Hazard installations in the industrial pockets in the district shall aid, assist and facilitate functioning of the District Crisis Group,
- b. The Major Accident Hazard installations in the industrial pockets shall also aid, assist and facilities the functioning of the Local Crisis Group.

13. Information in the public, --

- a. The Central Crisis Group shall provide information on request regarding chemical accident prevention, preparedness and mitigation in the country.
- b. The State Crisis Group shall provide information on request regarding chemical accident prevention, preparedness and mitigation to the public in the State.
- c. The Local Crisis Group shall provide information regarding possible chemical accident at a site in the industrial pocket and related information to the public on request;
- d. The Local Crisis Group shall assist the Major Accident Hazard installations in the industrial pocket in taking appropriate steps to inform persons likely to be affected by a chemical accident

Schedule – I

[See rule 3(b) & 2(j)]

Part – I

- a. Toxic Chemicals : Chemicals having the following values of acute toxicity and which owing to their physical and chemical properties, are capable of producing major accident hazards :

Sr. no.	Degree of toxicity	Oral toxicity LD50(mg/kg)	Dermal toxicity (Dermal LD50) (mg/kg)	Inhalation toxicity by dust & mists (mg/l)
1.	Extremely toxic	<5	<40	<0.5
2.	Highly toxic	>5 – 50	>4 – 200	>0.5 – 2.0
3.	Toxic	>50 – 200	>200 – 1000	>2 – 10

- b. Flammable Chemicals :-

1. Flammable gases chemicals which in the gaseous state at normal pressure and mixed with air become flammable and the boiling point of which at normal pressure is 20°C or below.
2. Highly flammable liquids chemicals which have a flash point lower than 23°C and the boiling point of which at normal pressure is above 20°C.
3. Flammable liquids chemicals which have a flash point lower than 65°C and which remain liquids under pressure, where particular processing conditions, such as high pressure and high temperature, may create major accident hazards.

- c. Explosion Chemicals which may explode under the effect of flame, heat or petro-chemical conditions or which are more sensitive to shocks or friction than dinitro-benzene.

Part – II**List of Hazardous and Toxic Chemicals**

Sr. No.	Chemical	Sr.no in MSIHC Rules*
1	Acetone	1
3	Acetylene Chloride	3
4	Acetylene (Ethyne)	8
6	Acrylonitrile	12
16	Ammonia	31
21	Aniline	37
32	Benzene	56
51	Bromine	84
54	Butadiene	88
82	Carbon Tetrachloride	109
80	Carbon Di-sulphide	110
84	Chlorine	119
121	Cyclohexane	161
-	Ethyl Alcohol	248
190	Ethylene	261
205	Formaldehyde	285
217	Hexane	306
223	Hydrogen	314
224	Hydrogen Bromide	315
231	Iodine	323
-	Isopropyl Alcohol	334
242	Liquefied Petroleum Gas (LPG)	347
-	Methane	368
258	Methyl Alcohol	377

ANNEXURE – 25

Continue..

-	Nitric Acid	423
287	Nitro Benzene	425
-	Nitrogen	429
301	Oleum	444
310	Oxygen (Liquid)	428
315	Parathion	462
329	Phenol	481
333	Phorate	490
337	Phosgene	493
362	Sodium Cyanide	569
370	Sulphuric Acid	591
388	Toluene	628
421	Turpentine	666
424	Vinyl Chloride	672
428	Xylene	-
430	Zinc & Compounds	-
431	Zirconium & Compounds	684

* As per MSIHC Rules - 2000

Schedule – II & III

List of Chemicals with Threshold Quantity under rule 2(b), 2(c), 2(g).

Schedule – IV

List of Installation includes an operation or processes under rule 2(c), 2(e).

Schedule – V

[See rule 3(2)]

Composition of Central Crisis Group

1.	Secretary Govt. of India Ministry of Environment & Forests	Chair Person
2.	Joint Secretary Adviser (Environment & Forests)	Member Secretary
3.	Joint Secretary (Labour)	Member
4.	Joint Secretary / Advisor (Chemicals & Petrochemicals)	Member
5.	Director General, Civil Defence	Member
6.	Fire Advisor, Directorate General, Civil Defence	Member
7.	Chief Controller of Explosives	Member
8.	Joint Secretary (Dept. of Industries)	Member
9.	Direct General, Indian Council of Medical Research	Member
10.	Joint Secretary (Health)	Member
11.	Chairman, Central Pollution Control Board	Member
12.	Director General, Indian Council of Agriculture Research	Member
13.	Director General, Council of Scientific & Industrial Research	Member
14.	4 Experts (Industrial Safety and Health)	Member
15.	Joint Secretary (Fertilizers)	Member
16.	Director General (Telecom)	Member
17.	2 Representatives of Industries to be nominated by the Central Govt.	Member
18.	Joint Secretary (surface transport)	Member
19.	General Manager (Rail Safety)	Member
20.	Advisor, Centre for environment and explosive safety	Member
21.	One Representative of Indian Chemical Manufacturers Association to be nominated by the Central Govt.	Member

Schedule – VI

[See rule 6(2)]

ANNEXURE – 25

Continue...

Composition of the State Crisis Group

1.	Chief Secretary	Chair Person
2.	Secretary (Labour)	Member Secretary
3.	Secretary (Environment)	Member
4.	Secretary (Health)	Member
5.	Secretary (Industries)	Member
6.	Secretary (Public Health Engg.)	Member
7.	Chairman, State Pollution Control Board	Member
8.	4 Experts (Industrial Safety & Health) to be nominated by the State Govt.	Member
9.	Secretary / Commissioner (Transport)	Member
10.	Director (Industrial Safety / Chief Inspector of Factories)	Member
11.	Fire Chief	Member
12.	Commissioner of Police	Member
13.	One Representative from the industry to be nominated by the State Govt.	Member

Schedule – VII

[See rule 8]

Composition of the District Crisis Group

1.	District Collector	Chair person
2.	Inspector of Factories	Member secretary
3.	District Energy Officer	Member
4.	Chief Fire Officer	Member
5.	District information Officer	Member
6.	Controller of Explosives	Member
7.	Chief Civil Defence	Member
8.	One Rep. Of Trade Unions to be nominated by the Dist. Collector	Member
9.	Deputy Sup. Of Police	Member
10.	District Health Officer / Chief Medical Officer	Member
11.	Commissioner, Municipal Corporation	Member
12.	Rep. Of the Dept. of Public Health Engg.	Member
13.	Rep. Of Pollution Control Board	Member
14.	District Agricultural Officer	Member
15.	4 Experts (Industrial Safety & Health) to be nominated by the Dist. Collector	Member
16.	Commissioner (Transport)	Member
17.	One rep. Of Industry to be nominated by the Dist. Collector	Member
18.	Chair persons member secretary of Local Crisis Group	Member

Schedule – VIII

[See rule 8]

Composition of the Local Crisis Group

1.	Sub-divisional Magistrate / District Emergency Authority	Chair person
2.	Inspector of Factories	Member Secretary
3.	Industries in the District Industrial area / Industrial Pocket	Member
4.	Transporters of Hazardous Chemicals (2 nos.)	Member
5.	Fire Officer	Member
6.	Station House Officer (Police)	Member
7.	Block Development Officer	Member
8.	One rep. Of Civil Defence	Member
9.	Primary Health Officer	Member
10.	Editor of Local News Paper	Member
11.	Community leader / sarpanch / village pradhan nominated by Chair Person	Member
12.	One rep. Of non-government organization to be nominated by the Chair person	Member
13.	Two Doctors eminent in the Local area to be nominated by Chair person	Member
14.	Two social workers to be nominated by the chair person	Member

VADODARA DISTRICT OFF - SITE EMERGENCY PLAN 2025

PAC ANALYSIS *Part -3*

Prepared by
**VADODARA DISTRICT CRISIS GROUP
VADODARA
2025**

PAC ANALYSIS FOR EMERGENC SCENARIOS

1. INTRODUCTION

The PAC analysis is a method developed by PRESTELS for developing Emergency Response Plan for a particular emergency scenario. The PAC analysis clarifies the roles and responsibilities of various responders, actions to be taken and communication to be made. The PAC analysis throws light on the resources required to combat emergency. It also draws attention to the pacific's of communication that must be made.

a. P-A-C

The term PAC stands for Person – Action – Communication during an emergency, each responder is required to take certain Action and make certain Communication. The PAC analysis charts the Actions to be taken and the Communication to be made against every responder. The analysis begins at the onset of signs for a looming disaster and ends with the 'calling-off' of the off-site emergency.

b. Person

The person is an individual authority or role such as District Collector or Site Controller. It may also be group of people such as Police Constables, Bus Drivers or NGOs volunteers.

c. Action

The action is an act undertaken by person such as assessment of damage potential or projection of vulnerable zone or transportation of person from one place to another or diversion of traffic.

d. Communication

Communication is a message communicated from one person to other person(s) to initiate actions from the person(s) to whom the message is communicated.

2. EXPLANATION OF COLUMNS ON THE PAC SHEET

a. Person

b. Primary

Here, enter name of authority, role such as District Collector, Police officer or Site Incident Controller Enter the name of persons in brackets.

c. Alternate

Here, enter name of person who will assume temporary charge in absence of the person listed in the Primary.

d. Action

e. Act

Here, enter the activities to be undertaken such as Assess Damage, Divert Traffic and others by Concerned persons.

f. Resource

Here enter the resource(s) required by the person to carry out his Act sufficiently and efficiently. e.g.: Nose Masks, Ambulances, Water etc.

g. Communication

h. Whom

Here enter the authority, role to whom the communication must be made. Enter the name of person in brackets

i. How

Here, enter the means of communication and phone numbers as:

INT: for internal line numbers

O: for office landline numbers

R: for residence landline numbers

M: for mobile numbers

j. **What**

Here, enter the specifics of message to be communicated

k. **Remarks**

This section is to be used for making observations on the Person – Action – Communication proceeds. This section may be filled during a Mock Drill exercise

l. **Time**

Here, enter the clock time at the completion of a particular Person – Action – Communication Sequence.

m. **Resource Gap**

Here, enter the shortcoming in resources and additional resources necessary.

n. **Communication Gap**

Here, enter communication gaps observed.

o. **Other**

Here, enter other observations, comments or suggestions.

3. SERIAL NUMBERING RULES FOR PAC SHEET

Every row of PAC corresponds to the entity 'Person'. Number rows as '1, 2, 3...etc.' for every 'Person', there will be numbers of actions. Label 'Act' as 'a, b, c...etc.' Every 'Act' will have its resource requirement. Label 'Resources' as 'a, b, c...etc.' corresponding to the respective 'Act'. Likewise, one 'Person' may have to communicate too many others. Under communication

Columns, label 'Whom' as 'a, b, c...etc.' and label the 'How' and 'What' as 'a, b, c...etc.' corresponding to the 'Whom' respectively. (See examples for clarity of labelling serial numbers. Wherever required grouping of serial numbers such as 'a, b)' or 'a-f)' is permitted.

Where only one item exists labelling can be dropped. However, every label in 'Act' column must have a corresponding label in 'Resources' column and every label in 'Whom' column must have a corresponding label in 'How' and 'What' column. In case a particular 'Act' does not require any 'Resources', then the entry may be made as '-' in the Resources column.

4. BENEFITS OF PAC

The benefits of PAC are as under:

- Clarity of roles and responsibilities to people involved in emergency management.
- Identification of resource gaps for resource planning and procurement.
- Specificity of communication and improvement in communication messages, which is crucial to efficient response mitigation.
- Improved specificity of observations during mock-drills and identification of improvement opportunities.
- The PAC can be a very effective tool for training emergency responders

5. CASE STUDY 1 - CHLORINE LEAK

a. Scenario

A chlorine pipeline connected to the bulk storage tank is ruptured. Initially about 500 kg of liquid Chlorine leaks out creating a major emergency. The flow is stopped by applying special cement, and the transfer of chlorine to the spare tank is started. However, there is a danger of escalation because the cement could give way to the internal pressure before the transfer is completed. Thus, the off-site plan is activated including evacuation. The scenario incorporates situations illustrating how the plan is activated, how each responder responds and what problems arise.

b. Development

The incident occurs at 4-30 pm when the second shift has started. As soon as the emergency occurs, the shift maintenance engineer assumes charge of Incident Controller. The Dy. Chief Engineer who is in charge of the factory at that time assumes the charge of Site Controller. He informs the District Collector, Fire Brigade, Police, Medical Officer and other agencies. He informs the Chief Maintenance Engineer, who arrives and takes over as the Incident Controller. He informs the CEO/Manager, who immediately reaches factory and then takes over as Site Controller from Dy. Chief Engineer.

The RDC who was in the office when the message is received assumes the charge and informs the Collector who reaches office in 15 minutes. Before the Collector arrives, the RDC has activated the Plan and has informed the Fire Brigade, Police, Medical Officer, Transport provider among responders and has confirmed that they have received the information and have initiated their action.

Meanwhile the Site Controller procures and projects the details on extent of emergency and informs it to the District Collector, Fire Brigade, Police and other responders. He informs that the situation is getting under control but can develop into a major emergency requiring intimation to public to stay confined indoors and evacuation from certain areas. He also identifies the area likely to be affected and gives the details to the agencies.

The Police block the traffic, send a vehicle with loud speaker to alert public to go stay confined indoors. Those who are on the streets are directed to walk crosswind.

Police realize that a public meeting is going on an open ground nearby. A constable is sent to ask the public to walk away in particular direction and get inside confined shelters. The leaders of the political party conducting the meeting (which is the opposition party) take it amiss and refuse to disperse, taking it as a ploy to prevent their meeting. A senior officer is deputed with a police van. The leaders understand the gravity and situation is under control. People start evacuating the ground.

In a nearby cinema house a show is going on. Police inform the manager of cinema theatre. An announcement is made to ask the people to stay inside. The air conditioning system is stopped. As the AC system is stopped the people are uncomfortable and in bad mood. Situation is tactfully controlled.

Hutments near the factory, are not “gas-proof”, staying inside is not safe. The Collector asks State Transport to dispatch buses to undertake evacuation. The ST drivers refuse, questioning about their safety. There are no PPE for them. They are persuaded to go with wet cloth tied over the nose. A decision is taken to evacuate women, children and old people first. They are shifted to “shelters” (such as school). Food and water arrangements are made through the civil supplies department and help from NGOs.

There is a milk dairy in the vicinity. The cattle are in open sheds and hence not safe. Evacuation is difficult. The dairy owners are asked to cover the sides of the sheds by tarpaulin sheets, which are provided by the nearby supplier. People affected by chlorine are shifted to hospitals and treated by medical teams.

The Fire Brigade tenders help the Incident Controller to establish water curtains.

Ambulance is kept ready near the incident-spot, in case anybody from the incident controller's team gets affected.

The District Collector continuously monitors the actions being taken and ensures proper coordination amongst the responding agencies. The District Collector also requests for additional assistance from the neighbouring districts and the State Authorities. The Collector also is constantly in touch with the Site Controller at the factory to know the status and to ascertain the developing situation. (For example, the wind direction may change, leak may aggravate.)

The Incident Controller and his team work hard and ensure that the emergency does not escalate further and Chlorine is transferred from the affected tank to the spare tank.

When the Chlorine transfer to safe spare tank is complete, the Site Controller informs the District Collector, who calls off the emergency.

Arrangements are made to ensure that the people who were shifted from the hutments are again brought back to their homes. The Factory Inspectorate initiates accident investigation. The Pollution Control Board alerts the District Collector on the possible pollution and its effects on near and distant future. The long term clean up and post-emergency restoration activities are initiated.

6. CASE STUDY 2 - TRANSPORTATION EMERGENCY

6.1 Scenario

Tanker carrying highly flammable naphtha overturns on mountainous road (goat) and develops a leak after its valve is damaged. The leak is minimal but can develop further if untreated. The driver and his assistant (cleaner) are luckily not injured. The tanker belongs to Kerala state and accident takes place in Karnataka state.

6.2 Development

- The driver, using his cell phone, tries to call the Police Control Room but the network is weak. Meanwhile, the cleaner requests a passing vehicle to report the incidence to the next police station on way.
- The driver succeeds in calling the Police Control Room and informs them about the type of emergency, location and what help is required. The driver also tries to contact his employer. (The Police also receive information from the driver of a passing vehicle, which had seen the overturned vehicle.)
- The cleaner tries to keep the moving traffic as far away as possible by using stones and tree branches. (He improvises because he is not carrying the equipment for road blockage like the portable plastic cones or a barrier stand). He is unable to repair or stop the leak.
- Some local nomads gather and try to collect the leaking liquid. Driver tries to stop them, warns them about the hazard.
- Traffic jam ensues.
- The police team reaches the spot. The police control room alerts and transmits information to District

Collector, Fire Brigade, Medical Office, Police headquarters for additional staff to control the situation. The District Collector declares an off-site emergency. The technical team to repair and stop the leakage, a spare tanker and a crane to move the overturned tanker is called for.

- The driver briefs the police who have arrived at the spot and they immediately stop the traffic, and also disperse the crowd local nomads. TM.

(Observe that first the driver and later the police team are the 'Incident Controllers'. The officer at the Police Control Room is the 'Site Controller')

- The technical team arrives and the leader of the team takes charge as the 'Incident Controller'. The repairs stopped the leakage, but it is decided that the tanker will be emptied before it is made to stand on its wheels. The fire brigade arrives and is kept on standby in case its service is required. The spare tanker, requested earlier, arrives. The transfer is started. The crane arrives and the overturned tanker is lifted. The police regulate the traffic and the jam is gradually reduced. The incident is brought under control. The off-site emergency is called off and the post-emergency operations are initiated.

(Note: The following PAC draft may show the same communication or task being done by multiple agencies. This is to ensure that intimation has reached at least from one source or action is initiated in fastest possible manner.)

7. ROLE OF INCIDENT CONTROLLER AND SITE CONTROLLER

The Site Controller and the Incident Controller are the two vital roles in the management of emergency. This note seeks to clarify the two roles.

7.1 Incident Controller

The incident controller is responsible for attending to the source or the cause of emergency. He leads the team involved in repairing, controlling and preventing escalation at the source. He is expected to have the required technical knowledge, skill and resources required to attend to the incident causing emergency. For example, if there is a crack in a pipeline carrying toxic gas, he ensures that the valve on the supply line is closed and repairs the damaged pipeline. If a bulk Storage tank has a crack, transfer of the contents to a spare tank is started and repairs undertaken.

The incident controller co-ordinates with only the 'Site Controller' (see below). The incident controller must ask for any additional help (staff, tools, material, equipment etc required for dealing with the incident) from the Site controller. The site controller will arrange for the same at the earliest. This enables incident controller to concentrate on his job of attending to the incident without being burdened by communication tasks. Also, in the normal course, the incident controller does not directly interact with the outside industry authorities and agencies such as the District Collector, Fire brigade, Police etc. This is done by the site controller.

The incident controller gives continuous feedback about the status of the operation to the site controller.

7.2 Site Controller

The 'Site Controller' is overall in-charge of the operation at the incident-site. While the incident controller attends to the

source or the cause of emergency, the site controller will be in the Emergency Control Room (ECR). The ECR is a place to be well equipped with telephones, drawings and maps, computer programs for dispersion modelling etc.

The site controller ensures that the off-site responders (District Collector, Police, Fire Brigade etc) are given quick intimation. He also ensures prompt assistance to the requirements of the incident controller. He may have to arrange the assistance from the factory itself or get help from outside (from fire brigade, mutual aid member, stockiest etc). He will continuously monitor the progress and give information to the offsite responders. He will identify the areas likely to be affected and communicate the same to the responders. He will update all concerned responders with the emergency status. For example: Escalation in the emergency, change in wind direction etc. The site controller will also communicate the necessary information to the media and public at large. In short, the site controller acts as the focal point who on the one hand interacts with the incident controller to give him required assistance and know the status and on the other hand, interacts with other district authorities and agencies to give information.

7.3 Temporary Assumption of Roles

It needs to be noted that 'Incident Controller' and 'Site Controller' are emergency roles. It is not necessary that only the one person will act as incident controller / site controller from beginning to end. For example, when a valve fails and toxic gas starts leaking, the person on the spot assumes the charge of incident controller till a senior expert, personnel (appointed incident controller) reaches the spot and takes over from him. This will be especially true when the incident happens during a late night shift, when only the skeleton staff may be present. Similarly, a senior person present will assume the charge of site controller till the

manager / CEO (appointed Site Controller) reaches the factory and takes over.

For a transport emergency, the driver may be the first incident controller till the Police team and subsequently a technical team reaches with tools to take care of the emergency. Then the police and later the technical team leader will be incident controller.

It may be mentioned that it is difficult to lay down specific and rigid guidelines in this respect. What is important is that the relevant functions are carried out efficiently, smoothly and promptly. There should be no loss of time, there should be no conflict, and the aim should be to bring the emergency control as fast as possible with least damage or loss.

Emergency Scenario Description: For Chlorine leakage

8. **PRESTEL'S PAC ANALYSIS FOR EMERGENCY SCENARIOS - ILLUSTRATION PURPOSE ONLY**

Sr.	Person		Action		Communication		
	Primary	Alternet	Act	Recourse	Whom	How	What
1.	Incident controller of unit		- Attend to leakage with maintenance team - Start transfer activity - Use neutralizing medium for spilled liquid, fog and curtain to prevent spread.	- Team of trained works, equipment for repairs , emergency kit ,local exhaust,scbas,special Quick setting cement - Permanent piping arrangement for transfer to other storage vessel. - Neutralizing medium, gas scrubbing arrangement, water for creating fog and water curtain	Site controller		Chlorine leak from pipe or tonner, use chlorine hood with sucker pump and transfer leak chlorine to scrubber or caustic pit for fog and water curtain needed assessed quantity spilled about 3 kg
2.	Site Controller of Unit		- Coordinate actions with incident controller for staff , matirial, equipment, experts advise and arrange for help - Identify if all workers are safe and arrange for rescue where necessary.	- Templates, windsock, plant and area map - Internal telephone - Transport for injured - Communication centre	- District collector - Police - Fire brigade - Factory inspector - Mutual aid representative - Media		- The nature of emergency, consequences ,area likely to be affected presently and if emergency is escalated, what help is required - Nature of emergency, area likely to be affected and precautions to be taken by public at large.

8. PRESTELS PAC ANALYSIS FOR EMERGENCY SCENARIOS - ILLUSTRATION PURPOSE ONLY
(CONTINUE...)

Sr.	Person		Action		Communication		
	Primary	Alternate	Act	Resource	Whom	How	What
3.	District Collector	Asst. District collector	- Conform that police fire brigade and medical officer have received information and activated their plan. Direct them suite bly. - Direct concerned revenue official for evacuation, sheltering arrangement wherever necessary. - Monitor situation at factory continuously and in the affected area and issues directions to responders. - Requisition from authorities and agencies (both government and private) such as transportation, water, electricity providers as necessary. - Arrange media centre to give information to media, public, families.	- Area Map - Vulnerably - Ability - Templates, - Telephones - Communication Centre	- Police - Fire brigade - Medical officer - State transport depot manager - Electricity board official - Water supply officer (mr. Arun Iyer) - Supply officer (revenue dept.) - Station master , anandnagar - Media - Outside district authorities (neighbouring districts, state authority)		- Inform police about nature of emergency per sifting wind direction, affected areas, isolation area, and arrangement for warning and preparation for evacuation. - Inform fire brigade abo requirement us nature of emergency, wind direction, casualties in the factory, rescue requirement, mitigation requirements. - Arrange for informing public through local cable tv, sms, local fm radio, PA system. - Stop the traffic on the railway line passing through the area likely to be affected. - Shelters, food. H) direct station master, anandnagar to - And instruct him to be ready to arrange to evacuate people in coordination with police and to arrange for providing safe - Tenuous water supply with proper pressure. - Alert supply officer (revenue dept.) - Constant electric supply to the area. - direct water supply ffcier to ensure con- - From dc/police. E) direct electricity board officials to ensure - Area. Direct him to keep buses ready with drivers, full with fuel and await instructions - Inform state transport depot manager about nature of emergency, likely affected - Likely to be affected. Direct medical officer to alert hospitals in the area. - Inform medical officer about nature of emergency, casualties in the factory, area - Request for all additional help required to mitigate the emergency.

8. PRESTELS PAC ANALYSIS FOR EMERGENCY SCENARIOS - ILLUSTRATION PURPOSE ONLY
(CONTINUE...)

Sr. No.	Person		Action		Communication		
	Primary	Alternate	Act	Resource	Whom	How	What
4.	Factory Inspector In-Charge Dy. DISH, Vadodara	Deputy DISH	- Visit site in coordination with technical experts. - Investigate accident in due course.	- Transport arrangement. - Investigation form	- Experts - Mutual aid members		- Inform about emergency and seek their technical advice. - Direct to provide assistance in handling emergency.
5.	Fire Brigade Chief	Deputy Fire Chief	- Arrange for water curtains and fog around the spilled liquid chlorine in association with the factory fire team. - Rescue the affected persons. Evacuate them and other casualties and hand over to medical team.	- Water, nozzles for fog and curtain, fire tenders, scbas. - Fire tender with extendible ladders, scbas, stretchers, arrangement to lower the stretchers from height.	- Fire brigade (neighboring district) - Medical officer - District collector		- Request for fire tenders. - Inform location of effected rescued persons. - Request for additional assistance from fire brigade of neighboring cities, districts if required.
6.	Police Superintendent	Deputy Police Super-Intendment	- Cordon off area, stop traffic going towards effected area. - Arrange for warning public. - Arrange for personnel at various spots to maintain law and order - Send police to public congregation to ask them to stay confined. - Make arrangements to evacuate dwellers from neighbouring hutments, which are likely to be affected. Hand over charge of evacuees to revenue officer. - Interact continuously with site controller and district collector.	- Barricades' - PA system fixed On Jeeps. - Police Personnel, Vehicles - Telephone	- Commandant home guards - Commandant civil defense - State transport manager - District collector - Neighboring district headquarters		- Inform where they are needed and about action to be taken. - Inform where they are needed and about action to be taken. - Request to arrange buses to evacuate people from public congregation and hutments. - Inform ground-status and request for additional arrangements or measures to be taken. - Inform emergency and ask for additional staff and resources.

8. PRESTEL PAC ANALYSIS FOR EMERGENCY SCENARIOS - ILLUSTRATION PURPOSE ONLY
(CONTINUE...)

Sr. No.	Person		Action		Communication		
	Primary	Alternate	Act	Recourse	Whom	How	What
7.	Medical Officer	Asst. Medical Officer	- Arrange for ambulances, doctors and staff. - Arrange for oxygen and other requirements for emergency treatment.	- Ambulances , doctors, nursing staff - Oxygen cylinders	- Identified - Hospitals and doctors		Inform about nature of emergency, and ask them to be ready for treatment. Inform about likely number of casualties and ask them to make beds available promptly, dispatch ambulances and pick up casualties in coordination with police and other authorities.
8.	State Transport Manager	Asst. State Transport Manager	- Keep vehicles ready with drivers and with sufficient fuel. Ascertain number of buses, pick points, routes and destinations from district collector and police. Dispatch vehicles with necessary instructions to drivers as directed by police / district collector for evacuation, or for transportation of provisions. - Arrange for more vehicles from other depots if required.	- Buses, Water Tankers, Drivers. - Telephone	- Police/ District Collector - Other Depots For Additional Vehicles		- Details of requirements of buses, pickup points, routes, destinations - Requirement for additional vehicles

8. PRESTELS PAC ANALYSIS FOR EMERGENCY SCENARIOS - ILLUSTRATION PURPOSE ONLY
(CONTINUE...)

Sr. No.	Person		Action		Communication		
	Primary	Alternate	Act	Resource	Whom	How	What
9.	Technical Experts	-	- Respond with appropriate technical advice to the factory, district collector, police, fire brigade, medical officer, factory inspector. - Visit site in coordination with district collector, factory inspector to provide necessary advice	- Own expertise, technical reference library, internet facility, telephone - Vehicle	- Factory - Factory inspector - District collector - Fire brigade - Medical officer		Technical advice for handling emergency
10.	Pollution Control Board Member	GPCB Officer	Project areas to be affected and monitor chlorine concentration levels at various spots	Monitoring equipment			
11.	Electricity Board		Ensure uninterrupted electric supply to the factory and at shelters				
12.	Animal Husbandry		Provide necessary care for cattle of the dairies, arrange for veterinary doctor.		Veterinary doctor		Look after the cattle
13.	Agriculture Department		-				
14.	Civil Defense And Home Guards		- Co-ordinate with police and arrange to control traffic, assist in evacuation. - Assist police for security of evacuated property.	Staff	Police		Information regarding evacuation and traffic control arrangements
15.	PWD/Water Supply		- Ensure continuous water supply with adequate pressure for fire brigade. - Arrange drinking water at shelters. - Ensure water for the cattle.	- Water, - Drinking Water - Water For Cattle			

8. PRESTELS PAC ANALYSIS FOR EMERGENCY SCENARIOS - ILLUSTRATION PURPOSE ONLY
(CONTINUE...)

Sr. No.	Person		Action		Communication		
	Primary	Alternate	Act	Resource	Whom	How	What
16.	Civil Supplies Department		Arrange for food, water and other basic amenities as necessary for evacuees	Food, water and other basic amenities			
17.	Railway Station Master		- Stop trains passing through the affected area as advised by district collector. - Coordinate with police if evacuation is necessitated				Ground Status Reporting
18.	Head Of Local Government Body (VMSS)		Mobilize resources required under the control of the body like buses, shelters (community halls, town hall, schools), food and water supply	Emergency shelters, food and water supply	District collector		Find out resources, personnel help required
19.	Telecommunication Department		Ensure that communication lines are efficiently working				
20.	NGO		- Assist emergency responders. - Help families of casualties, counsel victims.				
21.	Media		Disseminate vital information to public in a responsible manner		Public at large	Media channels	Precautions and actions to be taken by public

VADODARA DISTRICT CRISIS GROUP

**MATERIAL SAFETY DATA SHEETS
(MSDS)****LIST OF M.S.D.S. (SELECTED)**

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1.	Acrylonitrile	373
2.	Ammonia	382
3.	Benzene	394
4.	Bromine	406
5.	Chlorine	414
6.	Chlorosulfonic Acid	423
7.	Ethylene Oxide	431
8.	Liquified Petroleum Gas (LPG)	441
9.	Methanol (Methyl Alcohol)	444
10.	Nitric Acid	454
11.	Oleum	458
12.	Sulphuric Acid	466
13.	Thionyl Chloride	475
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MSDS-1 :Acrylonitrile**Safety Data Sheet**

Acrylonitrile, 99+%

Section 1 - Chemical Product and Company Identification**MSDS Name:** Acrylonitrile, 99+%**Synonyms:** Acrylonitrile monomer; 2-Propenenitrile; Vinyl cyanide; Cyanoethylene.**Company Identification:**

China Petrochemical Development Corp.

1, Ching-Chien Rd, Ta-Sheh

Kaohsiung, Taiwan, R.O.C.

For emergencies in the ROC, call CPDC: 07-351-3521**Section 2 - Hazards Identification****EMERGENCY OVERVIEW**

Appearance: clear, colorless liquid. Flash Point: -5 deg C.

Danger! May be fatal if inhaled, absorbed through the skin or swallowed. **Flammable liquid and vapor.** Causes eye, skin, and respiratory tract irritation. May cause allergic skin reaction. May cause cancer based on animal studies. This material has been reported to be susceptible to autoxidation and therefore should be classified as peroxidizable. Light sensitive. Hazardous polymerization may occur. Hazardous due to peroxide initiation of polymerization.

Target Organs: Central nervous system, respiratory system, eyes, skin.**NFPA RATINGS (SCALE 0-4):** HEALTH=4 FIRE=3 REACTIVITY=2**EMERGENCY OVERVIEW:****COLOR:** colorless**PHYSICAL FORM:** liquid**ODOR:** pungent odor**MAJOR HEALTH HAZARDS:** harmful (if inhaled, on contact with the skin, or swallowed), eye burns, respiratory tract irritation, skin irritation, allergic reactions, cancer hazard (in humans)**PHYSICAL HAZARDS:** Flammable liquid and vapor. Vapor may cause flash fire. May polymerize. Containers may rupture or explode.**POTENTIAL HEALTH EFFECTS:**

MSDS-1 :Acrylonitrile (Continue...)**INHALATION:**

SHORT TERM EXPOSURE: irritation, itching, nausea, vomiting, diarrhea, stomach pain, irregular heartbeat, headache, drowsiness, dizziness, bluish skin color, suffocation, convulsions, coma

LONG TERM EXPOSURE: digestive disorders, reproductive effects, cancer

SKIN CONTACT:

SHORT TERM EXPOSURE: irritation (possibly severe), allergic reactions, blisters, suffocation

LONG TERM EXPOSURE: same as effects reported in short term exposure

EYE CONTACT:

SHORT TERM EXPOSURE: burns, tearing, eye damage

LONG TERM EXPOSURE: same as effects reported in short term exposure

INGESTION:

SHORT TERM EXPOSURE: suffocation

LONG TERM EXPOSURE: reproductive effects, cancer

Section 3 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
107-13-1	Acrylonitrile	>99	203-466-5
150-76-5	4-Methoxyphenol	.004	205-769-8

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.

Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

Ingestion: POISON material. If swallowed, get medical aid immediately. Only induce vomiting if directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

Inhalation: POISON material. If inhaled, get medical aid immediately. Remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician: Treat symptomatically and supportively.

Antidote: Always have a cyanide antidote kit on hand when working with cyanide compounds. Get medical advice to use.

Section 5 - Fire Fighting Measures

MSDS-1 :Acrylonitrile (Continue...)

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. Fire or excessive heat may result in violent rupture of the container due to bulk polymerization. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.

Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog or alcohol-resistant foam. Do NOT use straight streams of water. Cool containers with flooding quantities of water until well after fire is out.

Flash Point: -5 deg C (23.00 deg F)

Autoignition Temperature: 481 deg C (897.80 deg F)

Explosion Limits, Lower:3.1%

Upper: 17.0%

NFPA Rating: (estimated) Health: 4; Flammability: 3; Instability: 2

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Scoop up with a nonsparking tool, then place into a suitable container for disposal. Remove all sources of ignition. Provide ventilation. Use water spray to reduce vapors or divert vapor cloud drift.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Do not get in eyes, on skin, or on clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Do not breathe vapor. Keep away from heat, sparks and flame. Pure vapor will be uninhibited and may polymerize in vents or other confined spaces. Use only with adequate ventilation or respiratory protection.

Storage: Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. See 29CFR 1910.1045 for regulations applying to all occupational exposures to acrylonitrile.

Exposure Limits

MSDS-1 :Acrylonitrile (Continue...)

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Acrylonitrile	2 ppm TWA; Skin - potential significant contribution to overall exposure by the cutaneous route	1 ppm TWA 85 ppm IDLH	2 ppm TWA; 10 ppm Ceiling; 1 ppm Action Level; 2 ppm TWA; 10 ppm Excursion Limit (15 min, Skin and eye exposure prohibited. Cancer hazard - see 29 CFR 1910.1045)
4-Methoxyphenol	5 mg/m3 TWA	5 mg/m3 TWA	none listed

OSHA Vacated PELs: Acrylonitrile: No OSHA Vacated PELs are listed for this chemical.
4-Methoxyphenol: 5 mg/m3 TWA

Personal Protective Equipment

Eyes: Wear chemical splash goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Appearance: clear, colorless

Odor: slightly pungent - garlic-like odor

pH: 5.5-7.5 (5% soln)

Vapor Pressure: 86.25 mm Hg @ 20 deg C

Vapor Density: 1.83 (air=1)

Evaporation Rate: 4.54 (n-Butyl Acetate =1)

Viscosity: 0.35 cps @ 20 deg C

Boiling Point: 77.3 deg C

Freezing/Melting Point: -83.55 deg C

Decomposition Temperature: Not available.

Solubility: Moderately Soluble 7.3g/100ml

Specific Gravity/Density: 0.806 @ 20°C

Molecular Formula: C₃H₃N

Molecular Weight: 53.06

MSDS-1 :Acrylonitrile (Continue...)**Section 10 - Stability and Reactivity**

Chemical Stability: Acrylonitrile vapor or uninhibited liquid may polymerize explosively, if heated, or exposed to sunlight (ultraviolet light), pressure, peroxides, or other incompatible materials. Inhibited liquid may polymerize explosively at temperatures > 200 𐀀.

Conditions to Avoid: Light, ignition sources, excess heat, loss of inhibitor, confined spaces.

Incompatibilities with Other Materials: Strong bases, strong acids, halogens, amines, strong oxidizing agents, polymerizing initiators.

Hazardous Decomposition Products: Hydrogen cyanide, nitrogen oxides, carbon monoxide, carbon dioxide.

Hazardous Polymerization: May occur.

Section 11 - Toxicological Information

Eye: Causes severe eye irritation. May result in corneal injury. Lachrymator (substance which increases the flow of tears). Causes redness and pain.

Skin: Causes skin irritation. Harmful if absorbed through the skin. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Causes symptoms similar to those of inhalation.

Ingestion: May be fatal if swallowed. Acrylonitrile forms very toxic cyanide in the body, but to a lesser extent than some other nitriles. There is a relatively low rate of conversion of acrylonitrile to cyanide (approximately 20% following oral exposure).

Inhalation: May be fatal if inhaled. Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. May cause cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood). Causes respiratory tract irritation. Exposure to high concentrations may cause weakness, asphyxia, and death. May be metabolized to cyanide which in turns act by inhibiting cytochrome oxidase impairing cellular respiration. Material volatilizes at room temperature.

Chronic: Acrylonitrile has caused nervous system effects (e.g. reduced nerve conduction) in animals exposed to very low concentrations, which have also been associated with the development of nervous system cancer. Inhalation of relatively low concentrations of acrylonitrile (20 ppm for 24 months) has caused degeneration and inflammatory changes in the nasal cavities of rats.

LD50/LC50:

Dermal, guinea pig: LD50 = 202 mg/kg;

Draize test, rabbit, eye: 100 mg Moderate;

Draize test, rabbit, skin: 500 mg Severe;

Inhalation, rat: LC50 = 333 ppm/4H;

Oral, mouse: LD50 = 27 mg/kg;

Oral, rat: LD50 = 78 mg/kg;

Skin, rabbit: LD50 = 63 mg/kg;

Skin, rat: LD50 = 148 mg/kg;

Carcinogenicity:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans

MSDS-1 :Acrylonitrile (Continue...)

- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

Epidemiology: Overall, the earlier indications of an increased risk of lung cancer among employees exposed to acrylonitrile are not confirmed by the recent, more informative studies.

Teratogenicity: Fetotoxicity, teratogenicity and embryotoxicity have been observed in the offspring of rats exposed to acrylonitrile by inhalation or ingestion, but only at doses that also produced significant maternal toxicity.

Reproductive Effects: In one study with acrylonitrile, reduced sperm count and testicular effects were observed in mice, but reproductive outcome was not assessed.

Mutagenicity: No information available.

Neurotoxicity: No information available.

Other Studies: None

Section 12 - Ecological Information

Ecotoxicity: Fish: Bluegill/Sunfish: 28mg/L; 24H; Fish: Fathead Minnow: 10,000ug/L; 96H; Flow-through Daphnia: Water Flea: 13mg/L; 24H; No data available.

Environmental: Aquatic: Reacts to produce 3-hydroxypropionitrile and bis(2-cyanoethyl)ether in the presence of a catalyst. Terrestrial: Expected to evaporate rapidly if spilled on land. Because it is so poorly adsorbed to soil, it may also leach. Atmospheric: Will degrade by reaction with hydroxyl radicals; half-life of 3.5 12-hr sunlit days. The biodegradation is reported to occur readily at concentrations > 20 mg/l during anaerobic digestion process. Experimental and estimated factors indicate that bioconcentration in aquatic organisms is not significant.

Physical: Log P(oct) = 0.25

Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.

RCRA U-Series:

CAS# 107-13-1: waste number U009.

Section 14 - Transport Information

	US DOT	Canada TDG
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MSDS-1 :Acrylonitrile (Continue...)

Shipping Name:	ACRYLONITRILE, STABILIZED	ACRYLONITRILE, STABILIZED
Hazard Class:	3	3(6.1)
UN Number:	UN1093	UN1093
Packing Group:	I	I
Additional Info:		FLASHPOINT -5C

Section 15 - Regulatory Information**US FEDERAL****TSCA**

CAS# 107-13-1 is listed on the TSCA inventory.

CAS# 150-76-5 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

CAS# 150-76-5: 40 CFR 799.5115

Section 12b

CAS# 150-76-5: Section 4, 1 % de minimus concentration

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 107-13-1: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

CAS# 107-13-1: 10000 lb TPQ

SARA Codes

CAS # 107-13-1: immediate, delayed, fire, reactive.

Section 313

This material contains Acrylonitrile (CAS# 107-13-1, >99%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

Clean Air Act:

CAS# 107-13-1 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depleters.

This material does not contain any Class 2 Ozone depleters.

Clean Water Act:

MSDS-1 :Acrylonitrile (Continue...)

CAS# 107-13-1 is listed as a Hazardous Substance under the CWA. CAS# 107-13-1 is listed as a Priority Pollutant under the Clean Water Act. CAS# 107-13-1 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T F N

Risk Phrases:

R 11 Highly flammable.

R 23/24/25 Toxic by inhalation, in contact with skin and if swallowed.

R 37/38 Irritating to respiratory system and skin.

R 41 Risk of serious damage to eyes.

R 43 May cause sensitization by skin contact.

R 45 May cause cancer.

R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 16 Keep away from sources of ignition - No smoking.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 53 Avoid exposure - obtain special instructions before use.

S 9 Keep container in a well-ventilated place.

S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 107-13-1: 3

CAS# 150-76-5: 1

Canada - DSL/NDSL

CAS# 107-13-1 is listed on Canada's DSL List.

CAS# 150-76-5 is listed on Canada's DSL List.

Canada – WHMIS

MSDS-1 :Acrylonitrile (Continue...)

This product has a WHMIS classification of B2, D1A, D2A, F.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 107-13-1 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

Revision #5 Date: 4/7/2013

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

MSDS-2 : Ammonia**SAFETY DATA SHEET**

Ammonia

Airgas
an Air Liquide company**Section 1. Identification**

GHS product identifier : Ammonia
Chemical name : ammonia
Other means of identification : ammonia; anhydrous ammonia
Product type : Gas.
Product use : Synthetic/Analytical chemistry.
Synonym : ammonia; anhydrous ammonia
SDS # : 001003
Supplier's details : Airgas USA, LLC and its affiliates
 259 North Radnor-Chester Road
 Suite 100
 Radnor, PA 19087-5283
 1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture : FLAMMABLE GASES - Category 2
 GASES UNDER PRESSURE - Liquefied gas
 ACUTE TOXICITY (inhalation) - Category 4
 SKIN CORROSION - Category 1
 SERIOUS EYE DAMAGE - Category 1
 AQUATIC HAZARD (ACUTE) - Category 1

GHS label elements**Hazard pictograms****Signal word**

: Danger

Hazard statements

: Flammable gas.
 May form explosive mixtures with air.
 Contains gas under pressure; may explode if heated.
 May displace oxygen and cause rapid suffocation.
 Harmful if inhaled.
 Causes severe skin burns and eye damage.
 Very toxic to aquatic life.

Precautionary statements**General**

: Read and follow all Safety Data Sheets (SDS'S) before use. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.

Prevention

: Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Avoid breathing gas. Wash hands thoroughly after handling.

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MSDS-2 : AMMONIA (Continue...)

Ammonia

Section 2. Hazards identification

- Response** : Collect spillage. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or physician. IF SWALLOWED: Immediately call a POISON CENTER or physician. Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or physician. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or physician. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.
- Storage** : Store locked up. Protect from sunlight. Store in a well-ventilated place.
- Disposal** : Dispose of contents and container in accordance with all local, regional, national and international regulations.
- Hazards not otherwise classified** : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

- Substance/mixture** : Substance
- Chemical name** : ammonia
- Other means of identification** : ammonia; anhydrous ammonia
- Product code** : 001003

CAS number/other identifiers

- CAS number** : 7664-41-7

Ingredient name	%	CAS number
ammonia	100	7664-41-7

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures**Description of necessary first aid measures**

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention immediately. Call medical doctor or poison control center immediately. Chemical burns must be treated promptly by a physician.
- Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately. Call medical doctor or poison control center immediately. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Skin contact** : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Continue to rinse for at least 10 minutes. Get medical attention immediately. Call medical doctor or poison control center immediately. Chemical burns must be treated promptly by a physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** : As this product is a gas, refer to the inhalation section.

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MSDS-2 : AMMONIA (Continue...)

Ammonia

Section 4. First aid measures**Most important symptoms/effects, acute and delayed****Potential acute health effects**

- Eye contact** : Causes serious eye damage.
- Inhalation** : Harmful if inhaled.
- Skin contact** : Causes severe burns.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Ingestion** : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following: pain, watering, redness
- Inhalation** : No specific data.
- Skin contact** : Adverse symptoms may include the following: pain or irritation, redness, blistering may occur
- Ingestion** : Adverse symptoms may include the following: stomach pains

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures**Extinguishing media**

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.
- Unsuitable extinguishing media** : None known.

- Specific hazards arising from the chemical** : Contains gas under pressure. Flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. This material is very toxic to aquatic life. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

- Hazardous thermal decomposition products** : Decomposition products may include the following materials: nitrogen oxides

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

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MSDS-2 : AMMONIA (Continue...)

Ammonia

Section 6. Accidental release measures**Personal precautions, protective equipment and emergency procedures**

- For non-emergency personnel** : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Do not breathe gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
- Environmental precautions** : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

Methods and materials for containment and cleaning up

- Small spill** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.
- Large spill** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage**Precautions for safe handling**

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Do not get in eyes or on skin or clothing. Do not breathe gas. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Store and use away from heat, sparks, open flame or any other ignition source. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Store locked up. Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F). Refer to ANSI/CGA G-2.1, Section 5.13 for electrical classification of anhydrous ammonia storage and handling areas. Where anhydrous ammonia is stored indoors, use electrical (ventilating, lighting and material handling) equipment with the appropriate electrical classification rating and use only non-sparking tools.

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Ammonia

Section 8. Exposure controls/personal protection**Control parameters****Occupational exposure limits**

Ingredient name	Exposure limits
ammonia	California PEL for Chemical Contaminants (Table AC-1) (United States). PEL: 25 ppm 8 hours. STEL: 35 ppm 15 minutes. ACGIH TLV (United States, 3/2017). TWA: 25 ppm 8 hours. TWA: 17 mg/m³ 8 hours. STEL: 35 ppm 15 minutes. STEL: 24 mg/m³ 15 minutes. OSHA PEL 1989 (United States, 3/1989). STEL: 35 ppm 15 minutes. STEL: 27 mg/m³ 15 minutes. NIOSH REL (United States, 10/2016). TWA: 25 ppm 10 hours. TWA: 18 mg/m³ 10 hours. STEL: 35 ppm 15 minutes. STEL: 27 mg/m³ 15 minutes. OSHA PEL (United States, 6/2016). TWA: 50 ppm 8 hours. TWA: 35 mg/m³ 8 hours.

Appropriate engineering controls

: Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls

: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures**Hygiene measures**

: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection

: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.

Skin protection**Hand protection**

: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection

: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

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Ammonia

Section 8. Exposure controls/personal protection

- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties**Appearance**

- Physical state** : Gas. [Compressed gas.]
- Color** : Colorless.
- Odor** : Pungent.
- Odor threshold** : Not available.
- pH** : Approx. 11.6
- Melting point** : -77.7°C (-107.9°F)
- Boiling point** : -33°C (-27.4°F)
- Critical temperature** : 132.85°C (271.1°F)
- Flash point** : Not available.
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Extremely flammable in the presence of the following materials or conditions: oxidizing materials.
- Lower and upper explosive (flammable) limits** : Lower: 16%
Upper: 25%
- Vapor pressure** : 114.1 (psig)
- Vapor density** : 0.59 (Air = 1)
- Specific Volume (ft³/lb)** : 20.79
- Gas Density (lb/ft³)** : 0.0481 (32°C / 89.6 to °F)
- Relative density** : SPECIFIC GRAVITY (AIR=1): @ 70°F (21.1°C) = 0.59
- Solubility** : Soluble in water. Soluble in alcohol and ether.
- Solubility in water** : 540 g/l
- Partition coefficient: n-octanol/water** : Not available.
- Auto-ignition temperature** : 651°C (1203.8°F)
- Decomposition temperature** : Not available.
- Viscosity** : Not applicable.
- Flow time (ISO 2431)** : Not available.
- Molecular weight** : 17.03 g/mole
- Aerosol product**
- Heat of combustion** : -18589392 J/kg

Section 10. Stability and reactivity

- Reactivity** : No specific test data related to reactivity available for this product or its ingredients.
- Chemical stability** : The product is stable.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
- Conditions to avoid** : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

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MSDS-2 : AMMONIA (Continue...)

Ammonia

Section 10. Stability and reactivity**Incompatible materials** : Oxidizers and Yellow Metals (brass & copper)**Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.**Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.**Section 11. Toxicological information****Information on toxicological effects****Acute toxicity**

Product/ingredient name	Result	Species	Dose	Exposure
ammonia	LC50 Inhalation Gas.	Rat	7338 ppm	1 hours

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.**Potential acute health effects**

- Eye contact** : Causes serious eye damage.
- Inhalation** : Harmful if inhaled.
- Skin contact** : Causes severe burns.
- Ingestion** : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following: pain, watering, redness
- Inhalation** : No specific data.
- Skin contact** : Adverse symptoms may include the following: pain or irritation, redness, blistering may occur

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Ammonia

Section 11. Toxicological information**Ingestion** : Adverse symptoms may include the following:, stomach pains**Delayed and immediate effects and also chronic effects from short and long term exposure****Short term exposure****Potential immediate effects** : Not available.**Potential delayed effects** : Not available.**Long term exposure****Potential immediate effects** : Not available.**Potential delayed effects** : Not available.**Potential chronic health effects**

Not available.

General : No known significant effects or critical hazards.**Carcinogenicity** : No known significant effects or critical hazards.**Mutagenicity** : No known significant effects or critical hazards.**Teratogenicity** : No known significant effects or critical hazards.**Developmental effects** : No known significant effects or critical hazards.**Fertility effects** : No known significant effects or critical hazards.**Numerical measures of toxicity****Acute toxicity estimates**

Not available.

Other information : IDLH : 300 ppm**Section 12. Ecological information****Toxicity**

Product/ingredient name	Result	Species	Exposure
ammonia	Acute EC50 29.2 mg/l Marine water	Algae - Ulva fasciata - Zoea	96 hours
	Acute LC50 2080 µg/l Fresh water	Crustaceans - Gammarus pulex	48 hours
	Acute LC50 0.53 ppm Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 300 µg/l Fresh water	Fish - Hypophthalmichthys nobilis	96 hours
	Chronic NOEC 0.204 mg/l Marine water	Fish - Dicentrarchus labrax	62 days

Persistence and degradability

Not available.

Bioaccumulative potential

Not available.

Mobility in soil**Soil/water partition coefficient (K_{oc})** : Not available.**Other adverse effects** : No known significant effects or critical hazards.

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Ammonia

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1005	UN1005	UN1005	UN1005	UN1005
UN proper shipping name	AMMONIA, ANHYDROUS	AMMONIA, ANHYDROUS; OR ANHYDROUS AMMONIA	AMMONIA, ANHYDROUS	AMMONIA, ANHYDROUS	AMMONIA, ANHYDROUS
Transport hazard class(es)	2.2 	2.3 (8)   	2.3 (8)  	2.3 (8)   	2.3 (8)  
Packing group	-	-	-	-	-
Environmental hazards	Yes.	Yes.	Yes. The environmentally hazardous substance mark is not required.	Yes.	Yes. The environmentally hazardous substance mark is not required.

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Additional information**DOT Classification**

: Inhalation hazard
This product is not regulated as a marine pollutant when transported on inland waterways in sizes of ≤5 L or ≤5 kg or by road, rail, or inland air in non-bulk sizes, provided the packagings meet the general provisions of §§ 173.24 and 173.24a.
Reportable quantity 100 lbs / 45.4 kg. Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.
Limited quantity Yes.
Quantity limitation Passenger aircraft/rail: Forbidden. Cargo aircraft: Forbidden.
Special provisions 13,T50

TDG Classification

: Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2), 2.40-2.42 (Class 8), 2.7 (Marine pollutant mark).
The marine pollutant mark is not required when transported by road or rail.
Explosive Limit and Limited Quantity Index 0
ERAP Index 3000
Passenger Carrying Ship Index Forbidden
Passenger Carrying Road or Rail Index Forbidden

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Ammonia

Section 14. Transport information**Special provisions**

- Mexico Classification** : Toxic Inhalation Hazard Zone D
- IMDG** : The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg.
- IATA** : The environmentally hazardous substance mark may appear if required by other transportation regulations.
- Quantity limitation** Passenger and Cargo Aircraft: Forbidden. Cargo Aircraft Only: Forbidden. Limited Quantities - Passenger Aircraft: Forbidden.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : TSCA 8(a) CDR Exempt/Partial exemption: Not determined
Clean Water Act (CWA) 311: ammonia

Clean Air Act (CAA) 112 regulated toxic substances: ammonia

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304**Composition/information on ingredients**

Name	%	EHS	SARA 302 TPQ		SARA 304 RQ	
			(lbs)	(gallons)	(lbs)	(gallons)
ammonia	100	Yes.	500	-	100	-

SARA 304 RQ : 100 lbs / 45.4 kg

SARA 311/312

Classification : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	ammonia	7664-41-7	100
Supplier notification	ammonia	7664-41-7	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : This material is listed.

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Section 15. Regulatory information**New York** : This material is listed.**New Jersey** : This material is listed.**Pennsylvania** : This material is listed.**International regulations****Chemical Weapon Convention List Schedules I, II & III Chemicals**

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list**Australia** : This material is listed or exempted.**Canada** : This material is listed or exempted.**China** : This material is listed or exempted.**Europe** : This material is listed or exempted.**Japan** : **Japan inventory (ENCS)**: This material is listed or exempted.
Japan inventory (ISHL): This material is listed or exempted.**Malaysia** : This material is listed or exempted.**New Zealand** : This material is listed or exempted.**Philippines** : This material is listed or exempted.**Republic of Korea** : This material is listed or exempted.**Taiwan** : This material is listed or exempted.**Thailand** : Not determined.**Turkey** : This material is listed or exempted.**United States** : This material is listed or exempted.**Viet Nam** : Not determined.**Section 16. Other information****Hazardous Material Information System (U.S.A.)**

Health	/	3
Flammability		1
Physical hazards		2

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

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

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Ammonia

Section 16. Other information

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
FLAMMABLE GASES - Category 2	Expert judgment
GASES UNDER PRESSURE - Liquefied gas	Expert judgment
ACUTE TOXICITY (inhalation) - Category 4	Expert judgment
SKIN CORROSION - Category 1	Expert judgment
SERIOUS EYE DAMAGE - Category 1	Expert judgment
AQUATIC HAZARD (ACUTE) - Category 1	Expert judgment

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Key to abbreviations : ATE = Acute Toxicity Estimate
 BCF = Bioconcentration Factor
 GHS = Globally Harmonized System of Classification and Labelling of Chemicals
 IATA = International Air Transport Association
 IBC = Intermediate Bulk Container
 IMDG = International Maritime Dangerous Goods
 LogPow = logarithm of the octanol/water partition coefficient
 MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
 UN = United Nations

References : Not available.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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MSDS-3 : Benzene

	Material Safety Data Sheet Benzene	Creation	2009.09.29
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1. Chemical Product & Company Identification

A. Product Name : **Benzene**

B. Intended Use : Polymers, detergents, pesticides, dyes, plastics, resins etc
Manufacture of industrial chemicals

C. Manufacturer/Supplier :

1) Manufacturer :

HanwhaTotal Petrochemicals Co.,Ltd			
411-1, Dokgod-Ri, Daesan-Up, Seosan-Si, Chungnam, Korea, 356-711			
Te l e p h o n e	82-41-660-6441	F a x	82-41-660-6447

2) Supplier : (Product information: 041-660-6180)

HanwhaTotal Petrochemicals Co.,Ltd			
Base chemical export division, 24F Samsung Elec' Seocho Tower, Seocho 2-dong, Seocho-gu, Seoul, 137-955, Korea			
Te l e p h o n e	82-2-3415-9361	F a x	82-2-3415-9300

2. Hazard Identification

A. Hazard Category :

1) Physicochemical Hazards – Flammable Liquid : Category 2

2) Health Hazards – Acute toxicity (oral) : Category 4
Skin corrosion/irritation : Category 2
Serious eye damage/irritation : Category 2
Carcinogenicity : Category 1A
Germ cell mutagenicity : Category 1B
Specific target organ toxicity(Repeated exposure) : Category 1
Aspiration hazard : Category 1

3) Environmental Hazards – Chronic aquatic toxicity : Category 3

B. Precautionary Statement(s) & Warning Label

1) Symbol :



2) Signal Word : Danger

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3) Hazard Statement(s) :				
H225 Highly flammable liquid and vapour				
H302 Harmful if swallowed				
H304 May be fatal if swallowed and enters airways				
H315 Causes skin irritation				
H319 Causes serious eye irritation				
H340 May cause genetic defects				
H350 May cause cancer				
H372 Causes damage to organs through prolonged or repeated exposure (Refer Section SDS 11)				
H412 Harmful to aquatic life with long lasting effects				
4) Precautionary Statement(s) :				
■ Prevention				
P201 Obtain special instructions before use.				
P202 Do not handle until all safety precautions have been read and understood.				
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.				
P233 Keep container tightly closed.				
P240 Ground/bond container and receiving equipment.				
P241 Use explosion-proof electrical/ventilating/lighting/equipment.				
P242 Use only non-sparking tools. Flammable liquids (chapter 2.6) 1, 2, 3				
P243 Take precautionary measures against static discharge.				
P260 Do not breathe dust/fume/gas/mist/vapours/spray.				
P264 Wash hands thoroughly after handling.				
P270 Do not eat, drink or smoke when using this product.				
P273 Avoid release to the environment.				
P280 Wear protective gloves/protective clothing/eye protection/face protection.				
P281 Use personal protective equipment as required.				
■ Response				
P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.				
P301+P312 IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.				
P302+P352 IF ON SKIN: Wash with plenty of soap and water.				
P303+P361+P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.				
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.				
P308+P313 If exposed or concerned: Get medical advice/attention.				
P314 Get medical advice/attention if you feel unwell.				

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P321 Specific treatment
 P330 Rinse mouth.
 P331 Do NOT induce vomiting.
 P332+P313 If skin irritation occurs: Get medical advice/attention.
 P337+P313 If eye irritation persists: Get medical advice/attention.
 P362 Take off contaminated clothing and wash before reuse.
 P370+P378 In case of fire: Use Suitable extinguishing media for extinction(Refer Section MSDS 5).

■ Storage
 P403+P235 : Store in a well-ventilated place. Keep cool.
 P405 : Store locked up.

■ Disposal
 P501 Dispose of contents/container in accordance with local/regional/national/international regulation

C. Other hazards
 NFPA ratings : Health=2, Fire=3, Reactivity=0

3. Composition / Information on Ingredients

Chemical Name	Other Name	CAS No. or EU No.	(%)
Benzene	Benzol, Benzole	71-43-2 (EU No.200-753-7)	99~100%

4. First Aid Measures

A. Eye Contact : Flush thoroughly with water at least 15minutes.
 Get medical assistance.
 Do not rub your eyes.
 Go to the hospital immediately if symptoms(flare, irritate) occur.
 Remove contact lenses if worn.

B. Skin Contact : Wash contact areas with soap and water.
 Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
 Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
 Go to the hospital immediately if symptoms(flare, irritate) occur.

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Wash thoroughly after handling.

Wear gloves when washing the patient, and please avoid contact with contaminated clothing.

C. Inhalation : If inhaled, remove to fresh air.

If not breathing give artificial respiration.

If breathing is difficult, give oxygen. Get medical aid.

When exposed to large amounts of steam and mist, move to fresh air.

Take specific treatment if needed.

Get medical attention immediately.

D. Ingestion : Potential for aspiration if swallowed. Get medical aid immediately.

Do not induce vomiting unless directed to do so by medical personnel.

Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.

Rinse your mouth with water immediately.

E. Likely Acute or Delayed Symptoms/Effects :

1) Inhalation

- Short term exposure : respiratory tract irritation, drowsiness, unconsciousness, central nervous system depression
- Long term exposure : respiratory tract irritation, drowsiness, unconsciousness, central nervous system depression, aplastic anemia.

2) Skin contact

- Short term exposure : irritation
- Long term exposure : irritation

3) Eye contact

- Short term exposure : irritation
- Long term exposure : irritation

4) Ingestion

- Short term exposure : central nervous system depression, characterized by excitement, headache, dizziness, drowsiness, nausea, unconsciousness
- Long term exposure : coma and possible death due to respiratory failure, cancer

F. Emergency measure / Notes to physician :

- Notify medical personnel of contaminated situations and have them take appropriate protective measures.

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5. Fire Fighting Measures

A. Extinguishing media :

- 1) Suitable extinguishing media
: Use dry chemical **powder**, carbon dioxide, or appropriate foam.
- 2) Unsuitable extinguishing media : Avoid use of water jet for extinguishing
- 3) Unusual fire(big fire) : Do use extinguishing media with water **spray or fog**.

B. Unusual fire & Explosion hazard :

- 1) Hazardous combustion product : Carbon oxides
(carbon monoxide (CO), carbon dioxide (CO2))
- 2) Fire & Explosion hazard : **Static electricity will cause to fire or explosion.**
Vapor is more heavier than air.
Liquid and vapour are highly flammable.
Vapor may travel a considerable distance to source of ignition.
Heating may cause expansion or decomposition leading to violent rupture of containers.
On combustion, may emit toxic fumes of carbon monoxide (CO).

C. Special fire fighting procedure / protection of firefighters :

Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

Move containers from fire area, if you can do without the risk.

Keep unauthorized personnel out.

Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.

Notify your local firestation and inform the location of the fire and characteristics hazard.

Using a unattended and water devices in case of large fire and leave alone to burn if you do not imperative.

Vapor or gas is burned at distant ignition sources can be spread quickly.

The extremely low flash point made by fire-fighters may be less effective at digesting weeks.

May be violently or explosively reactive.

Fight fire from a safe distance, with adequate cover.

If safe, switch off electrical equipment until vapour fire hazard removed.

DO NOT approach containers suspected to be hot.

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6. Accidental Release Measures

A. Personal precautions :

- Shut off all sources of ignition.
- Wear self-contained breathing apparatus.
- Ventilate closed spaces before entering.
- Move container to safe area from the leak area.
- Handling the damaged containers or spilled material after wearing protective equipment.
- Do not direct water at spill or source of leak.
- Avoid skin contact and inhalation.
- Cleanup and disposal under expert supervision is advised.
- Keep unauthorized people away, isolate hazard area and deny entry.

B. Environmental precautions :

- 1) atmosphere release : water fog for the reduction of vapor generation
- 2) soil release : Use a non-combustible material like sand or earth to soak up the product.
- 3) underwater release : Use the non-inflammability absorbent.
Prevent runoff and contact with waterways, drains or sewers.
If large amounts have been spilled, inform the relevant authorities.

C. Spill cleanup methods :

- 1) Small liquid spill : Use a non-combustible material like sand(or vermiculite) to soak up the product and place into a container for later disposal.
Wipe off the solvent.
Do not use plastic containers.
Spilled material should be treated as a potential risk of waste collected.
Appropriate container for disposal of spilled material collected.
- 2) Large spillages : Flush area with plenty of water. Prevent runoff from entering drains, sewers, or streams. Dike for later disposal.
Stay upwind and keep out of low areas.
Notification to central government, local government. When emissions at least of the standard amount
Dispose of waste in accordance with local regulation.

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7. Handling and Storage

A. Handling : Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material.
 Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
 Use only with adequate ventilation. Keep away from heat, sparks and flame.
 Avoid breathing vapor.
 Avoid direct physical contact.
 Comply with all applicable laws and regulations for handling
 Do not handle until all safety precautions have been read and understood.
 Operators should wear antistatic footwear and clothing.
 Do not inhale the steam prolonged or repeated.
 Contaminated work clothing should not be allowed out of the workplace.

B. Storage : Keep away from sources of ignition. Store in a tightly closed container.
 Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.
 Do not use damaged containers.
 Save applicable laws and regulations.
 Keep sealed when not in use.
 By specifying a storage area for carcinogenic substances.
 Do not eat, drink or smoke when using this product.
 Store away from water and sewer.
 Spilled material should be treated as a potential risk of waste collected.

8. Exposure Controls / Personal Protection

A. Exposure limit value :

- 1) ACGIH :
 - TLV-TWA : 0.5ppm
 - TLV-STEL : 2.5ppm
- 2) OSHA : 1ppm OSHA TWA
 5ppm OSHA STEL

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B. Engineering control : Adequate ventilation(localize ventilation) should be provided in workplaces. Use non sparking tools.
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
A system of local and/or general exhaust is recommended to keep employee exposures above the Exposure Limits.

C. Personal protective equipment

1) Respiratory protection : If required to control exposure, use only suitable respirators and components tested and approved under appropriate government standards such as NIOSH.
Under conditions of frequent use or heavy exposure, Respiratory protection may be needed.
Respiratory protection is ranked in order from minimum to maximum.
Consider warning properties before use.
Any chemical cartridge respirator with organic vapor cartridge(s).
Any chemical cartridge respirator with a full facepiece and organic vaporcartridge(s).
Any air-purifying respirator with a full facepiece and an organic vapor canister.
For Unknown Concentration or Immediately Dangerous to Life or Health : Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. Any self-contained breathing apparatus with a full facepiece.

2) Eye protection - Wear approved chemical safety glasses or goggles where eye exposure is reasonably probable.
Eye wash fountain is recommended.

3) Hand protection - Wear protective gloves. Butyl rubber gloves are recommended.

4) Skin / Body protection - Wear appropriate chemical resistant protective clothing.

9. Physical and Chemical Properties

A. Appearance(physical state, color etc.) : Colorless to yellow liquid

B. Odor : sweetish odor, aromatic odor

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C. Odor Threshold : 4.68ppm
D. pH : Not available
E. Melting point/Freezing point : 5.5℃
F. Boiling point/range : 80℃
G. Flash point : -11℃(c.c.)
H. Evaporation rate : 5.1(Butyl acetate=1)
I. Flammability (solid, liquid) : Not available
J. Flammability Limit (lower/upper) : 1.2%~7.8%
K. Vapor pressure : 75.02mmHg (@20℃), 94.8mmHg(@25℃)
L. Solubility in water : 0.18%/100ml (@25℃)
M. Vapor density(Air=1) : 2.8
N. Specific gravity : 0.88 (H2O=1)
O. Partition Coefficient(n-Octanol/water) : 2.13 (= log Pow)
P. Auto-ignition temperature : 498℃
Q. Thermal decomposition : Not available
R. Viscosity : 0.6468cP (@20℃)
S. Molecular weight : 78.11

10. Stability and Reactivity

A. Stability : Stable under normal temperatures and pressures
B. Possibility of hazardous reaction : Has not been reported
C. Conditions to avoid : Ignition source, excess heat, sparks, flame, confined spaces
D. Incompatible material :
Strong oxidizing agents. Vigorous reactions, sometimes amounting to explosions, can result from the contact between aromatic rings and strong oxidising agents.
Aromatics can react exothermically with bases and with diazo compounds.
E. Hazardous decomposition products : Hydrocarbon compounds. Carbon oxides(carbon monoxide (CO), carbon dioxide (CO2))

11. Toxicological Information

A. Route of exposure
1) Inhalation : May be fatal if swallowed and enters airways
2) Ingestion : Harmful if swallowed
3) Skin contact : Causes skin irritation
4) Eye contact : Causes serious eye irritation

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B. Delayed and immediate effects and also chronic effects from short and long term exposure

- 1) Acute toxicity :
 - Oral : [Benzene] : rat LD50=810mg/kg
 - Dermal : Not available
 - Inhalation : Not available
- 2) Skin corrosion/irritation : Cause skin irritation
- 3) Serious eye damage/irritation : (rabbit) Cause serious eye irritation.
- 4) Respiratory sensitization : Not available
- 5) Skin sensitization :Not available
- 6) Carcinogenicity :
 - OSHA : Not available
 - NTP : Group A
 - IARC(GROUP) : 1
 - ACGIH : A1
 - EU CLP : Carc.1A
 - MOL Notice : Carcinogenicity 1A
- 7) Germ cell mutagenicity :
 - Muta. Cat. 2: R46.
 - MOL Notice : Germ cell mutageniity 1B
- 8) Reproductive toxicity : Not available
- 9) STOT-single exposure : Not available
- 10) STOT-repeated exposure :

Causes laryngitis, bronchitis, bleeding in lung and narcotic effects
- 11) Aspiration hazard : If inhaled directly, induce pulmonary edema and bleeding immediately.

12. Ecological Information

A. Ecotoxicity :

- 1) Fishes : Not available
- 2) Crustacea : Not available
- 3) Seaweeds : Not available

B. Persistence and Degradability :

- 1) Persistence : Not available
- 2) Degradabilty : Not available

C. Bio accumulation potential :

- 1) Biodegration : Not available
- 2) Bioaccumulation : Not available

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D. Mobility in soil : Not available

E. Other adverse effects : Disconnection by BOD. : 40%, Chronic aquatic toxicity Category 3 in accordance to Poisonous substances Announcement on The Toxic Chemical Control Act in Korea(TCCA)

13. Disposal Consideration

A. Disposal method : Dispose in accordance with all applicable regulations.
 Since more than two kinds of designaed waste is mixed, it is difficult to treat seperatly, then can be reduction or stabilization by incineration or similar process.
 If water separation is possible, pre-process with Water separation process. Dispose by incineration.
 Do disposal as neutralization, hydrolysis and oxidation-reduction.
 High temperature incinerating, high-temperature melt processing will be landfilled
 Solidification processing.

B. Disposal instruction : The user of this product must disposal by oneself or entrust to waste disposer or person who other' s waste recycle and dispose, person who establish and operate waste disposal facilities.
 Dispose of waste in accordance with all applicable laws and regulations.

C. Waste code : Not available

14. Transportation Information

A. UN classification : UN1114
 B. Proper shipping name : Benzene
 C. Class/division : 3
 D. Packing group : II
 E. Marine pollutant -
 F. Special precautions for user related to transport or transportation measures
☐ Local transport follows in accordance with Dangerous goods Safety Management Law.
☐ Package and transport follow in accordance with Department of Transportation (DOT) and other regulatory agency requirements.

MSDS-3 : Benzene (Continue...)

	Material Safety Data Sheet		Creation	2009.09.29
			Revision	2015.06.01
	Benzene		Rev. No.	2
			Sheet	12/12

- EmS FIRE SCHEDULE : F-E (Non-water-reactive flammable liquids)
 - EmS SPILLAGE SCHEDULE : S-D (Flammable liquids)

15. Regulatory Information

A. Additional national and/or international regulatory information

☐ Information of EU Classification :

- Classification :
 - [Benzene] : F; R11 Carc. Cat. 1; R45 Muta. Cat. 2; R46 T; R48/23/24/25 Xn; R65 Xi; R36/38
- Risk Phrases :
 - [Benzene] : R45, R46, R11, R36/38, R48/23/24/25, R65
- Safety Phrase :
 - [Benzene] : S53, S45

☐ U.S. Federal regulations :

- OSHA PROCESS SAFETY (29CFR1910.119) : Not available
- CERCLA Section 103 (40CFR302.4) :
 - [Benzene] : 4.53599 kg 10 lb
- EPCRA Section 302 (40CFR355.30) : Not available
- EPCRA Section 304 (40CFR355.40) : Not available
- EPCRA Section 313 (40CFR372.65) :
 - [Benzene] : Applicable

☐ Rotterdam Convention listed ingredients : Not available

☐ Stockholm Convention listed ingredients : Not available

☐ Montreal Protocol listed ingredients : Not available

16. Other Information

This information relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty or guarantee is made as to its accuracy, reliability on completeness. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his own particular use. We do not accept liability for any loss or damage that may occur from the use of this information nor do we offer warranty against patent infringement.

A. Issue date : 2009.9.29

B. Last revision : 2009.9.29 (in accordance with GHS regulation), Rev 0.
 2013.3.8 Rev 1.
 2015.6.1 Rev 2.

MSDS-4 : Bromine

Tata Chemicals Ltd.	MSDS - BROMINE				
 TATA CHEMICALS LIMITED SAFETY DATA SHEET (SDS)					
Name of chemical: BROMINE (Br₂)					
1. <u>PRODUCT IDENTIFICATION / COMPANY ADDRESS</u>					
Trade Name	Bromine	Common Name	Bromine	Synonyms	Bromine
Company Name / Address / Phone / Fax		Tata Chemicals Limited, Mithapur District: Devbhoomi Dwarka (Gujarat) 361 345 INDIA <u>Contact in case of Emergency Only :</u> +91(02892 675802 / 03) Contact Person :+91 9227676113 Mr. Devendra Thakur			
Chemical Name		Bromine			
2. <u>HAZARD IDENTIFICATION</u>					
Hazard Classification	Classification according to Regulation (EC) No 1272/2008: Acute toxicity, Inhalation (Category 2), H330 Skin corrosion (Category 1A), H314 Acute aquatic toxicity (Category 1), H400				
LABEL ELEMENTS	HAZARD PICTOGRAMS.    GHS05 GHS06 GHS09				
Signal word	Danger				
Hazard statement	H314 Causes severe skin burns and eye damage. H330 Fatal if inhaled. H400 Very toxic to aquatic life.				
Precautionary statement	P260 Do not breathe dust/ fume/ gas/ mist/ vapors/ spray. P273 Avoid release to the environment. P280 Wear protective gloves/ protective clothing/ eye protection / face protection. P284 Wear respiratory protection. P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P310 Immediately call a POISON CENTER/doctor.				
3. <u>COMPOSITION / INFORMATION AND INGREDIENTS</u>					
Updated as On : 21.06.2021					
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MSDS-4 : Bromine (Continue...)

Tata Chemicals Ltd.		MSDS - BROMINE	
Structural Formula	Br-Br	Chemical Family	
		Molecular weight	159.808 g/mole
CAS No		Molecular Formula	Br ₂
Name	Product identifier	%	Classification
Bromine	7726-95-6	100%	Acute Tox. 2; Skin Corr. 1A; Aquatic Acute 1; H330, H314, H400 M-Factor - Aquatic Acute: 10

4. FIRST AID MEASURE

Ingestion	- If inhaled, remove to fresh air. - If not breathing, give artificial respiration. - If breathing is difficult, give oxygen. - Get medical attention immediately.
Inhalation	- Do NOT induce vomiting unless directed to do so by medical personnel. - Never give anything by mouth to an unconscious person. - Loosen tight clothing - Get medical attention immediately.
Eyes	- Check for and remove any contact lenses. - In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. - Get medical attention immediately.
Skin	- In case of contact, immediately flush skin with plenty of water. - Get medical attention.
Antidote	

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MSDS-4 : Bromine (Continue...)

Tata Chemicals Ltd.	MSDS - BROMINE
Most important symptoms/ effects, acute and or delayed	Eye Contact- • Causes eye burns. Lachrymator (substance which increases the flow of tears). • May cause permanent corneal opacification. • May cause chemical conjunctivitis and corneal damage. Inhalation- • May be fatal if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract. • Causes severe irritation of upper respiratory tract with coughing, burns, breathing difficulty, and possible coma. Causes chemical burns to the respiratory tract. May cause central nervous system effects including vertigo, anxiety, depression, muscle in coordination, and emotional instability. Skin contact- • Contact with liquid is corrosive and causes severe burns and ulceration. • May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color. Ingestion- • May cause severe and permanent damage to the digestive tract. • Causes gastrointestinal tract burns. • May cause liver and kidney damage. • May cause perforation of the digestive tract. • May cause cardiac disturbances. • May cause central nervous system effects. • May cause systemic effects. • May cause nausea, vomiting, and diarrhea, possibly with blood.
Indication of immediate medical attention and special treatment needed	No data available.
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MSDS-4 : Bromine (Continue...)

Tata Chemicals Ltd.

MSDS - BROMINE

5. FIRE FIGHTING MEASURES

Fire extinguishing media	• Use media suitable for surrounding materials.
Hazardous decomposition products	• Non-flammable.
Special firefighting procedure	• Firefighters should wear self-contained breathing apparatus and full protective gear.
Precaution to Fire Fighters	Wear self-contained breathing apparatus for firefighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precaution	• Wear self-contained breathing apparatus • Avoid breathing vapors • Ensure adequate ventilation. • Evacuate personnel to safe areas.
Precautions for the environment	Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided
Clean up method	• Use water spray curtain to divert vapor drift, Use 4 % sodium thiosulphate solution on spilled bromine. • Do not touch spilled material. • Prevent entry into sewers, basements or confined areas, dike if needed.

7. HANDLING AND STORAGE

General precaution	• Avoid breathing of vapor. Avoid contact with skin and clothing. Use all required PPEs as mentioned in section 8. • Avoid contact with eyes.
Personal protection	Wear personal protective equipment as per Section-8.
Storage	• Keep container/bottle tightly closed. • Keep container/bottle in a cool, well-ventilated area.
Incompatibilities	Reducing agents, Alkali metals, Powdered metals, Aluminum, Stainless steel, Iron, Copper, Organic materials, Bromine will attack some types of plastics, rubber, and coatings, Aldehydes, Ketones, arsenic powder, Amines, Amides, phenols, Alcohol, reacts violently with ammonia, Azides, Ozone.

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MSDS-4 : Bromine (Continue...)

Tata Chemicals Ltd.		MSDS - BROMINE			
8. EXPOSURE CONTROL / PERSONAL PROTECTION					
Personal protection     					
Skin	• Wear chemical protective gloves & gum boot. • Wear full body chemical protective suit.	Eyes	• Wear chemical goggles and face shield.		
Respiration	• Wear Airline respirator or self-contained breathing apparatus while dealing with product.	Other			
Exposure limits					
TLV-TWA	0.1 ppm	TLV-STEL	0.2 ppm		
Appropriate Engineering Control	Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.				
9. PHYSICAL AND CHEMICAL PROPERTIES					
Appearance	Red Brown (Dark) Liquid	Molecular Weight	159.808 g/mole	Specific gravity	No data available
Odour/Odor threshold	Pungent and Suffocating. (Strong)	Flash Point °C	Not Pertinent	pH/ Acidity	Not available.
Auto Ignition Temp. °C	Not Pertinent	Boiling Point °C @ 760 mm Hg	59°C	Melting Point °C	
Vapor Press. Mm Hg @ 20 °C		Vapour Density		Water Solubility @ 20 °C	36.5 g/l at 20 °C (68 °F)
LEL %	Not Pertinent	UEL %	Not Pertinent	% Volatile	
Evaporation rate		Viscosity @ 25 °C		PH	
Octanol / Water Partition Coefficient	No data Available			No data available	
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MSDS-4 : Bromine (Continue...)

Tata Chemicals Ltd.

MSDS - BROMINE

10. STABILITY AND REACTIVITY

Chemical Stability	Stable under recommended storage conditions.	Possibility of Hazardous reaction	No data available
Hazardous Reactions/ Decomposition products	• Bromine gas, Hydrogen Bromide, Hydrogen Chloride,	Incompatible Materials	• Reducing agents, Alkali metals, Powdered metals, Aluminum, Stainless steel, Iron, Copper, Organic materials, Bromine will attack some types of plastics, rubber, and coatings, Aldehydes, Ketones, arsenic powder, Amines, Amides, phenols, Alcohol, reacts violently with: Ammonia, Azides, Ozone.
Condition to avoid	• Confined spaces & contact with material mentioned in material to avoid section		

11. TOXICOLOGICAL INFORMATION

Routes of exposure	Ingestion, Eyes, Inhalation, Skin Absorption				
LD50 (oral / rats) mg/kg	2600 mg/kg	LD50 (dermal/ rats) mg/kg		LC50 (inhalation / rats)	750 1 hours
Target Organ Effects	Respiratory system				
Symptoms related to physical, chemical & toxicological characteristics					

12. ECOLOGICAL INFORMATION

Mobility in Soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.
Persistence and degradability	No data available.
Bio accumulative Potential	No data available
Effects on fish (Eco toxicity)	Waste must be disposed of in accordance with federal, state and local environmental control regulations.
Effects on birds	No data available
Effects on bees	No data available

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MSDS-4 : Bromine (Continue...)

Tata Chemicals Ltd.

MSDS - BROMINE

13. DISPOSAL CONSIDERATIONS

- Dispose of waste and residues in accordance with local authority requirements.

14. TRANSPORT INFORMATION

UN No.	---	IMDG No.	---
Shipping Name	Bromine	Hazard class	---
Packing group	---	Hazard Sub class	---
Marine Pollutant	---	Labels required	----
Warning Statement	---		
Packaging / Precaution			
Shipping Marking			

15. REGULATORY INFORMATION**LABELING:****PHRASES R:**

- R 26 Very toxic by inhalation.
 R 35 Causes severe burns.
 R 50 Very toxic to aquatic organisms.

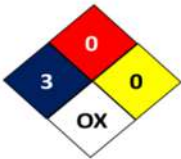
PHRASES S:

- S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
 S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
 S 7/9 Keep container tightly closed and in a well-ventilated place.
 S 61 Avoid release to the environment. Refer to special instructions/Safety data sheets.

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MSDS-4 : Bromine (Continue...)

Tata Chemicals Ltd. 16. <u>OTHER INFORMATION</u>  NFPA Classification: Health Hazard: 3 Fire Hazard: 0 Reactive Hazard: 0 Special Hazard : OX The information provided in this Material Safety data sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with other materials This data belongs to TATA Chemical Ltd. All rights reserved.	MSDS - BROMINE
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MSDS-5 : Chlorine



Safety Data Sheet

Material Name: CHLORINE

SDS ID: MAT04600

*****Section 1 - IDENTIFICATION*****

Manufacturer Information

MATHESON TRI-GAS, INC.
150 Allen Road, Suite 302
Basking Ridge, NJ 07920

General Information: 1-800-416-2505

Emergency #: 1-800-424-9300 (CHEMTREC)

Outside the US: 703-527-3887 (Call collect)

Product Identifier: CHLORINE

Trade Names/Synonyms

MTG MSDS 22; CHLORINE MOLECULAR; DIATOMIC CHLORINE; DICHLORINE; MOLECULAR CHLORINE;
UN 1017; Cl₂; RTECS: FO2100000

Chemical Family

halogens, gas

Product Use

industrial

Restrictions on Use

None known.

*****Section 2 - HAZARDS IDENTIFICATION*****

GHS Classification

Oxidizing gas, Category 1
Gas under pressure, Liquefied gas
Acute toxicity, Category 2
Skin corrosion/irritation, Category 1
Eye damage/irritation, Category 1
Specific target organ systemic toxicity following single exposure, Category 1
Specific target organ systemic toxicity following repeated exposure, Category 1
Hazardous to the aquatic environment - acute hazard, Category 1

GHS LABEL ELEMENTS

Symbol(s)



Signal Word

DANGER

Hazard Statement(s)

May cause or intensify fire; oxidizer
Contains gas under pressure; may explode if heated
Fatal if inhaled
Causes severe skin burns and eye damage
Causes serious eye damage

MSDS-5 : Chlorine (Continue...)**Safety Data Sheet****Material Name: CHLORINE****SDS ID: MAT04600**

Causes damage to organs
 Causes damage to organs through prolonged or repeated exposure
 Very toxic to aquatic life

Precautionary Statement(s)

Keep away from clothing and other combustible materials. Do not breathe gas, fumes, vapor, or spray. Do not eat, drink, or smoke when using this product. Keep reduction valves free from grease and oil. Wear respiratory protection. Wear protective gloves/clothing and eye/face protection. Use only outdoors or in a well-ventilated area. In case of fire, stop leak if safe to do so. Wash thoroughly after handling. Avoid release to the environment. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or doctor/physician. Specific treatment is urgent, see first aid section of Safety Data Sheet. Store locked up. Keep container tightly closed. Store in a well-ventilated place. Protect from sunlight. Collect spillage. Dispose in accordance with all applicable regulations.

*****Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS*****

CAS#	Component	Percent
7782-50-5	CHLORINE	100

*****Section 4 - FIRST AID MEASURES*******Inhalation**

If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Skin

Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention. Thoroughly clean and dry contaminated clothing before reuse. Destroy contaminated shoes.

Eyes

Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

Ingestion

If a large amount is swallowed, get medical attention.

Note to Physicians

For inhalation, consider oxygen.
 Avoid gastric lavage or emesis.

Symptoms: Immediate

respiratory tract burns, skin burns, eye burns, respiratory system effects, central nervous system effects

Symptoms: Delayed

respiratory tract burns, skin burns, eye burns, kidney damage, tooth erosion, respiratory system effects

*****Section 5 - FIRE FIGHTING MEASURES*****

See Section 9 for Flammability Properties

Specific Hazards Arising from the Chemical

Oxidizer. May ignite or explode on contact with combustible materials. Containers may rupture or explode if exposed to heat.

Extinguishing Media

water

MSDS-5 : Chlorine (Continue...)

Safety Data Sheet

Material Name: CHLORINE

SDS ID: MAT04600

Large fires: Flood with fine water spray.

Unsuitable Extinguishing Media

Do not use dry chemicals, carbon dioxide or halogenated extinguishing agents.

Protective Equipment and Precautions for Firefighters

Wear full protective fire fighting gear including self contained breathing apparatus (SCBA) for protection against possible exposure.

Fire Fighting Measures

Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. For small fires, contain and let burn. Use extinguishing agents appropriate for surrounding fire. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Evacuation radius: 800 meters (1/2 mile).

Hazardous Combustion Products

Water or Moisture: hypochlorous acid, hydrochloric acid

*****Section 6 - ACCIDENTAL RELEASE MEASURES*****

Personal Precautions

Wear personal protective clothing and equipment, see Section 8.

Environmental Precautions

Avoid release to the environment. Keep out of water supplies and sewers. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

Methods for Containment

Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so. Reduce vapors with water spray.

Cleanup Methods

Stop leak if safe to do so - Prevent entry into waterways, drains, or confined areas. Do not touch spilled material. Eliminate all ignition sources if safe to do so. Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. Damaged cylinders should be handled only by specialists.

*****Section 7 - HANDLING AND STORAGE*****

Handling Procedures

Subject to handling regulations: U.S. OSHA 29 CFR 1910.119.

Storage Procedures

Store and handle in accordance with all current regulations and standards. Protect from physical damage. Keep separated from incompatible substances. Store outside or in a detached building. NFPA 430 Code for the Storage of Liquid and Solid Oxidizing Materials. Store in a cool, dry place. Store in a well-ventilated area. Protect from sunlight. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Notify State Emergency Response Commission for storage or use at amounts greater than or equal to the TPQ (U.S. EPA SARA Section 302). SARA Section 303 requires facilities storing a material with a TPQ to participate in local emergency response planning (U.S. EPA 40 CFR 355 Part B).

Incompatibilities combustible materials, bases, metals, halogens, metal salts, reducing agents, amines, metal carbide, metal oxides, oxidizing materials, halo carbons, acids, arsenic, calcium, iodine, mercuric oxide, ethers, fluorine

MSDS-5 : Chlorine (Continue...)**Safety Data Sheet**

Material Name: CHLORINE

SDS ID: MAT04600

*****Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION*******Component Exposure Limits****CHLORINE (7782-50-5)****ACGIH:** 0.5 ppm TWA

1 ppm STEL

Europe: 0.5 ppm STEL; 1.5 mg/m³ STEL**OSHA (Final):** 1 ppm Ceiling; 3 mg/m³ Ceiling**OSHA (Vacated):** 0.5 ppm TWA; 1.5 mg/m³ TWA1 ppm STEL; 3 mg/m³ STEL**NIOSH:** 0.5 ppm Ceiling (15 min); 1.45 mg/m³ Ceiling (15 min)**Component Biological Limit Values**

There are no biological limit values for any of this product's components.

IDLH

10 ppm

Engineering Controls

Ensure adequate ventilation. Ensure compliance with applicable exposure limits.

PERSONAL PROTECTIVE EQUIPMENT**Eyes/Face**

Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Protective Clothing

Wear appropriate chemical resistant clothing. For the liquid: Wear appropriate protective, cold insulating clothing.

Glove Recommendations

Wear appropriate chemical resistant gloves.

Respiratory Protection

The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

5 ppm

Any air-purifying half-mask respirator equipped with cartridge(s) providing protection against the compound of concern.

Any supplied-air respirator.

10 ppm

Any supplied-air respirator operated in a continuous-flow mode.

Any powered, air-purifying respirator with cartridge(s) providing protection against this substance.

Any air-purifying respirator with a full facepiece and a canister providing protection against this substance.

Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted canister providing protection against the compound of concern.

Any self-contained breathing apparatus with a full facepiece.

Any supplied-air respirator with a full facepiece.

Emergency or planned entry into unknown concentrations or IDLH conditions -

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

Escape -

Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted canister providing protection against the compound of concern.

MSDS-5 : Chlorine (Continue...)**Safety Data Sheet**

Material Name: CHLORINE

SDS ID: MAT04600

Any appropriate escape-type, self-contained breathing apparatus.

*****Section 9 - PHYSICAL AND CHEMICAL PROPERTIES*****

Physical State:	Gas	Appearance:	Not available
Color:	yellow or green	Physical Form:	gas
Odor:	distinct odor, irritating odor	Odor Threshold:	0.01 ppm
pH:	Not available	Melting/Freezing Point:	-101 °C
Boiling Point:	-35 °C	Flash Point:	not flammable
Decomposition:	Not available	Evaporation Rate:	Not available
Vapor Pressure:	5168 mmHg @ 21 °C	Vapor Density (air = 1):	2.49
Density:	3.214 g/L @ 0 °C	Specific Gravity (water=1):	1.5649 @ -35 °C (liquid)
Water Solubility:	1.46 % @ 0 °C	Log KOW:	Not available
Auto Ignition:	Not available	Viscosity:	0.01327 cP @20 °C
Molecular Weight:	70.906	Molecular Formula:	Cl ₂

Solvent Solubility

Soluble: alkali, chlorides, alcohols

*****Section 10 - STABILITY AND REACTIVITY*******Chemical Stability**

Stable at normal temperatures and pressure.

Conditions to Avoid

Avoid contact with combustible materials. Minimize contact with material. Avoid inhalation of material or combustion by-products. Keep out of water supplies and sewers. May ignite or explode on contact with combustible materials.

Possibility of Hazardous Reactions

Will not polymerize.

Incompatible Materials

combustible materials, bases, metals, halogens, metal salts, reducing agents, amines, metal carbide, metal oxides, oxidizing materials, halo carbons, acids, arsenic, calcium, iodine, mercuric oxide, ethers, fluorine

Decomposition Products

chlorine

Hazardous Decomposition

Water or Moisture: hypochlorous acid, hydrochloric acid

*****Section 11 - TOXICOLOGICAL INFORMATION*******Acute and Chronic Toxicity****Component Analysis - LD50/LC50**

The components of this material have been reviewed in various sources and the following selected endpoints are published:

CHLORINE (7782-50-5)

Inhalation LC50 Rat 293 ppm 1 h

MSDS-5 : Chlorine (Continue...)**Safety Data Sheet****Material Name: CHLORINE****SDS ID: MAT04600****RTECS Acute Toxicity (selected)**

The components of this material have been reviewed, and RTECS publishes the following endpoints:

CHLORINE (7782-50-5)

Inhalation: 368 mg/m³/30 minute(s) Inhalation Mouse LC50; 137 ppm/1 hour Inhalation Mouse LC50
293 ppm/1 hour Inhalation Rat LC50

Acute Toxicity Level**CHLORINE (7782-50-5)****Toxic:** inhalation**Immediate Effects**

respiratory tract burns, skin burns, eye burns, respiratory system effects, central nervous system effects

Delayed Effects

respiratory tract burns, skin burns, eye burns, tooth erosion, kidney damage, respiratory system effects

Irritation/Corrosivity Data

No animal testing data available for skin or eyes.

RTECS Irritation

The components of this material have been reviewed and RTECS publishes no data as of the date on this document.

Local Effects**CHLORINE (7782-50-5)****Corrosive:** inhalation, skin, eye**Respiratory Sensitizer**

No data available.

Dermal Sensitizer

No data available.

Carcinogenicity**Component Carcinogenicity****CHLORINE (7782-50-5)****ACGIH:** A4 - Not Classifiable as a Human Carcinogen**RTECS Mutagenic**

The components of this material have been reviewed, and RTECS publishes data for one or more components.

RTECS Reproductive Effects

The components of this material have been reviewed, and RTECS publishes the following endpoints:

CHLORINE (7782-50-5)

565 mg/kg Oral Rat TDLo (8 week, prior to copulation 2 week, 3 week, continuous)

RTECS Tumorigenic

The components of this material have been reviewed, and RTECS publishes data for one or more components.

Specific Target Organ Toxicity - Single Exposure

respiratory system, central nervous system

Specific Target Organ Toxicity - Repeated Exposure

teeth, kidneys, respiratory system

Aspiration Hazard

Not applicable.

Medical Conditions Aggravated by Exposure

heart problems

MSDS-5 : Chlorine (Continue...)

Safety Data Sheet

Material Name: CHLORINE

SDS ID: MAT04600

*****Section 12 - ECOLOGICAL INFORMATION*****

Component Analysis - Aquatic Toxicity

CHLORINE (7782-50-5)

Fish: 96 Hr LC50 *Lepomis macrochirus*: 0.44 mg/L [flow-through]; 96 Hr LC50 *Oncorhynchus mykiss*: 0.014 mg/L [flow-through]; 96 Hr LC50 *Oncorhynchus mykiss*: 0.014 mg/L; 96 Hr LC50 *Oncorhynchus mykiss*: 0.104 - 0.168 mg/L [static]; 96 Hr LC50 *Pimephales promelas*: 0.08 mg/L [flow-through]; 96 Hr LC50 *Pimephales promelas*: 0.1 mg/L

Invertebrate: 48 Hr LC50 *Daphnia magna*: 0.017 mg/L

Abiotic Degradation

Rapidly undergoes disproportionation in water to form hypochlorous acid and chloride ion.

Persistence and Degradability

No data available.

Bioaccumulative Potential

No data available.

Mobility in Environmental Media

No data available.

*****Section 13 - DISPOSAL CONSIDERATIONS*****

Disposal Methods

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.

Component Waste Numbers

The U.S. EPA has not published waste numbers for this product's components.

*****Section 14 - TRANSPORT INFORMATION*****

US DOT Information

Shipping Name: Chlorine

UN/NA #: UN1017 **Hazard Class:** 2.3

Required Label(s): 2.3, 5.1, 8

Additional Info.: Toxic-Inhalation Hazard Zone B

IMDG Information

Shipping Name: Chlorine

UN #: UN1017 **Hazard Class:** 2.3

Required Label(s): 2.3, 5.1, 8

MSDS-5 : Chlorine (Continue...)**Safety Data Sheet****Material Name: CHLORINE****SDS ID: MAT04600****Component Marine Pollutants**

This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

Component	CAS	
CHLORINE	7782-50-5	DOT regulated marine pollutant

Component Marine Pollutants (IMDG)

This material contains one or more of the following chemicals required by IMDG to be identified as marine pollutants.

CHLORINE (7782-50-5)

IMDG regulated marine pollutant (UN1017)

*****Section 15 - REGULATORY INFORMATION*******Component Analysis****U.S. Federal Regulations**

This material contains one or more of the following chemicals required to be identified under SARA Section 302/304 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

CHLORINE (7782-50-5)**SARA 302:** 100 lb TPQ**SARA 304:** 10 lb EPCRA RQ**SARA 313:** 1.0 % de minimis concentration**CERCLA:** 10 lb final RQ; 4.54 kg final RQ**OSHA (safety):** 1500 lb TQ**SARA 311/312 Hazardous Categories****Acute Health:** Yes **Chronic Health:** Yes **Fire:** Yes **Pressure:** Yes **Reactive:** No**U.S. State Regulations**

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA
CHLORINE	7782-50-5	Yes	Yes	Yes	Yes	Yes

Not regulated under California Proposition 65

Component Analysis - Inventory

Component	CAS	US	CA	EU	AU	PH	JP	KR	CN	NZ
CHLORINE	7782-50-5	Yes	DSL	EIN	Yes	Yes	No	Yes	Yes	Yes

*****Section 16 - OTHER INFORMATION*******NFPA Ratings:** Health: 4 Fire: 0 Reactivity: 0 Other: Oxidizer

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

MSDS-5 : Chlorine (Continue...)

Safety Data Sheet

Material Name: CHLORINE

SDS ID: MAT04600

Key / Legend

ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSL - Domestic Substances List; EEC - European Economic Community; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; JP - Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LOLI - List Of Lists™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; RID - European Rail Transport; RTECS - Registry of Toxic Effects of Chemical Substances®; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States

Other Information

Matheson Tri-Gas, Inc. makes no express or implied warranties, guarantees or representations regarding the product or the information herein, including but not limited to any implied warranty or merchantability or fitness for use. Matheson Tri-Gas, Inc. shall not be liable for any personal injury, property or other damages of any nature, whether compensatory, consequential, exemplary, or otherwise, resulting from any publication, use or reliance upon the information herein.

End of Sheet MAT04600

MSDS-6 : Chlorosulfonic Acid**SAFETY DATA SHEET**

Creation Date 09-May-2012

Revision Date 25-Dec-2021

Revision Number 6

1. Identification

Product Name Chlorosulfonic acid

Cat No. : AC304490000; AC304490010; AC304490025; AC304490250;
AC304491000; AC304495000

CAS No 7790-94-5
Synonyms No information available

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US**:001-201-796-7100 / **Europe**: +32 14 57 52 99
CHEMTREC Tel. No.**US**:001-800-424-9300 / **Europe**:001-703-527-3887

2. Hazard(s) identification**Classification**

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Corrosion/Irritation	Category 1 A
Serious Eye Damage/Eye Irritation	Category 1
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes severe skin burns and eye damage

MSDS-6 : Chlorosulfonic Acid (Continue...)

Chlorosulfonic acid

Revision Date 25-Dec-2021

May cause respiratory irritation

**Precautionary Statements****Prevention**

Do not breathe dust/fume/gas/mist/vapors/spray

Wash face, hands and any exposed skin thoroughly after handling

Wear protective gloves/protective clothing/eye protection/face protection

Use only outdoors or in a well-ventilated area

Response

Immediately call a POISON CENTER or doctor/physician

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

Skin

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower

Wash contaminated clothing before reuse

Eyes

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

Ingestion

IF SWALLOWED: Rinse mouth. DO NOT induce vomiting

Storage

Store locked up

Store in a well-ventilated place. Keep container tightly closed

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Reacts violently with water

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Chlorosulfonic acid	7790-94-5	>95

4. First-aid measures**General Advice**

Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.

Eye Contact

Immediate medical attention is required. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Keep eye wide open while rinsing.

Skin Contact

Wash off immediately with plenty of water for at least 15 minutes. Remove and wash contaminated clothing and gloves, including the inside, before re-use. Call a physician immediately.

Inhalation

Remove from exposure, lie down. If breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Call a physician immediately.

MSDS-6 : Chlorosulfonic Acid (Continue...)

Chlorosulfonic acid

Revision Date 25-Dec-2021

Ingestion	Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Call a physician immediately. Clean mouth with water.
Most important symptoms and effects	Causes burns by all exposure routes. Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media CO₂, dry chemical, dry sand, alcohol-resistant foam.

Insuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available

Explosion Limits
Upper 37.70%
Lower 3.30%

Sensitivity to Mechanical Impact No information available

Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical

Thermal decomposition can lead to release of irritating gases and vapors. The product causes burns of eyes, skin and mucous membranes. Reacts violently with water.

Hazardous Combustion Products

Carbon monoxide (CO), Carbon dioxide (CO₂), Sulfur oxides. Thermal decomposition can lead to release of irritating gases and vapors. Hydrogen chloride gas.

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health
4

Flammability
0

Instability
2

Physical hazards
W

6. Accidental release measures

Personal Precautions Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Use personal protective equipment as required. Ensure adequate ventilation.

Environmental Precautions Should not be released into the environment. See Section 12 for additional Ecological Information.

Methods for Containment and Clean Up Keep in suitable, closed containers for disposal. Soak up with inert absorbent material. Do not expose spill to water.

7. Handling and storage

Handling Do not get in eyes, on skin, or on clothing. Do not ingest. If swallowed then seek immediate medical assistance. Use only under a chemical fume hood. Wear personal protective equipment/face protection. Do not breathe mist/vapors/spray. Do not allow contact with water.

Storage. Corrosives area. Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from water or moist air. Incompatible Materials. Acids. Bases. Alcohols. Amines. Butyl rubber. Finely powdered metals.

MSDS-6 : Chlorosulfonic Acid (Continue...)

Chlorosulfonic acid

Revision Date 25-Dec-2021

8. Exposure controls / personal protection**Exposure Guidelines**

This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Engineering Measures

Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment**Eye/face Protection**

Tight sealing safety goggles. Face protection shield.

Skin and body protection

Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	No information available
Odor	pungent
Odor Threshold	No information available
pH	< 1
Melting Point/Range	-80 °C / -112 °F
Boiling Point/Range	151 - 152 °C / 303.8 - 305.6 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	No information available
Flammability (solid, gas)	No information available
Flammability or explosive limits	
Upper	37.70%
Lower	3.30%
Vapor Pressure	No information available
Vapor Density	4
Specific Gravity	1.750
Solubility	Reacts violently with water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	> 151°C
Viscosity	3 mPa.s at 95 °C
Molecular Formula	H Cl O3 S
Molecular Weight	116.52

10. Stability and reactivity

Reactive Hazard	Yes
Stability	Moisture sensitive.
Conditions to Avoid	Incompatible products. Excess heat. Exposure to moist air or water. Exposure to moisture.
Incompatible Materials	Acids, Bases, Alcohols, Amines, Butyl rubber, Finely powdered metals
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO ₂), Sulfur oxides, Thermal decomposition can

MSDS-6 : Chlorosulfonic Acid (Continue...)

Chlorosulfonic acid

Revision Date 25-Dec-2021

lead to release of irritating gases and vapors, Hydrogen chloride gas

Hazardous Polymerization

Hazardous polymerization does not occur.

Hazardous Reactions

None under normal processing. Reacts violently with water.

11. Toxicological information**Acute Toxicity****Product Information
Component Information**

No acute toxicity information is available for this product

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Chlorosulfonic acid	-	Not listed	LC50 = 0.0385 mg/L (Rat) 4 h

Toxicologically Synergistic

No information available

Products**Delayed and immediate effects as well as chronic effects from short and long-term exposure****Irritation**

No information available

Sensitization

No information available

Carcinogenicity

The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Chlorosulfonic acid	7790-94-5	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects

No information available

Reproductive Effects

No information available.

Developmental Effects

No information available.

Teratogenicity

No information available.

STOT - single exposure

Respiratory system

STOT - repeated exposure

None known

Aspiration hazard

No information available

Symptoms / effects, both acute and delayed

Product is a corrosive material. Use of gastric lavage or emesis is contraindicated.
Possible perforation of stomach or esophagus should be investigated; Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

Endocrine Disruptor Information

No information available

Other Adverse Effects

See actual entry in RTECS for complete information.

12. Ecological information**Ecotoxicity**

Do not empty into drains. Reacts with water so no ecotoxicity data for the substance is available.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Chlorosulfonic acid	Not listed	LC50 = 5740 mg/L 96h	Not listed	EC50 = 32 mg/L 48h

Persistence and Degradability

Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation

No information available.

Mobility

Is not likely mobile in the environment.

MSDS-6 : Chlorosulfonic Acid (Continue...)

Chlorosulfonic acid

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13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information**DOT**

UN-No UN1754
 Proper Shipping Name CHLOROSULFONIC ACID
 Hazard Class 8
 Packing Group I

TDG

UN-No UN1754
 Proper Shipping Name CHLOROSULFONIC ACID
 Hazard Class 8
 Packing Group I

IATA

UN-No UN1754
 Proper Shipping Name CHLOROSULFONIC ACID, FORBIDDEN FOR IATA TRANSPORT
 Hazard Class 8

IMDG/IMO

UN-No UN1754
 Proper Shipping Name CHLOROSULFONIC ACID
 Hazard Class 8
 Packing Group I

15. Regulatory information**United States of America Inventory**

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Chlorosulfonic acid	7790-94-5	X	ACTIVE	-

Legend:

TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)

X - Listed

“-” - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories

Canada (DSL/NDL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Chlorosulfonic acid	7790-94-5	X	-	232-234-6	X	X	X	X	X	KE-05909

KECL - NIER number or KE number (<http://ncis.nier.go.kr/en/main.do>)

U.S. Federal Regulations

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
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MSDS-6 : Chlorosulfonic Acid (Continue...)

Chlorosulfonic acid

Revision Date 25-Dec-2021

Chlorosulfonic acid	X	1000 lb	-	-
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Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Chlorosulfonic acid	1000 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Chlorosulfonic acid	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
 DOT Marine Pollutant N
 DOT Severe Marine Pollutant N

U.S. Department of Homeland Security

This product contains the following DHS chemicals:
 Legend - STQs = Screening Threshold Quantities, APA = A placarded amount

Component	DHS Chemical Facility Anti-Terrorism Standard
Chlorosulfonic acid	APA

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Chlorosulfonic acid	-	Use restricted. See item 75. (see link for restriction details)	-

<https://echa.europa.eu/substances-restricted-under-reach>

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Chlorosulfonic acid	7790-94-5	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Chlorosulfonic acid	7790-94-5	Not applicable	Not applicable	Not applicable	Not applicable

MSDS-6 : Chlorosulfonic Acid (Continue...)

Chlorosulfonic acid

Revision Date 25-Dec-2021

16. Other information

Prepared By

Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date

09-May-2012

Revision Date

25-Dec-2021

Print Date

25-Dec-2021

Revision Summary

This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

MSDS-7 : Ethylene Oxide**Ethylene oxide****Safety Data Sheet P-4798**

This SDS conforms to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.
 Date of issue: 01/01/1982 Revision date: 10/24/2016 Supersedes: 10/26/2015

SECTION: 1. Product and company identification**1.1. Product identifier**

Name : Ethylene oxide
 CAS No : 75-21-8
 Other means of identification : Dihydrooxirine, dimethylene oxide, ethene oxide, epoxyethane, oxane, oxacyclopropane, oxidoethane, oxiran, oxirane, 1,2 epoxyethane

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Industrial use. Use as directed.

1.3. Details of the supplier of the safety data sheet

Praxair, Inc.
 10 Riverview Drive
 Danbury, CT 06810-6268 - USA
 T 1-800-772-9247 (1-800-PRAXAIR) - F 1-716-879-2146
www.praxair.com

1.4. Emergency telephone number

Emergency number : Onsite Emergency: 1-800-645-4633

CHEMTREC, 24hr/day 7days/week
 — Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887
 (collect calls accepted, Contract 17729)

SECTION 2: Hazard identification**2.1. Classification of the substance or mixture****GHS-US classification**

Flam. Gas 1	H220
Liquefied gas	H280
Acute Tox. 3 (Inhalation:gas)	H331
Skin Irrit. 2	H315
Eye Irrit. 2A	H319
Skin Sens. 1B	H317
Muta. 1B	H340
Carc. 1A	H350
Repr. 1A	H360
STOT SE 3	H335
STOT RE 1	H372

2.2. Label elements**GHS-US labeling**

Hazard pictograms (GHS-US)



Signal word (GHS-US)

: DANGER

Hazard statements (GHS-US)

: H220 - **EXTREMELY FLAMMABLE GAS**
 H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
 H315+H320 - CAUSES SKIN AND EYE IRRITATION
 H317 - MAY CAUSE AN ALLERGIC SKIN REACTION
 H331 - TOXIC IF INHALED
 H335 - MAY CAUSE RESPIRATORY IRRITATION
 H340 - MAY CAUSE GENETIC DEFECTS
 H350 - MAY CAUSE CANCER

EN (English US)

SDS ID: P-4798

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MSDS-7 : Ethylene Oxide (Continue...)**Ethylene oxide****Safety Data Sheet P-4798**

This SDS conforms to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.

Date of issue: 01/01/1982 Revision date: 10/24/2016 Supersedes: 10/26/2015

Precautionary statements (GHS-US)

H360 - MAY DAMAGE FERTILITY OR THE UNBORN CHILD
 H372 - CAUSES DAMAGE TO ORGANS (NERVOUS SYSTEM, KIDNEYS) THROUGH PROLONGED OR REPEATED EXPOSURE
 CGA-HG04 - MAY FORM EXPLOSIVE MIXTURES WITH AIR
 CGA-HG11 - SYMPTOMS MAY BE DELAYED

P201 - Obtain special instructions before use
 P202 - Do not handle until all safety precautions have been read and understood
 P210 - Keep away from Heat/Open flames/Sparks/Hot surfaces. - No smoking
 P260 - Do not breathe gas
 P262 - Do not get in eyes, on skin, or on clothing
 P271+P403 - Use and store only outdoors or in a well-ventilated place
 P280+P284 - Wear protective gloves, protective clothing, eye protection, respiratory protection, and/or face protection
 P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely
 P381 - Eliminate all ignition sources if safe to do so
 P405 - Store locked up
 P501 - Dispose of contents/container in accordance with container Supplier/owner instructions
 CGA-PG05 - Use a back flow preventive device in the piping
 CGA-PG20+CGA-PG10 - Use only with equipment of compatible materials of construction and rated for cylinder pressure
 CGA-PG12 - Do not open valve until connected to equipment prepared for use
 CGA-PG06 - Close valve after each use and when empty
 CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F)

2.3. Other hazards

Other hazards not contributing to the classification : Asphyxiant in high concentrations.

2.4. Unknown acute toxicity (GHS US)

No data available

SECTION 3: Composition/Information on ingredients**3.1. Substance**

Name	Product identifier	%
Ethylene oxide (Main constituent)	(CAS No) 75-21-8	100

3.2. Mixture

Not applicable

SECTION 4: First aid measures**4.1. Description of first aid measures**

First-aid measures general : **IMPORTANT** In all cases of exposure, get or summon medical treatment immediately. Take the victim to a doctor or medical facility at once.

First-aid measures after inhalation : Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician.

First-aid measures after skin contact : In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash with plenty of soap and water. The liquid may cause frostbite. For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensation have returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately.

First-aid measures after ingestion : Not expected to be a primary route of exposure. Give water to drink if victim completely conscious/alert. Do not induce vomiting. Call a physician. Never give anything by mouth to an unconscious person.

4.2. Most important symptoms and effects, both acute and delayed

No additional information available

EN (English US)

SDS ID: P-4798

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MSDS-7 : Ethylene Oxide (Continue...)**Ethylene oxide****Safety Data Sheet P-4798**

This SDS conforms to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.

Date of issue: 01/01/1982 Revision date: 10/24/2016 Supersedes: 10/26/2015

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures**5.1. Extinguishing media**

Suitable extinguishing media : Carbon dioxide, Dry chemical, Water spray or fog.

5.2. Special hazards arising from the substance or mixtureFire hazard : **EXTREMELY FLAMMABLE GAS**.Explosion hazard : **EXTREMELY FLAMMABLE GAS**. Forms explosive mixtures with air and oxidizing agents.

Reactivity : Exothermic polymerization is possible (see incompatible materials).

5.3. Advice for firefightersFirefighting instructions : **DANGER! Cancer and reproductive hazard.****DANGER! Toxic, flammable liquefied gas**

FORMS EXPLOSIVE MIXTURES WITH AIR

Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with their provincial and local fire regulations.

Special protective equipment for fire fighters : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.

Other information : Containers are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.).

SECTION 6: Accidental release measures**6.1. Personal precautions, protective equipment and emergency procedures**General measures : **DANGER! Cancer and reproductive hazard.** . **DANGER! Toxic, flammable liquefied gas** . FORMS EXPLOSIVE MIXTURES WITH AIR. If involved in a fire, this product may emit irritating and potentially toxic fumes. Fumes and vapors may spread from leak. Vapors are heavier than air and may collect in low spots. Evacuate personnel to a safe area. Appropriate self-contained breathing apparatus may be required. Approach suspected leak area with caution. Remove all sources of ignition, if safe to do so. Reverse flow into cylinder may cause rupture. Reduce gas with fog or fine water spray. Stop flow of product if safe to do so. Ventilate area or move container to a well-ventilated area. Flammable gas may spread from leak. Before entering the area, especially a confined area, check the atmosphere with an appropriate device.**6.1.1. For non-emergency personnel**

No additional information available

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

Try to stop release. Reduce vapor with fog or fine water spray. Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

6.3. Methods and material for containment and cleaning up

No additional information available

6.4. Reference to other sections

See also sections 8 and 13.

EN (English US)

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MSDS-7 : Ethylene Oxide (Continue...)**Ethylene oxide****Safety Data Sheet P-4798**

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SECTION 7: Handling and storage**7.1. Precautions for safe handling**

Precautions for safe handling

: Prevent product contamination

Water or organic contamination may cause a violent reaction

Do not breathe gas/vapor. Avoid all contact with skin, eyes, or clothing. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only non-sparking tools. Use only explosion-proof equipment

Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g. wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions

: Because of the potential for violent decomposition, containers of ethylene oxide must be properly blanketed with an inert gas and given extraordinary protection against fire exposure

Store only where temperature will not exceed 125°F (52°C). Post "No Smoking/No Open Flames" signs in storage and use areas. There must be no sources of ignition. Separate packages and protect against potential fire and/or explosion damage following appropriate codes and requirements (e.g. NFPA 30, NFPA 55, NFPA 70, and/or NFPA 221 in the U.S.) or according to requirements determined by the Authority Having Jurisdiction (AHJ). Always secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand when the container is not in use. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods. For other precautions in using this product, see section 16

All equipment in storage areas must be explosion-proof. Electric installation in storage areas must meet the requirements of National Electric Code (NEC) Article 500. This material is a static accumulator. To avoid ignition of vapors by static discharge, all metal parts and equipment must be grounded. Follow NFPA 77, Recommended Practice on Static Electricity (www.nfpa.org), and API Recommended Practice 2003, Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection**8.1. Control parameters**

No additional information available

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8.2. Exposure controls

Appropriate engineering controls	: Use an explosion-proof local exhaust system. Local exhaust and general ventilation must be adequate to meet exposure standards. MECHANICAL (GENERAL): Inadequate - Use only in a closed system. Use explosion proof equipment and lighting.
Hand protection	: Butyl rubber (IIR) /.
Eye protection	: Select eye protection in accordance with OSHA 29 CFR 1910.133. Safety glasses with face shield. Contact lenses should not be worn.
Skin and body protection	: Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear appropriate chemical gloves during cylinder changeout or wherever contact with product is possible. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138. Rubber shoes and apron where risk of liquid spill exists. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133.
Respiratory protection	: When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).
Thermal hazard protection	: Wear cold insulating gloves when transfilling or breaking transfer connections.

SECTION 9: Physical and chemical properties**9.1. Information on basic physical and chemical properties**

Physical state	: Gas
Color	: Colorless
Odor	: ether-like
Odor threshold	: 420 - 490 ppm
pH	: Not applicable.
Relative evaporation rate (butyl acetate=1)	: No data available
Relative evaporation rate (ether=1)	: Not applicable.
Melting point	: No data available
Freezing point	: No data available
Boiling point	: 10.5 °C (51.26 °F)
Flash point	: -20 °C (-4 °F)
Critical temperature	: 195.8 °C
Auto-ignition temperature	: 429 °C (804 °F)
Decomposition temperature	: No data available
Flammability (solid, gas)	: 3 - 100 vol %
Vapor pressure	: 1.5 bar (22 psia) (at 20°C (68°F))
Relative vapor density at 20 °C	: No data available
Relative density	: 0.87 (Water = 1) (at 4°C (39.2°F))
Density	: 1.824 kg/m³ (0.1139 lb/ft³) (at 21.1 °C (70 °F))
Relative gas density	: 1.52 (Air = 1) (at 21.1 °C (70 °F))
Solubility	: Water: No data available
Log Pow	: Not applicable.
Log Kow	: Not applicable.
Viscosity, kinematic	: Not applicable.
Viscosity, dynamic	: Not applicable.
Explosive properties	: Forms explosive mixtures with air and oxidizing agents.
Oxidizing properties	: None.

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Explosion limits : No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity**10.1. Reactivity**

Exothermic polymerization is possible (see incompatible materials).

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

May occur.

10.4. Conditions to avoid

Contamination, especially by incompatible materials (see 10.5). Heat. Sparks. Ignition sources.

Pure ethylene oxide decomposes violently if exposed to a high enough temperature. The temperature required for decomposition can vary depending on time, pressure, and conditions within the system and is reduced as pressure and volume-to-surface ratios are increased. Decomposition temperatures ranging from 842°F-1040°F (450°C-560°C) have been observed in experimental apparatus.

10.5. Incompatible materials

Oxidizing agents. Mercaptans. Alcohols. Alkali metals, Alkaline earth metals, Acetylide forming metals, Chromium, Titanium > 1022°F (550°C), Uranium (U) > 1382°F (750°C), Magnesium > 1427°F (775°C). **Will polymerize violently if contaminated with:** Amines, alkalis, Acids, Mineral acids, Metal chlorides, Metal oxides, Water, Organic materials.

10.6. Hazardous decomposition products

Carbon dioxide, Carbon monoxide.

SECTION 11: Toxicological information**11.1. Information on toxicological effects**

Acute toxicity : Inhalation:gas: TOXIC IF INHALED.

Ethylene oxide (1f)75-21-8	
LC50 inhalation rat (ppm)	2920 ppm/1h
ATE US (gases)	1460.000 ppmV/4h

Skin corrosion/irritation : CAUSES SKIN IRRITATION.

pH: Not applicable.

Serious eye damage/irritation : CAUSES SERIOUS EYE IRRITATION.

pH: Not applicable.

Respiratory or skin sensitization : MAY CAUSE AN ALLERGIC SKIN REACTION.

Germ cell mutagenicity : MAY CAUSE GENETIC DEFECTS.

Carcinogenicity : MAY CAUSE CANCER.

Ethylene oxide (75-21-8)	
IARC group	1 - Carcinogenic to humans
National Toxicology Program (NTP) Status	2 - Known Human Carcinogens

Reproductive toxicity : MAY DAMAGE FERTILITY OR THE UNBORN CHILD.

Specific target organ toxicity (single exposure) : MAY CAUSE RESPIRATORY IRRITATION.

Specific target organ toxicity (repeated exposure) : CAUSES DAMAGE TO ORGANS (NERVOUS SYSTEM, KIDNEYS) THROUGH PROLONGED OR REPEATED EXPOSURE.

Aspiration hazard : Not classified

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SECTION 12: Ecological information**12.1. Toxicity**

No additional information available

12.2. Persistence and degradability

Ethylene oxide (75-21-8)	
Persistence and degradability	No ecological damage caused by this product.

12.3. Bioaccumulative potential

Ethylene oxide (75-21-8)	
Log Pow	Not applicable.
Log Kow	Not applicable.
Bioaccumulative potential	No ecological damage caused by this product.

12.4. Mobility in soil

Ethylene oxide (75-21-8)	
Mobility in soil	No data available.

12.5. Other adverse effects

Effect on ozone layer : None

SECTION 13: Disposal considerations**13.1. Waste treatment methods**

Waste disposal recommendations : Do not attempt to dispose of residual or unused quantities. Return container to supplier.
 Additional information : This chemical is a pesticide product registered by the United States Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets (SDS), and for workplace labels of non-pesticide chemicals. The hazard information required on the pesticide label is reproduced below. The pesticide label also includes other important information, including directions for use

STORAGE AND DISPOSAL:

Do not contaminate water, food, or feed by storage and disposal.
 Pesticide Storage: Cylinders should be stored in a well ventilated area.
 Pesticide Disposal: Return cylinder with residual product to supplier.
 Container Handling: Do not reuse this container for any other purpose. Do not refill this cylinder; return to supplier.

SECTION 14: Transport information

In accordance with DOT

Transport document description : UN1040 Ethylene oxide (up to a total pressure of 1MPa (10 bar) at 50 degrees C), 2.3

UN-No.(DOT) : UN1040

Proper Shipping Name (DOT) : Ethylene oxide
 up to a total pressure of 1MPa (10 bar) at 50 degrees C

Class (DOT) : 2.3 - Class 2.3 - Poisonous gas 49 CFR 173.115

Hazard labels (DOT) : Poison Gas
 2.3 - Poison gas
 2.1 - Flammable gas



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DOT Special Provisions (49 CFR 172.102)

4 - This material is poisonous by inhalation (see 171.8 of this subchapter) in Hazard Zone D (see 173.116(a) of this subchapter), and must be described as an inhalation hazard under the provisions of this subchapter

342 - Glass inner packaging (such as ampoules or capsules) intended only for use in sterilization devices, when containing less than 30 mL of ethylene oxide per inner packaging with not more than 300 mL per outer packaging, may be transported in accordance with §173.4a of this subchapter, irrespective of the restriction of §173.4a(b) provided that: a. After filling, each glass inner packaging must be determined to be leak-tight by placing the glass inner packaging in a hot water bath at a temperature and for a period of time sufficient to ensure that an internal pressure equal to the vapor pressure of ethylene oxide at 55 °C is achieved. Any glass inner packaging showing evidence of leakage, distortion or other defect under this test must not be transported under the terms of this special provision; b. In addition to the packaging required in §173.4a, each glass inner packaging must be placed in a sealed plastic bag compatible with ethylene oxide and capable of containing the contents in the event of breakage or leakage of the glass inner packaging; and c. Each glass inner packaging is protected by a means of preventing puncture of the plastic bag (e.g., sleeves or cushioning) in the event of damage to the packaging (e.g., by crushing)

T50 - When portable tank instruction T50 is referenced in Column (7) of the 172.101 Table, the applicable liquefied compressed gases are authorized to be transported in portable tanks in accordance with the requirements of 173.313 of this subchapter

TP20 - This hazardous material must only be transported in insulated tanks under a nitrogen blanket

Additional information

Other information : No supplementary information available.

Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers: - Ensure there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

Transport by sea

UN-No. (IMDG) : 1040

Proper Shipping Name (IMDG) : ETHYLENE OXIDE

Class (IMDG) : 2 - Gases

Air transport

UN-No. (IATA) : 1040

Proper Shipping Name (IATA) : Ethylene oxide

Class (IATA) : 2

SECTION 15: Regulatory information**15.1. US Federal regulations**

Ethylene oxide (75-21-8)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Subject to reporting requirements of United States SARA Section 313	
CERCLA RQ	10 lb
SARA Section 302 Threshold Planning Quantity (TPQ)	1000 lb
SARA Section 311/312 Hazard Classes	Delayed (chronic) health hazard Fire hazard Immediate (acute) health hazard Reactive hazard Sudden release of pressure hazard

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15.2. International regulations**CANADA****EU-Regulations****15.2.2. National regulations**

Ethylene oxide (75-21-8)
Listed on IARC (International Agency for Research on Cancer)
Listed as carcinogen on NTP (National Toxicology Program)

15.3. US State regulations

Ethylene oxide(75-21-8)	
U.S. - California - Proposition 65 - Carcinogens List	Yes
U.S. - California - Proposition 65 - Developmental Toxicity	Yes
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	Yes
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	Yes
Non-significant risk level (HSRL)	20
State or local regulations	U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List

SECTION 16: Other information**Other information**

: When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Before using any plastics, confirm their compatibility with this product

Praxair asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information

The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Praxair, Inc, it is the user's obligation to determine the conditions of safe use of the product

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MSDS-7 : Ethylene Oxide (Continue...)



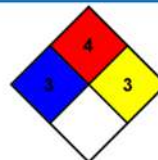
Ethylene oxide

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NFPA health hazard	: 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.
NFPA fire hazard	: 4 - Will rapidly or completely vaporize at normal pressure and temperature, or is readily dispersed in air and will burn readily.
NFPA reactivity	: 3 - Capable of detonation or explosive reaction, but requires a strong initiating source or must be heated under confinement before initiation, or reacts explosively with water.



HMIS III Rating

Health	: 1 Slight Hazard - Irritation or minor reversible injury possible
Flammability	: 4 Severe Hazard
Physical	: 3 Serious Hazard

SDS US (GHS HazCom 2012) - Praxair

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

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MSDS-8: Liquefied Petroleum Gas (LPG)

MSDS: LPG

MATERIAL SAFETY DATA SHEET

1. CHEMICAL IDENTITY		
CHEMICAL NAME : Liquefied petroleum gas		
CHEMICAL CLASSIFICATION: Mixture of butane and propane		
SYNONYMES :		
TRADE NAME: Liquefied petroleum gas		
FORMULA: Mixture of C ₃ H ₈ & C ₄ H ₁₀ .	C.A.S. NO.	
U.N. NO: 1075	HAZCHEM CODE: 2WE	
REGULATED IDENTIFICATION : NA		
SHIPPING NAME CODES/ LABLE : Liquefied petroleum gas		
HAZARDOUS WASTE I.D. NO. : NA		
HAZARDOUS INGREDIENTS :	C.A.S. No. :	
1. Propane	106-97-8	
2. Butane	74-98-6	
3. Pentane	109-66-0	
2. PHYSICAL AND CHEMICAL DATA		
BOILING POINT (°C): >-40	PHYSICL STATE: Liquefied gas	APPEARANCE: Colorless
MELTING / FREEZING POINT(°C): N/A	VAPOUR PRESSURE @ 35 °C mm/Hg: 1311.56 mm hg @-20 Dg F	Odor: Odorless Gas.
VAPOUR DENSITY (AIR= 1): 1.5	SOLUBILITY IN H ₂ O @ 30 °C : Slight at 30 Deg. CG	
SPECIFIC GRAVITY (H ₂ O=1): 0.51 to 0.58 at 50 Deg. CG	PH: NA	
3. FIRE AND EXPLOSION HAZARD DATA		
FLAMMABILITY : Yes	LEL : 1.8 %	UEL : 12.8 %
TDG FLAMMABILITY:	FLASH POINT (°C): -76	AUTO IGNITION

MSDS-8 : Liquified Petroleum Gas (LPG) (Continue...)

GAIL (India) Limited
Gas & Beyond

MSDS: LPG

2.1	to -156 Deg. FH	TEMP(°C): 320 to 405 deg C
EXPLOSION SENSITIVITY TO IMPACT: NA	EXPLOSION SENSITIVITY TO STATIC ELECTRICITY: NA	HAZARDOUS COMBUSTION PRODUCTS : Carbon monoxide and carbon dioxide
HAZARDOUS POLIMERISATION : NA	EXPLOSIVE MATERIAL: NA	CORROSSIVE MATERIAL: NA
FLAMMABLE MATERIAL : NA	OXIDISER :NA	OTHERS :NA
PYROPHORIC : NA		ORGANIC PEROXIDE : NA
4. REACTIVITY DATA		
CHEMICAL STABILITY : Stable		
INCOMPATABILITY WITH OTHER MATERIAL : With oxidizing materials		
REACTIVITY : Yes		
HAZARDOUS REACTION PRODUCTS : Carbon dioxide, Carbon monoxide		
5. HEALTH HAZARD DATA		
ROUTES OF ENTRY: Skin Absorption: NA. Skin Contact: Yes (liquid) Eye Contact: Yes Inhalation: Acute: Yes Chronic: NA. Ingestion: No		
EFFECTS OF EXPOSURE / SYMPTOMS: Inhalation can cause headache, disorientation, dizziness, drowsiness and possibly Unconsciousness at concentrations that cause oxygen deficiency and asphyxiation. Rapidly expanding gas or vaporized liquid may cause frostbite to skin and eyes		
EMERGENCY TREATMENT : Flush eyes and skin with plenty of water and get medical aid.		
TLV (ACGIH) : 100 PPM, 1800 mg/m3		STEL : PPM mg/m3
PERMISSIBLE EXPOSURE LIMITS LD 50: PPM mg/m3		ODOUR THRESHOLD LD50 : 5000ppm to 20000 ppm
NFPA HAZARD	HELATH: NA	FLAMABILITY : Yes
		STABILITY: Stable
		SPECIAL: NA

MSDS-8 : Liquified Petroleum Gas (LPG) (Continue...)

GAIL (India) Limited
Gas & Beyond

MSDS: LPG

RATING				
6. PREVENTIVE MEASURES				
PERSONAL PROTECTIVE EQUIPMENTS : Respiratory protective equipment required. Eye & Face : Safety goggles. Hand & Arm : Hand gloves (PVC synthetic only) Other clothing and equipment : Gum boots, PVC apron.				
HANDLING AND STORAGE PRECAUTION : Store the container in a cool, dry and well ventilated specified place, away from heat, spark and flame.				
7. EMERGENCY AND FIRST- AID MESURES				
FIRE	FIRE EXTINGUISHING MEDIA : Dry chemical powder, carbon dioxide and water spray.			
	SPECIAL PROCEDURE : NA			
	UNUSUAL HAZARDS : Air vapour mixture highly explosive.			
EXPOSURE	FIRST AID MEASURES : Skin: If freeze burn occurs, gently bathe affected area in warm water (38 – 43) deg.C. Do not rub. Get medical attention. Eye: Immediately flush with large amounts of luke warm water for 15 minutes, lifting upper and lower lids at intervals. Seek medical attention if irritation persists. Inhalation: Remove to fresh air. Give oxygen, artificial respiration, or CPR if needed. Seek medical attention. Ingestion: Usually no effect by this route.			
	ANTIDOTES / DOSAGES :NA			
	SPILLS STEPS TO BE TAKEN : Do not enter in the gas area without protective wears. Get the area evacuated. Stop flow of gas if without risk. Spray water to keep the container cool WASTE DISPOSAL METHOD : Collect the spillage & wash the effected area with plenty of water. Allow gas to burn under control			

MSDS-9 : Methanol**Methanol****Safety Data Sheet**

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Issue date: 07/03/2013

Revision date: 07/21/2020

Supersedes: 03/08/2019

Version: 1.4

SECTION 1: Identification**1.1. Identification**

Product form	: Substance
Substance name	: Methanol
CAS-No.	: 67-56-1
Product code	: VT430
Formula	: CH ₄ O
Synonyms	: acetone alcohol / alcohol C1 / alcohol, methyl / carbinol / colonial spirits / columbian spirits / green wood spirits / manhattan spirits / methyl alcohol / methyl hydrate / methyl hydroxide / methylen / methylol / monohydroxymethane / pyroigneous spirit / pyroxylic spirit / wood alcohol / wood naphtha

1.2. Recommended use and restrictions on use

Use of the substance/mixture	: Solvent
Recommended use	: Laboratory chemicals
Restrictions on use	: Not for food, drug or household use

1.3. Supplier

Val Tech Diagnostics, A Division of LabChem Inc
 Jackson's Pointe Commerce Park Building 1000
 1010 Jackson's Pointe Court
 Zelienople, PA 16063
 T 412-826-5230
 F 724-473-0647

1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or +1-703-741-5970

SECTION 2: Hazard(s) identification**2.1. Classification of the substance or mixture****GHS US classification**

Flammable liquids Category 2	H225 Highly flammable liquid and vapor
Acute toxicity (oral) Category 3	H301 Toxic if swallowed
Acute toxicity (dermal) Category 3	H311 Toxic in contact with skin
Acute toxicity (inhalation) Category 3	H331 Toxic if inhaled
Specific target organ toxicity (single exposure) Category 1	H370 Causes damage to organs (liver, kidneys, central nervous system, optic nerve) (Dermal, oral)

Full text of H statements : see section 16

2.2. GHS Label elements, including precautionary statements**GHS US labeling**

Hazard pictograms (GHS US)



Signal word (GHS US)

: Danger

Hazard statements (GHS US)

: H225 - Highly flammable liquid and vapor
 H301+H311+H331 - Toxic if swallowed, in contact with skin or if inhaled
 H370 - Causes damage to organs (liver, kidneys, central nervous system, optic nerve) (Dermal, oral)

Precautionary statements (GHS US)

: P210 - Keep away from heat, sparks, open flames, hot surfaces. - No smoking.
 P233 - Keep container tightly closed.
 P240 - Ground/bond container and receiving equipment.
 P241 - Use explosion-proof electrical, ventilating, lighting equipment.
 P242 - Use only non-sparking tools.
 P243 - Take precautionary measures against static discharge.
 P260 - Do not breathe mist, vapors, spray.

07/21/2020

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MSDS-9 : Methanol (Continue...)**Methanol**
Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

P264 - Wash exposed skin thoroughly after handling.
 P270 - Do not eat, drink or smoke when using this product.
 P271 - Use only outdoors or in a well-ventilated area.
 P280 - Wear protective gloves, protective clothing, eye protection, face protection.
 P301+P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
 P303+P361+P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
 P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.
 P330 - If swallowed, rinse mouth.
 P363 - Wash contaminated clothing before reuse.
 P370+P378 - In case of fire: Use carbon dioxide (CO2), powder, alcohol-resistant foam to extinguish.
 P403+P235 - Store in a well-ventilated place. Keep cool.
 P405 - Store locked up.
 P501 - Dispose of contents/container to comply with local, state and federal regulations.

2.3. Other hazards which do not result in classification

Other hazards not contributing to the classification : None.

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/Information on ingredients**3.1. Substances**

Substance type : Mono-constituent

Name	Product identifier	%	GHS US classification
Methanol (Main constituent)	(CAS-No.) 67-56-1	100	Flam. Liq. 2, H225 Acute Tox. 3 (Oral), H301 Acute Tox. 3 (Dermal), H311 Acute Tox. 3 (Inhalation), H331 STOT SE 1, H370

Full text of hazard classes and H-statements : see section 16

3.2. Mixtures

Not applicable

SECTION 4: First-aid measures**4.1. Description of first aid measures**

First-aid measures general : Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with labored breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain.

First-aid measures after inhalation : Remove the victim into fresh air. Immediately consult a doctor/medical service.

First-aid measures after skin contact : Wash immediately with lots of water. Soap may be used. Do not apply (chemical) neutralizing agents. Remove clothing before washing. Consult a doctor/medical service.

First-aid measures after eye contact : Rinse with water. Remove contact lenses, if present and easy to do. Continue rinsing. Take victim to an ophthalmologist if irritation persists.

First-aid measures after ingestion : Rinse mouth with water. Immediately after ingestion, give alcohol to drink. Give nothing to drink. Do not induce vomiting. Immediately consult a doctor/medical service. Take the container/vomit to the doctor/hospital. Call Poison Information Centre (www.big.be/antigif.htm).

4.2. Most important symptoms and effects (acute and delayed)

Potential Adverse human health effects and symptoms : Toxic in contact with skin. Toxic if swallowed. Toxic if inhaled.

Symptoms/effects after inhalation : EXPOSURE TO HIGH CONCENTRATIONS: Coughing. Symptoms similar to those listed under ingestion.

Symptoms/effects after skin contact : Symptoms similar to those listed under ingestion.

Symptoms/effects after eye contact : Redness of the eye tissue. Lacrimation.

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Symptoms/effects after ingestion	: Nausea. Vomiting. AFTER ABSORPTION OF LARGE QUANTITIES: FOLLOWING SYMPTOMS MAY APPEAR LATER: Change in the blood composition. Headache. Feeling of weakness. Abdominal pain. Muscular pain. Central nervous system depression. Dizziness. Mental confusion. Drunkenness. Coordination disorders. Disturbed motor response. Disturbances of consciousness. Visual disturbances. Blindness. Respiratory difficulties. Cramps/uncontrolled muscular contractions.
Chronic symptoms	: Red skin. Dry skin. Skin rash/inflammation. Headache. Disturbed tactile sensibility. Visual disturbances. Sleeplessness. Gastrointestinal complaints. Cardiac and blood circulation effects.

4.3. Immediate medical attention and special treatment, if necessary

Immediately after ingestion, give a glass of strong drink, beer or wine to drink. Hospitalize at once for treatment with the right antidotes.

SECTION 5: Fire-fighting measures**5.1. Suitable (and unsuitable) extinguishing media**

Suitable extinguishing media	: Quick-acting ABC powder extinguisher. Quick-acting BC powder extinguisher. Quick-acting class B foam extinguisher. Quick-acting CO2 extinguisher. Class B foam (alcohol-resistant). Water spray if puddle cannot expand.
Unsuitable extinguishing media	: Water (quick-acting extinguisher, reel); risk of puddle expansion. Water; risk of puddle expansion.

5.2. Specific hazards arising from the chemical

Fire hazard	: DIRECT FIRE HAZARD. Highly flammable liquid and vapour. Gas/vapor flammable with air within explosion limits. INDIRECT FIRE HAZARD. May be ignited by sparks.
Explosion hazard	: DIRECT EXPLOSION HAZARD. Gas/vapour explosive with air within explosion limits. INDIRECT EXPLOSION HAZARD. may be ignited by sparks. Reactions with explosion hazards: see "Reactivity Hazard".
Hazardous decomposition products in case of fire	: Upon combustion: CO and CO2 are formed.

5.3. Special protective equipment and precautions for fire-fighters

Firefighting instructions	: Cool tanks/drums with water spray/remove them into safety. Do not move the load if exposed to heat. Take account of toxic fire-fighting water. Use water moderately and if possible collect or contain it.
Protection during firefighting	: Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: Accidental release measures**6.1. Personal precautions, protective equipment and emergency procedures**

General measures	: No flames, no sparks. Eliminate all sources of ignition. No naked lights. No smoking. Dike and contain spill.
------------------	---

6.1.1. For non-emergency personnel

Protective equipment	: Gas-tight suit.
Emergency procedures	: Keep upwind. Mark the danger area. Consider evacuation. Close doors and windows of adjacent premises. Stop engines and no smoking. No naked flames or sparks. Spark- and explosion-proof appliances and lighting equipment. Keep containers closed. Wash contaminated clothes.

6.1.2. For emergency responders

Protective equipment	: Equip cleanup crew with proper protection.
Emergency procedures	: Stop leak if safe to do so. Ventilate area.

6.2. Environmental precautions

Prevent soil and water pollution. Prevent spreading in sewers.

6.3. Methods and material for containment and cleaning up

For containment	: Contain released substance, pump into suitable containers. Plug the leak, cut off the supply. Dam up the liquid spill. Try to reduce evaporation. Measure the concentration of the explosive gas-air mixture. Dilute combustible/toxic gases/vapours with water spray. Take account of toxic/corrosive precipitation water. Provide equipment/receptacles with earthing. Do not use compressed air for pumping over spills.
Methods for cleaning up	: Take up liquid spill into a non combustible material e.g.: sand, earth, vermiculite slaked lime or soda ash. Scoop absorbed substance into closing containers. Carefully collect the spill/leftovers. Damaged/cooled tanks must be emptied. Do not use compressed air for pumping over spills. Clean contaminated surfaces with an excess of water. Take collected spill to manufacturer/competent authority. Wash clothing and equipment after handling.

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6.4. Reference to other sections

No additional information available

SECTION 7: Handling and storage**7.1. Precautions for safe handling**

Precautions for safe handling

Use spark-/explosionproof appliances and lighting system. Take precautions against electrostatic charges. Keep away from naked flames/heat. Keep away from ignition sources/sparks. Measure the concentration in the air regularly. Work under local exhaust/ventilation. Comply with the legal requirements. Remove contaminated clothing immediately. Clean contaminated clothing. Handle uncleaned empty containers as full ones. Thoroughly clean/dry the installation before use. Do not discharge the waste into the drain. Do not use compressed air for pumping over. Keep container tightly closed.

Hygiene measures

Do not eat, drink or smoke when using this product. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Wash contaminated clothing before reuse.

7.2. Conditions for safe storage, including any incompatibilities

Incompatible products

Strong oxidizers. Strong bases. Strong acids. Acid anhydrides. Acid chlorides.

Incompatible materials

Direct sunlight. Heat sources. Sources of ignition.

Heat-ignition

KEEP SUBSTANCE AWAY FROM: heat sources, ignition sources.

Prohibitions on mixed storage

KEEP SUBSTANCE AWAY FROM: combustible materials, oxidizing agents, strong acids, (strong) bases, halogens, amines, water/moisture.

Storage area

Store in a cool area. Store in a dry area. Keep container in a well-ventilated place. Fireproof storeroom. Keep locked up. Provide for a tub to collect spills. Provide the tank with earthing. Unauthorized persons are not admitted. Aboveground. Meet the legal requirements.

Special rules on packaging

SPECIAL REQUIREMENTS: closing, dry, clean, correctly labelled, meet the legal requirements. Secure fragile packagings in solid containers.

Packaging materials

SUITABLE MATERIAL: steel, stainless steel, iron, glass. MATERIAL TO AVOID: lead, aluminium, zinc, polyethylene, PVC.

SECTION 8: Exposure controls/personal protection**8.1. Control parameters**

Methanol (67-56-1)	
USA - ACGIH - Occupational Exposure Limits	
Local name	Methanol
ACGIH TWA (ppm)	200 ppm
ACGIH STEL (ppm)	250 ppm
Remark (ACGIH)	TLV® Basis: Headache; eye dam; dizziness; nausea. Notations: Skin; BEI
USA - ACGIH - Biological Exposure Indices	
Biological Exposure Indices (BEI)	15 mg/l Parameter: Methanol - Medium: urine - Sampling time: End of shift - Notations: B, Ns
USA - OSHA - Occupational Exposure Limits	
Local name	Methyl alcohol
OSHA PEL (TWA) (mg/m³)	260 mg/m³
OSHA PEL (TWA) (ppm)	200 ppm
USA - IDLH - Occupational Exposure Limits	
US IDLH (ppm)	6000 ppm
USA - NIOSH - Occupational Exposure Limits	
NIOSH REL (TWA) (mg/m³)	250 mg/m³
NIOSH REL (TWA) (ppm)	200 ppm
NIOSH REL (STEL) (mg/m³)	325 mg/m³
NIOSH REL (STEL) (ppm)	250 ppm
Remark (NIOSH)	Skin

8.2. Appropriate engineering controls

Appropriate engineering controls

Emergency eye wash fountains should be available in the immediate vicinity of any potential exposure. Keep concentrations well below lower explosion limits.

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8.3. Individual protection measures/Personal protective equipment**Personal protective equipment:**

Safety glasses. Protective clothing. Gloves. Full protective flameproof clothing. Face shield.

Materials for protective clothing:

GIVE GOOD RESISTANCE: polyethylene/ethylenevinylalcohol. styrene-butadiene rubber. viton. GIVE LESS RESISTANCE: chloroprene rubber. chlorinated polyethylene. natural rubber. nitrile rubber/PVC. GIVE POOR RESISTANCE: leather. neoprene. nitrile rubber. polyethylene. PVA. PVC. polyurethane

Hand protection:

Protective gloves against chemicals (EN 374)

Eye protection:

Safety glasses

Skin and body protection:

Head/neck protection. Protective clothing

Respiratory protection:

Full face mask with filter type AX at conc. in air > exposure limit. High vapour/gas concentration: self-contained respirator

Personal protective equipment symbol(s):**SECTION 9: Physical and chemical properties****9.1. Information on basic physical and chemical properties**

Physical state	: Liquid
Appearance	: Liquid.
Color	: Colourless
Odor	: Characteristic odour Mild odour Pleasant odour Alcohol odour Commercial/unpurified substance: irritating/pungent odour
Odor threshold	: No data available
pH	: No data available
Melting point	: -97.8 °C
Freezing point	: No data available
Boiling point	: 64.7 °C (1013 hPa)
Critical temperature	: 240 °C
Critical pressure	: 79547 hPa
Flash point	: 9.7 °C (Closed cup, 1013 hPa, EU Method A.9: Flash-Point)
Relative evaporation rate (butyl acetate=1)	: 4.1
Relative evaporation rate (ether=1)	: 6.3
Flammability (solid, gas)	: No data available
Vapor pressure	: 128 hPa (20 °C)
Vapor pressure at 50 °C	: 552 hPa
Relative vapor density at 20 °C	: 1.1
Relative density	: 0.79 – 0.8 (20 °C)
Relative density of saturated gas/air mixture	: 1
Specific gravity / density	: 790 – 800 kg/m³ (20 °C)
Molecular mass	: 32.04 g/mol

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Solubility	: Soluble in water. Soluble in ethanol. Soluble in ether. Soluble in acetone. Soluble in chloroform. Water: 100 g/100ml (20 °C) Ethanol: complete Ether: complete Acetone: complete
Log Pow	: -0.77 (Experimental value)
Auto-ignition temperature	: 455 °C (1013 hPa, DIN 51794: Self-ignition temperature)
Decomposition temperature	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: 0.544 – 0.59 mPa·s (25 °C)
Explosion limits	: 5.5 – 36.5 vol %
Explosive properties	: No data available
Oxidizing properties	: No data available
9.2. Other information	
Minimum ignition energy	: 0.14 mJ
Saturation concentration	: 166 g/m³
VOC content	: 100 %
Other properties	: Clear. Hygroscopic. Volatile. Neutral reaction.

SECTION 10: Stability and reactivity**10.1. Reactivity**

Violent to explosive reaction with (some) metal powders and with (strong) oxidizers. Violent exothermic reaction with (some) acids and with (some) halogens compounds.

10.2. Chemical stability

Hygroscopic.

10.3. Possibility of hazardous reactions

No additional information available

10.4. Conditions to avoid

Direct sunlight. High temperature. Incompatible materials. Open flame. Sparks. Overheating.

10.5. Incompatible materials

Strong oxidizers. Strong bases. Strong acids. Peroxides. Acid anhydrides. Acid chlorides.

10.6. Hazardous decomposition products

Carbon dioxide. Carbon monoxide.

SECTION 11: Toxicological information**11.1. Information on toxicological effects**

Acute toxicity (oral)	: Toxic if swallowed.
Acute toxicity (dermal)	: Toxic in contact with skin.
Acute toxicity (inhalation)	: Toxic if inhaled.

Methanol (67-56-1)	
LD50 oral rat	1187 – 2769 mg/kg body weight (BASF test, Rat, Male / female, Weight of evidence, Aqueous solution, Oral, 7 day(s))
LD50 dermal rabbit	17100 mg/kg (Rabbit, Inconclusive, insufficient data, Dermal)
LC50 inhalation rat (mg/l)	128.2 mg/l air (BASF test, 4 h, Rat, Male / female, Experimental value, Inhalation (vapours))
ATE US (oral)	100 mg/kg body weight
ATE US (dermal)	300 mg/kg body weight
ATE US (gases)	700 ppmV/4h
ATE US (vapors)	3 mg/l/4h
ATE US (dust, mist)	0.5 mg/l/4h
Skin corrosion/irritation	: Not classified
Serious eye damage/irritation	: Not classified
Respiratory or skin sensitization	: Not classified

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Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
Reproductive toxicity	: Not classified
STOT-single exposure	: Causes damage to organs (liver, kidneys, central nervous system, optic nerve) (Dermal, oral).
STOT-repeated exposure	: Not classified
Aspiration hazard	: Not classified
Viscosity, kinematic	: No data available
Potential Adverse human health effects and symptoms	: Toxic in contact with skin. Toxic if swallowed. Toxic if inhaled.
Symptoms/effects after inhalation	: EXPOSURE TO HIGH CONCENTRATIONS: Coughing. Symptoms similar to those listed under ingestion.
Symptoms/effects after skin contact	: Symptoms similar to those listed under ingestion.
Symptoms/effects after eye contact	: Redness of the eye tissue. Lacrimation.
Symptoms/effects after ingestion	: Nausea. Vomiting. AFTER ABSORPTION OF LARGE QUANTITIES: FOLLOWING SYMPTOMS MAY APPEAR LATER: Change in the blood composition. Headache. Feeling of weakness. Abdominal pain. Muscular pain. Central nervous system depression. Dizziness. Mental confusion. Drunkenness. Coordination disorders. Disturbed motor response. Disturbances of consciousness. Visual disturbances. Blindness. Respiratory difficulties. Cramps/uncontrolled muscular contractions.
Chronic symptoms	: Red skin. Dry skin. Skin rash/inflammation. Headache. Disturbed tactile sensibility. Visual disturbances. Sleeplessness. Gastrointestinal complaints. Cardiac and blood circulation effects.

SECTION 12: Ecological information**12.1. Toxicity**

Ecology - general	: Not classified as dangerous for the environment according to the criteria of Regulation (EC) No 1272/2008.
Ecology - air	: Not included in the list of substances which may contribute to the greenhouse effect (IPCC). Not included in the list of fluorinated greenhouse gases (Regulation (EU) No 517/2014). Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009).
Ecology - water	: Not harmful to crustacea. Not harmful to fishes. Groundwater pollutant. Inhibition of activated sludge. Nitrification of activated sludge is inhibited. Not harmful to algae. Not harmful to bacteria.

Methanol (67-56-1)

LC50 fish 1	15400 mg/l (EPA 660/3 - 75/009, 96 h, Lepomis macrochirus, Flow-through system, Fresh water, Experimental value, Lethal)
EC50 Daphnia 1	18260 mg/l (OECD 202: Daphnia sp. Acute Immobilisation Test, 96 h, Daphnia magna, Semi-static system, Fresh water, Experimental value, Locomotor effect)
ErC50 (algae)	22000 mg/l (OECD 201: Alga, Growth Inhibition Test, 96 h, Pseudokirchneriella subcapitata, Static system, Fresh water, Experimental value)

12.2. Persistence and degradability**Methanol (67-56-1)**

Persistence and degradability	Readily biodegradable in the soil. Readily biodegradable in water.
Biochemical oxygen demand (BOD)	0.6 – 1.12 g O ₂ /g substance
Chemical oxygen demand (COD)	1.42 g O ₂ /g substance
ThOD	1.5 g O ₂ /g substance

12.3. Bioaccumulative potential**Methanol (67-56-1)**

BCF fish 1	1 – 4.5 (72 h, Cyprinus carpio, Static system, Fresh water, Experimental value)
Log Pow	-0.77 (Experimental value)
Bioaccumulative potential	Low potential for bioaccumulation (BCF < 500).

12.4. Mobility in soil**Methanol (67-56-1)**

Surface tension	0.023 N/m (20 °C)
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Methanol (67-56-1)	
Log Koc	0.088 (log Koc, SRC PCKOCWIN v2.0, Calculated value)
Ecology - soil	Highly mobile in soil.

12.5. Other adverse effects

No additional information available

SECTION 13: Disposal considerations**13.1. Disposal methods**

- Waste disposal recommendations :
- Do not discharge into drains or the environment. Remove waste in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Recycle by distillation. Incinerate under surveillance with energy recovery. Obtain the consent of pollution control authorities before discharging to wastewater treatment plants.
- Additional information :
- Hazardous waste according to Directive 2008/98/EC, as amended by Regulation (EU) No 1357/2014 and Regulation (EU) No 2017/997.

SECTION 14: Transport information**Department of Transportation (DOT)**

In accordance with DOT

- Transport document description : UN1230 Methanol, 3, II
- UN-No.(DOT) : UN1230
- Proper Shipping Name (DOT) : Methanol
- Transport hazard class(es) (DOT) : 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120
- Packing group (DOT) : II - Medium Danger
- Hazard labels (DOT) : 3 - Flammable liquid



- DOT Packaging Non Bulk (49 CFR 173.xxx) : 202
- DOT Packaging Bulk (49 CFR 173.xxx) : 242
- DOT Symbols : D - Proper shipping name for domestic use only, or to and from Canada
- DOT Special Provisions (49 CFR 172.102) :
- IB2 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized.
 - T7 - 4 178.274(d)(2) Normal..... 178.275(d)(3)
 - TP2 - a. The maximum degree of filling must not exceed the degree of filling determined by the following: (image) Where: tr is the maximum mean bulk temperature during transport, Tf is the temperature in degrees celsius of the liquid during filling, and a is the mean coefficient of cubical expansion of the liquid between the mean temperature of the liquid during filling (tf) and the maximum mean bulk temperature during transportation (tr) both in degrees celsius. b. For liquids transported under ambient conditions may be calculated using the formula: (image) Where: d15 and d50 are the densities (in units of mass per unit volume) of the liquid at 15 C (59 F) and 50 C (122 F), respectively.
- DOT Packaging Exceptions (49 CFR 173.xxx) : 150
- DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 1 L
- DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 60 L
- DOT Vessel Stowage Location :
- B - (i) The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length; and (ii) "On deck only" on passenger vessels in which the number of passengers specified in paragraph (k)(2)(i) of this section is exceeded.

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DOT Vessel Stowage Other : 40 - Stow "clear of living quarters"
 Other information : No supplementary information available.

Transportation of Dangerous Goods

Transport document description : UN1230 METHANOL, 3 (6.1), II
 UN-No. (TDG) : UN1230
 Proper Shipping Name (Transportation of Dangerous Goods) : METHANOL
 TDG Primary Hazard Classes : 3 - Class 3 - Flammable Liquids
 Packing group : II - Medium Danger
 TDG Subsidiary Classes : 6.1
 TDG Special Provisions : 43 - Despite section 2.1 of Part 2 (Classification), these dangerous goods are assigned to this classification based on human experience.
 Explosive Limit and Limited Quantity Index : 1 L
 Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index : 1 L

Transport by sea

Transport document description (IMDG) : UN 1230 methanol, 3 (6.1), II
 UN-No. (IMDG) : 1230
 Proper Shipping Name (IMDG) : methanol
 Class (IMDG) : 3 - Flammable liquids
 Packing group (IMDG) : II - substances presenting medium danger
 Subsidiary risks (IMDG) : 6.1 - Toxic substances
 EmS-No. (1) : F-E
 EmS-No. (2) : S-D
 MFAG-No : 19

Air transport

Transport document description (IATA) : UN 1230 Methanol, 3 (6.1), II
 UN-No. (IATA) : 1230
 Proper Shipping Name (IATA) : Methanol
 Class (IATA) : 3 - Flammable Liquids
 Packing group (IATA) : II - Medium Danger

SECTION 15: Regulatory information**15.1. US Federal regulations**

Methanol (67-56-1)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Subject to reporting requirements of United States SARA Section 313	
RQ (Reportable quantity, section 304 of EPA's List of Lists)	5000 lb
SARA Section 311/312 Hazard Classes	Physical hazard - Flammable (gases, aerosols, liquids, or solids) Health hazard - Acute toxicity (any route of exposure) Health hazard - Specific target organ toxicity (single or repeated exposure)

15.2. International regulations**CANADA**

Methanol (67-56-1)
Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

No additional information available

National regulations

No additional information available

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15.3. US State regulations

Methanol (67-56-1)	
U.S. - California - Proposition 65 - Carcinogens List	No
U.S. - California - Proposition 65 - Developmental Toxicity	Yes
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No

SECTION 16: Other information

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

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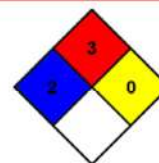
Full text of H-phrases: see section 16:

H225	Highly flammable liquid and vapor
H301	Toxic if swallowed
H311	Toxic in contact with skin
H331	Toxic if inhaled
H370	Causes damage to organs

NFPA health hazard : 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

NFPA fire hazard : 3 - Liquids and solids (including finely divided suspended solids) that can be ignited under almost all ambient temperature conditions.

NFPA reactivity : 0 - Material that in themselves are normally stable, even under fire conditions.

**Hazard Rating**

Health : 2 Moderate Hazard - Temporary or minor injury may occur

Flammability : 3 Serious Hazard - Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73 F and boiling points above 100 F, as well as liquids with flash points between 73 F and 100 F. (Classes IB & IC)

Physical : 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

Personal protection : H

H - Splash goggles, Gloves, Synthetic apron, Vapor respirator

SDS US ValTech

Information in this SDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this SDS. The user must determine suitability of this information for his application.

MSDS -10 : Nitric Acid**MATERIAL SAFETY DATA SHEET****NITRIC ACID****SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

Chemical Name	: Nitric Acid
Chemical Formula	: HNO_3
CAS Number	: 7697 - 37 - 2
Synonyms	: Aqua Fortis, Azotic Acid
General Use	: Industrial Chemical
Manufacturer's Name	: AAP CHEM
Address :	: C-366C-366, GIDC, SAYAKHA INDUSTRIAL ESTATE, GUJARAT
Telephone no. for info.	: STATE HIGHWAY 161,P.O. AGARAMA. DIST-BHARUCH-392012
Date prepared	: January,2023
Revision #	: 00

SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

Composition	Nitric Acid 60%
Hazardous components	: Nitric Acid
ACGIH TLV	: 2 ppm

SECTION 3 - HAZARDS IDENTIFICATION

Primary Entry Routes	: Inhalation, Skin & Eye contact and ingestion
Acute Effects	: Inhalation of vapours can cause breathing difficulties, severe exposure may lead to pneumonia and pulmonary edema. Ingestion can cause immediate pain & burns of mouth, throat and gastrointestinal tract, Skin contact can cause redness, pain and skin burns. Eye contact - vapours are irritating and may cause damage to eyes.
Carcinogenicity	: Not listed as carcinogenic
Chronic Effects	: Long term exposures seldom occur due to corrosive properties of the acid, it may cause erosion of teeth and lung damage.
NFPA rating	: Health - 3, Flammability - 0, Reactivity - 0, Other - Oxidizer

SECTION 4 - FIRST AID MEASURES

Eyes	: Immediate flush eyes with plenty of water for at least 15 minutes, lifting lower and upper lids occasionally, get medical attention immediately.
Skin	: Remove contaminated clothing and shoes, flush skin with plenty of water for at least 15 minutes, get medical attention immediately.
Inhalation	: Remove to fresh air, if not breathing give artificial respiration, if breathing is difficult, give oxygen and get medical attention immediately.
Ingestion	: Do not induce vomiting, give large quantities of water or milk if available; do not give anything by mouth to an unconscious person, get medical attention immediately.

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MSDS -10 : Nitric Acid (Continue...)**MATERIAL SAFETY DATA SHEET****SECTION 5 - FIRE FIGHTING MEASURES**

Flash point	:	Not Flammable
Flash point method	:	Not Applicable
Auto ignition temp.	:	Not Applicable
L E L	:	Not Applicable
U E L	:	Not Applicable
Flammability classifn.	:	Not Flammable
Extinguishing media	:	It is not combustible, however, water spray may be used to keep fire exposed containers cool.
Unusual fire or explosion hazards	:	It is not combustible but reacts explosively with combustible organic or readily oxidisable material, reacts with most metals to release hydrogen gas
Hazardous combustion products	:	Emits toxic nitrogen oxide fumes and hydrogen nitrate when heated to decomposition. Will react with water or steam to produce heat and toxic and corrosive fumes
Fire fighting instructions	:	Water spray may be used to keep fire exposed containers cool, Ensure that water doesn't enter inside the containers.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Small Spills	:	Shut off leaks if without risk, dilute with alkali and drench with water.
Containment	:	Prevent spillage from entering drains or water sources
Clean up	:	Dilute with alkali and wash with water

SECTION 7 - HANDLING AND STORAGE

Handling Precautions	:	Protect from physical damage
Storage Requirements	:	Store in a cool dry ventilated storage area with acid resistance floors. Keep away from heat, water and incompatible materials.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls	:	Provide proper ventilation so as to maintain environment below air borne exposure limit.
Respiratory Protection	:	If exposure limit is exceeded, use respiratory protection
Protective Clothing / equipment	:	Use full PVC Suit, PVC hand gloves and boots

MSDS -10 : Nitric Acid (Continue...)**MATERIAL SAFETY DATA SHEET****SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES**

Physical State	: Liquid
Appearance & Odour	: Colourless to yellowish liquid , choking odour
Vapor Pressure	: 48 mmHg at 20 °C
Specific Gravity	: 1.36
Water Solubility	: Soluble
Boiling Point	: 122 °C
Freezing Point	: (-) 42 °C
Vapor Density	: 2 - 3

SECTION 10 - STABILITY AND REACTIVITY

Stability	: Stable under ordinary condition
Chemical incompatibilities	: It is powerful oxidizing agent and is incompatible with strong bases, metallic powders, carbides, hydrogen sulfide, turpentine and combustible organics
Conditions to Avoid	: Light and heat
Hazardous Decomposition product	: Emits toxic nitrogen oxides, fumes and hydrogen nitrate when heated to decomposition

SECTION 11 - TOXICOLOGICAL INFORMATION

TLV as per ACIGH	: 2 ppm
Acute Inhalation Effects	: Corrosive. Inhalation of vapour can cause breathing difficulties, over exposure may lead to pneumonia and pulmonary edema

SECTION 12 - ECOLOGICAL INFORMATION

Information not available

SECTION 13 - DISPOSAL CONSIDERATIONS

Disposal	: It may be disposed off by neutralizing with alkaline material and water
----------	---

SECTION - 14 - TRANSPORT INFORMATION

	DOT	IMO
Shipping name	Nitric Acid	Nitric Acid
Hazard class	8	8
UN Number	2031	2031
Packing Group	II	II

MSDS -10 : Nitric Acid (Continue...)**MATERIAL SAFETY DATA SHEET****SECTION 15 - REGULATORY INFORMATION**

Corrosive, oxidizer and poison

SECTION 16 - OTHER INFORMATION

Prepared by : EHS Dept.

Disclaimer : This MSDS and the information it contains is offered to you in good faith as accurate. We believe that information to be correct but cannot guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all individual and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents.

MSDS-11 : Oleum**SIGMA-ALDRICH**

sigma-aldrich.com

SAFETY DATA SHEETVersion 5.3
Revision Date 07/03/2014
Print Date 11/17/2014**1. PRODUCT AND COMPANY IDENTIFICATION****1.1 Product identifiers**

Product name : Sulfuric acid, fuming

Product Number : 435597
Brand : Sigma-Aldrich
Index-No. : 016-019-00-2

CAS-No. : 8014-95-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheetCompany : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USATelephone : +1 800-325-5832
Fax : +1 800-325-5052**1.4 Emergency telephone number**

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION**2.1 Classification of the substance or mixture****GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Acute toxicity, Inhalation (Category 2), H330

Skin corrosion (Category 1A), H314

Serious eye damage (Category 1), H318

Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word : Danger

Hazard statement(s)

H314 : Causes severe skin burns and eye damage.

H330 : Fatal if inhaled.

H335 : May cause respiratory irritation.

Precautionary statement(s)

P260 : Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.

P264 : Wash skin thoroughly after handling.

P271 : Use only outdoors or in a well-ventilated area.

P280 : Wear protective gloves/ protective clothing/ eye protection/ face protection.

P284 : Wear respiratory protection.

MSDS-11 : Oleum (Continue...)

P301 + P330 + P331	IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/ physician.
P320	Specific treatment is urgent (see supplemental first aid instructions on this label).
P363	Wash contaminated clothing before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

- 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS**
 Reacts violently with water.

3. COMPOSITION/INFORMATION ON INGREDIENTS**3.1 Substances**

Synonyms	: Oleum
Formula	: H ₂ O ₄ S
Molecular Weight	: 98.08 g/mol
CAS-No.	: 8014-95-7
Index-No.	: 016-019-00-2

Hazardous components

Component	Classification	Concentration
Oleum	Acute Tox. 2; Skin Corr. 1A; Eye Dam. 1; STOT SE 3; H314, H330, H335	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES**4.1 Description of first aid measures****General advice**

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Continue rinsing eyes during transport to hospital.

If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

no data available

MSDS-11 : Oleum (Continue...)

5. FIREFIGHTING MEASURES

- 5.1 Extinguishing media**
Suitable extinguishing media
Dry powder
- 5.2 Special hazards arising from the substance or mixture**
Sulphur oxides
- 5.3 Advice for firefighters**
Wear self contained breathing apparatus for fire fighting if necessary.
- 5.4 Further information**
no data available

6. ACCIDENTAL RELEASE MEASURES

- 6.1 Personal precautions, protective equipment and emergency procedures**
Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.
- 6.2 Environmental precautions**
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.
- 6.3 Methods and materials for containment and cleaning up**
Soak up with inert absorbent material and dispose of as hazardous waste. Do not flush with water. Keep in suitable, closed containers for disposal.
- 6.4 Reference to other sections**
For disposal see section 13.

7. HANDLING AND STORAGE

- 7.1 Precautions for safe handling**
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.
- 7.2 Conditions for safe storage, including any incompatibilities**
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Never allow product to get in contact with water during storage.

strongly hygroscopic
- 7.3 Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

- 8.1 Control parameters**
Components with workplace control parameters
Contains no substances with occupational exposure limit values.
- 8.2 Exposure controls**
Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.
- Personal protective equipment**
Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

MSDS-11 : Oleum (Continue...)**Skin protection**

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0.4 mm

Break through time: 31 min

Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Complete suit protecting against chemicals, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES**9.1 Information on basic physical and chemical properties**

- | | |
|---|--|
| a) Appearance | Form: viscous liquid |
| b) Odour | no data available |
| c) Odour Threshold | no data available |
| d) pH | no data available |
| e) Melting point/freezing point | no data available |
| f) Initial boiling point and boiling range | no data available |
| g) Flash point | not applicable |
| h) Evaporation rate | no data available |
| i) Flammability (solid, gas) | no data available |
| j) Upper/lower flammability or explosive limits | no data available |
| k) Vapour pressure | 7 hPa (5 mmHg) at 37.7 °C (99.9 °F)
3 hPa (2 mmHg) at 25 °C (77 °F) |
| l) Vapour density | 3.39 - (Air = 1.0) |
| m) Relative density | 1.925 g/cm ³ at 25 °C (77 °F) |
| n) Water solubility | no data available |
| o) Partition coefficient: n-octanol/water | no data available |

MSDS-11 : Oleum (Continue...)

- | | |
|------------------------------|-------------------|
| p) Auto-ignition temperature | no data available |
| q) Decomposition temperature | no data available |
| r) Viscosity | no data available |
| s) Explosive properties | no data available |
| t) Oxidizing properties | no data available |

9.2 Other safety information

Relative vapour density 3.39 - (Air = 1.0)

10. STABILITY AND REACTIVITY**10.1 Reactivity**

no data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Reacts violently with water.

10.4 Conditions to avoid

Exposure to moisture.

10.5 Incompatible materials

Metals, Water, Acetaldehyde, Acetonitrile, metal acetylides, Chlorates

10.6 Hazardous decomposition products

Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION**11.1 Information on toxicological effects****Acute toxicity**

LC50 Inhalation - rat - 1 h - 347 ppm

Dermal: no data available

no data available

Skin corrosion/irritation

no data available

Serious eye damage/eye irritation

no data available

Respiratory or skin sensitisation

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a

MSDS-11 : Oleum (Continue...)

carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

no data available

Specific target organ toxicity - single exposure

no data available

Specific target organ toxicity - repeated exposure

no data available

Aspiration hazard

no data available

Additional Information

RTECS: WS5605000

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.,
Cough, Shortness of breath, Headache, Nausea

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION**12.1 Toxicity**

no data available

12.2 Persistence and degradability

no data available

12.3 Bioaccumulative potential

no data available

12.4 Mobility in soil

no data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS**13.1 Waste treatment methods****Product**

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION**DOT (US)**

UN number: 1831 Class: 8 Packing group: I

Proper shipping name: Sulfuric acid, fuming

Reportable Quantity (RQ):

Marine pollutant: No

Poison Inhalation Hazard: No

IMDG

UN number: 1831 Class: 8 (6.1) Packing group: I

Proper shipping name: SULPHURIC ACID, FUMING

EMS-No: F-A, S-B

MSDS-11 : Oleum (Continue...)

Marine pollutant: No

IATA

UN number: 1831 Class: 8 (6.1)
Proper shipping name: Sulphuric acid, fuming
IATA Passenger: Not permitted for transport
IATA Cargo: Not permitted for transport

15. REGULATORY INFORMATION**SARA 302 Components**

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Oleum	8014-95-7	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Oleum	8014-95-7	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Oleum	8014-95-7	1993-04-24

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION**Full text of H-Statements referred to under sections 2 and 3.**

Acute Tox.	Acute toxicity
Eye Dam.	Serious eye damage
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H330	Fatal if inhaled.
H335	May cause respiratory irritation.
Skin Corr.	Skin corrosion

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	3
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the

MSDS-11 : Oleum (Continue...)

product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 5.3

Revision Date: 07/03/2014

Print Date: 11/17/2014

MSDS-12 : Sulphuric Acid**Sulfuric Acid, ACS****Safety Data Sheet**

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 10/01/1998

Revision date: 02/28/2018

Supersedes: 01/23/2018

Version: 1.3

SECTION 1: Identification**1.1. Identification**

Product form	: Substance
Substance name	: Sulfuric Acid, ACS
CAS-No.	: 7664-93-9
Product code	: LC25550
Formula	: H ₂ SO ₄
Synonyms	: battery acid / brown acid / brown oil of vitriol / dihydrogen sulfate / dipping acid / electrolyte acid / nordhausen acid / oil of vitriol / sulphuric acid

1.2. Recommended use and restrictions on use

Use of the substance/mixture	: Industrial use Laboratory chemical Battery: component
Recommended use	: Laboratory chemicals
Restrictions on use	: Not for food, drug or household use

1.3. Supplier

LabChem Inc
Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court
Zelienople, PA 16063 - USA
T 412-826-5230 - F 724-473-0647
info@labchem.com - www.labchem.com

1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or 011-703-527-3887

SECTION 2: Hazard(s) identification**2.1. Classification of the substance or mixture****GHS-US classification**

Skin corrosion/irritation, Category 1A	H314	Causes severe skin burns and eye damage.
Serious eye damage/eye irritation, Category 1	H318	Causes serious eye damage.
Full text of H statements : see section 16		

2.2. GHS Label elements, including precautionary statements**GHS-US labelling**

Hazard pictograms (GHS-US)



GHS05

Signal word (GHS-US)	: Danger
Hazard statements (GHS-US)	: H314 - Causes severe skin burns and eye damage.
Precautionary statements (GHS-US)	: P260 - Do not breathe mist, vapours, spray. P264 - Wash exposed skin thoroughly after handling. P280 - Wear protective gloves, protective clothing, eye protection, face protection. P301+P330+P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting. P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P310 - Immediately call a POISON CENTER/doctor P363 - Wash contaminated clothing before reuse. P405 - Store locked up. P501 - Dispose of contents/container to comply with local, state and federal regulations

MSDS-12 : Sulphuric Acid (Continue...)**Sulfuric Acid, ACS****Safety Data Sheet**

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

2.3. Other hazards which do not result in classification

Other hazards not contributing to the classification : None.

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/information on ingredients**3.1. Substances**

Substance type : Mono-constituent

Name	Product identifier	%	GHS-US classification
Sulfuric Acid, ACS (Main constituent)	(CAS-No.) 7664-93-9	96	Skin Corr. 1A, H314 Eye Dam. 1, H318

Full text of hazard classes and H-statements : see section 16

3.2. Mixtures

Not applicable

SECTION 4: First-aid measures**4.1. Description of first aid measures**

First-aid measures general	: Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with laboured breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain. Depending on the victim's condition: doctor/hospital.
First-aid measures after inhalation	: Remove the victim into fresh air. Immediately consult a doctor/medical service.
First-aid measures after skin contact	: Wash immediately with lots of water (15 minutes)/shower. Do not apply (chemical) neutralizing agents. Remove clothing while washing. Do not remove clothing if it sticks to the skin. Cover wounds with sterile bandage. Consult a doctor/medical service. If burned surface > 10%: take victim to hospital.
First-aid measures after eye contact	: Rinse immediately with plenty of water for 15 minutes. Take victim to an ophthalmologist. Do not apply neutralizing agents. Remove contact lenses, if present and easy to do. Continue rinsing.
First-aid measures after ingestion	: Rinse mouth with water. Do not induce vomiting. Do not give activated charcoal. Immediately consult a doctor/medical service. Call Poison Information Centre (www.big.be/antigif.htm). Take the container/vomit to the doctor/hospital. Ingestion of large quantities: immediately to hospital. Do not give chemical antidote.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects after inhalation	: Dry/sore throat. Coughing. Irritation of the respiratory tract. Irritation of the nasal mucous membranes. ON CONTINUOUS EXPOSURE/CONTACT: Corrosion of the upper respiratory tract. FOLLOWING SYMPTOMS MAY APPEAR LATER: Possible laryngeal spasm/oedema. Risk of pneumonia. Risk of lung oedema. Respiratory difficulties.
Symptoms/effects after skin contact	: Caustic burns/corrosion of the skin.
Symptoms/effects after eye contact	: Corrosion of the eye tissue. Permanent eye damage.
Symptoms/effects after ingestion	: Nausea. Abdominal pain. Blood in stool. Blood in vomit. Burns to the gastric/intestinal mucosa. AFTER INGESTION OF HIGH QUANTITIES: Shock.
Chronic symptoms	: ON CONTINUOUS/REPEATED EXPOSURE/CONTACT: Red skin. Dry skin. Itching. Skin rash/inflammation. Affection/dyscolouration of the teeth. Inflammation/damage of the eye tissue.

4.3. Immediate medical attention and special treatment, if necessary

Obtain medical assistance.

SECTION 5: Fire-fighting measures**5.1. Suitable (and unsuitable) extinguishing media**

Suitable extinguishing media	: Quick-acting ABC powder extinguisher. Quick-acting BC powder extinguisher. Quick-acting CO2 extinguisher. Class B foam (alcohol-resistant); after consulting specialist.
Unsuitable extinguishing media	: Water (quick-acting extinguisher, reel); risk of puddle expansion. Quick-acting class B foam extinguisher. Water.

5.2. Specific hazards arising from the chemical

Fire hazard	: DIRECT FIRE HAZARD: Non combustible. INDIRECT FIRE HAZARD: Reactions involving a fire hazard: see "Reactivity Hazard".
Explosion hazard	: INDIRECT EXPLOSION HAZARD: Reactions with explosion hazards: see "Reactivity Hazard".

02/28/2018

EN (English)

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MSDS-12 : Sulphuric Acid (Continue...)

Sulfuric Acid, ACS

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Reactivity	: Reacts violently with (some) bases: heat release resulting in increased fire or explosion risk. Reacts with many compounds e.g.: with (strong) reducers, with organic material and with combustible materials: (increased) risk of fire/explosion. Violent exothermic reaction with water (moisture): release of corrosive gases/vapours.
5.3. Special protective equipment and precautions for fire-fighters	
Precautionary measures fire	: Exposure to fire/heat: keep upwind. Exposure to fire/heat: consider evacuation. Exposure to fire/heat: seal off low-lying areas. Exposure to fire/heat: have neighbourhood close doors and windows.
Firefighting instructions	: Cool tanks/drums with water spray/remove them into safety. When cooling/extinguishing: no water in the substance. Dilute toxic gases with water spray.
Protection during firefighting	: Heat/fire exposure: compressed air/oxygen apparatus.
SECTION 6: Accidental release measures	
6.1. Personal precautions, protective equipment and emergency procedures	
6.1.1. For non-emergency personnel	
Protective equipment	: Gloves. Face-shield. Corrosion-proof suit. Large spills/in enclosed spaces: compressed air apparatus. Large spills/in enclosed spaces: gas-tight suit.
Emergency procedures	: Mark the danger area. No naked flames. Keep containers closed. Avoid ingress of water in the containers. Wash contaminated clothes. Large spills/in confined spaces: consider evacuation. In case of hazardous reactions: keep upwind. In case of reactivity hazard: consider evacuation.
6.1.2. For emergency responders	
Protective equipment	: Equip cleanup crew with proper protection.
Emergency procedures	: Stop leak if safe to do so. Ventilate area.
6.2. Environmental precautions	
Prevent soil and water pollution. Prevent spreading in sewers.	
6.3. Methods and material for containment and cleaning up	
For containment	: Contain released product, pump into suitable containers. Plug the leak, cut off the supply. Dam up the liquid spill. Hazardous reaction: measure explosive gas-air mixture. Reaction: dilute combustible gas/vapour with water curtain. Take account of toxic/corrosive precipitation water. Heat exposure: dilute toxic gas/vapour with water spray.
Methods for cleaning up	: Take up liquid spill into inert absorbent material, e.g.: dry sand/earth/vermiculite. Scoop absorbed substance into closing containers. Carefully collect the spill/leftovers. Damaged/cooled tanks must be emptied. Clean contaminated surfaces with an excess of water. Take collected spill to manufacturer/competent authority. Wash clothing and equipment after handling.
6.4. Reference to other sections	
No additional information available	
SECTION 7: Handling and storage	
7.1. Precautions for safe handling	
Precautions for safe handling	: Keep away from naked flames/heat. Measure the concentration in the air regularly. Carry operations in the open/under local exhaust/ventilation or with respiratory protection. Comply with the legal requirements. Remove contaminated clothing immediately. Clean contaminated clothing. Keep the substance free from contamination. Thoroughly clean/dry the installation before use. Do not discharge the waste into the drain. Never add water to this product. Never dilute by pouring water to the acid. Always add the acid to the water.
Hygiene measures	: Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product.
7.2. Conditions for safe storage, including any incompatibilities	
Incompatible products	: Strong bases. metals. combustible materials.
Heat and ignition sources	: KEEP SUBSTANCE AWAY FROM: heat sources.
Prohibitions on mixed storage	: KEEP SUBSTANCE AWAY FROM: combustible materials. reducing agents. (strong) bases. highly flammable materials. metals. cellulosic materials. organic materials. alcohols. amines. water/moisture.
Storage area	: Store in a dry area. Ventilation at floor level. Keep locked up. Provide for a tub to collect spills. Unauthorized persons are not admitted. Meet the legal requirements.
Special rules on packaging	: SPECIAL REQUIREMENTS: closing. dry. clean. correctly labelled. meet the legal requirements. Secure fragile packagings in solid containers.
02/28/2018	EN (English)

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MSDS-12 : Sulphuric Acid (Continue...)

Sulfuric Acid, ACS

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Packaging materials : SUITABLE MATERIAL: stainless steel, carbon steel, polyethylene, polypropylene, glass, stoneware/porcelain. MATERIAL TO AVOID: monel steel, lead, copper, zinc.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Sulfuric Acid, ACS (7664-93-9)		
ACGIH	ACGIH TWA (mg/m ³)	0.2 mg/m ³ (Thoracic fraction)
OSHA	OSHA PEL (TWA) (mg/m ³)	1 mg/m ³
IDLH	US IDLH (mg/m ³)	15 mg/m ³
NIOSH	NIOSH REL (TWA) (mg/m ³)	1 mg/m ³

8.2. Appropriate engineering controls

Appropriate engineering controls : Emergency eye wash fountains should be available in the immediate vicinity of any potential exposure. Provide adequate general and local exhaust ventilation.

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment:

Gloves. Face shield. Chemical resistant apron. Safety glasses. Protective goggles. Gas mask with filter type E.



Materials for protective clothing:

GIVE EXCELLENT RESISTANCE: butyl rubber, polyethylene, tetrafluoroethylene. GIVE LESS RESISTANCE: neoprene, PVC, viton. GIVE POOR RESISTANCE: natural rubber, nitrile rubber, PVA

Hand protection:

Gloves

Eye protection:

Face shield

Skin and body protection:

Corrosion-proof clothing

Respiratory protection:

Full face mask with filter type E at conc. in air > exposure limit

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Appearance	: Liquid.
Colour	: Pure substance: colourless Unpurified: yellow to brown
Odour	: Almost odourless
Odour threshold	: > 1 mg/m ³
pH	: < 1
Melting point	: 10 °C
Freezing point	: No data available
Boiling point	: 288 °C
Flash point	: Not applicable
Relative evaporation rate (butylacetate=1)	: No data available
Flammability (solid, gas)	: No data available

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MSDS-12 : Sulphuric Acid (Continue...)**Sulfuric Acid, ACS****Safety Data Sheet**

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Vapour pressure	: < 1 hPa (20 °C)
Relative vapour density at 20 °C	: 3.4
Relative density	: 1.8
Density	: 1840 kg/m³
Molecular mass	: 98.08 g/mol
Solubility	: Exothermically soluble in water. Soluble in ethanol. Water: complete
Log Pow	: -2.2 (Estimated value)
Auto-ignition temperature	: No data available
Decomposition temperature	: > 340 °C
Viscosity, kinematic	: No data available
Viscosity, dynamic	: No data available
Explosive limits	: No data available
Explosive properties	: No data available.
Oxidising properties	: No data available.

9.2. Other information

VOC content	: 0 %
Other properties	: Gas/vapour heavier than air at 20°C. Clear. Hygroscopic. Slightly volatile. Substance has acid reaction.

SECTION 10: Stability and reactivity**10.1. Reactivity**

Reacts violently with (some) bases: heat release resulting in increased fire or explosion risk. Reacts with many compounds e.g.: with (strong) reducers, with organic material and with combustible materials: (increased) risk of fire/explosion. Violent exothermic reaction with water (moisture): release of corrosive gases/vapours.

10.2. Chemical stability

Unstable on exposure to moisture.

10.3. Possibility of hazardous reactions

Reacts violently with water. Reacts violently with (some) bases: release of heat.

10.4. Conditions to avoid

Incompatible materials. Moisture.

10.5. Incompatible materials

Water. Strong bases. Organic compounds. metals. Halogens. cyanides. combustible materials.

10.6. Hazardous decomposition products

Sulfur compounds.

SECTION 11: Toxicological information**11.1. Information on toxicological effects**

Likely routes of exposure	: Skin and eyes contact
Acute toxicity	: Not classified

Sulfuric Acid, ACS (7664-93-9)	
LD50 oral rat	2140 mg/kg bodyweight (Rat, Experimental value)
ATE US (oral)	2140 mg/kg bodyweight

Skin corrosion/irritation	: Causes severe skin burns and eye damage. pH: < 1
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Serious eye damage/irritation	: Causes serious eye damage. pH: < 1
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Respiratory or skin sensitisation	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified

MSDS-12 : Sulphuric Acid (Continue...)**Sulfuric Acid, ACS****Safety Data Sheet**

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Sulfuric Acid, ACS (7664-93-9)	
Additional information	Strong inorganic acid mists containing sulfuric acid are carcinogenic to humans
National Toxicology Program (NTP) Status	2 - Known Human Carcinogens
Reproductive toxicity	: Not classified
Specific target organ toxicity (single exposure)	: Not classified
Specific target organ toxicity (repeated exposure)	: Not classified
Aspiration hazard	: Not classified
Potential adverse human health effects and symptoms	: Odour threshold is well above the exposure limit. Causes severe skin burns. Irritant to the respiratory organs. Causes serious eye damage.
Symptoms/effects after inhalation	: Dry/sore throat. Coughing. Irritation of the respiratory tract. Irritation of the nasal mucous membranes. ON CONTINUOUS EXPOSURE/CONTACT: Corrosion of the upper respiratory tract. FOLLOWING SYMPTOMS MAY APPEAR LATER: Possible laryngeal spasm/oedema. Risk of pneumonia. Risk of lung oedema. Respiratory difficulties.
Symptoms/effects after skin contact	: Caustic burns/corrosion of the skin.
Symptoms/effects after eye contact	: Corrosion of the eye tissue. Permanent eye damage.
Symptoms/effects after ingestion	: Nausea. Abdominal pain. Blood in stool. Blood in vomit. Burns to the gastric/intestinal mucosa. AFTER INGESTION OF HIGH QUANTITIES: Shock.
Chronic symptoms	: ON CONTINUOUS/REPEATED EXPOSURE/CONTACT: Red skin. Dry skin. Itching. Skin rash/inflammation. Affection/dyscolouration of the teeth. Inflammation/damage of the eye tissue.

SECTION 12: Ecological information**12.1. Toxicity**

Ecology - general	: Not classified as dangerous for the environment according to the criteria of Regulation (EC) No 1272/2008.
Ecology - air	: Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009).
Ecology - water	: Harmful to crustacea. Harmful to fishes. Groundwater pollutant. Mild water pollutant (surface water). Inhibition of activated sludge. pH shift. Toxic to plankton.

Sulfuric Acid, ACS (7664-93-9)	
LC50 fish 1	42 mg/l (96 h, Gambusia affinis)
EC50 Daphnia 1	29 mg/l (24 h, Daphnia magna)

12.2. Persistence and degradability

Sulfuric Acid, ACS (7664-93-9)	
Persistence and degradability	Biodegradability: not applicable.
Biochemical oxygen demand (BOD)	Not applicable
Chemical oxygen demand (COD)	Not applicable
ThOD	Not applicable
BOD (% of ThOD)	Not applicable

12.3. Bioaccumulative potential

Sulfuric Acid, ACS (7664-93-9)	
Log Pow	-2.2 (Estimated value)
Bioaccumulative potential	Not bioaccumulative.

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

No additional information available

SECTION 13: Disposal considerations**13.1. Disposal methods**

Regional legislation (waste)	: LWCA (the Netherlands): KGA category 01.
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MSDS-12 : Sulphuric Acid (Continue...)**Sulfuric Acid, ACS****Safety Data Sheet**

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Waste disposal recommendations	: Treat using the best available techniques before discharge into drains or the aquatic environment. Use appropriate containment to avoid environmental contamination. Remove waste in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Recycle/reuse. Remove to an authorized dump (Class I). Remove for physico-chemical/biological treatment.
Additional information	: Hazardous waste according to Directive 2008/98/EC, as amended by Regulation (EU) No 1357/2014 and Regulation (EU) No 2017/997.
Ecology - waste materials	: Avoid release to the environment.

SECTION 14: Transport information**Department of Transportation (DOT)**

In accordance with DOT

Transport document description : UN1830 Sulfuric acid (with more than 51 percent acid), 8, II

UN-No. (DOT) : UN1830

Proper Shipping Name (DOT) : Sulfuric acid
with more than 51 percent acid

Transport hazard class(es) (DOT) : 8 - Class 8 - Corrosive material 49 CFR 173.136

Packing group (DOT) : II - Medium Danger

Hazard labels (DOT) : 8 - Corrosive



DOT Packaging Non Bulk (49 CFR 173.xxx) : 202

DOT Packaging Bulk (49 CFR 173.xxx) : 242

DOT Special Provisions (49 CFR 172.102) :

A3 - For combination packagings, if glass inner packagings (including ampoules) are used, they must be packed with absorbent material in tightly closed metal receptacles before packing in outer packagings.

A7 - Steel packagings must be corrosion-resistant or have protection against corrosion.

B3 - MC 300, MC 301, MC 302, MC 303, MC 305, and MC 306 and DOT 406 cargo tanks and DOT 57 portable tanks are not authorized.

B83 - Bottom outlets are prohibited on tank car tanks transporting sulfuric acid in concentrations over 65.25 percent.

B84 - Packagings must be protected with non-metallic linings impervious to the lading or have a suitable corrosion allowance for sulfuric acid or spent sulfuric acid in concentration up to 65.25 percent.

IB2 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized.

N34 - Aluminum construction materials are not authorized for any part of a packaging which is normally in contact with the hazardous material.

T8 - 4 178.274(d)(2) Normal..... Prohibited

TP2 - a. The maximum degree of filling must not exceed the degree of filling determined by the following: (image) Where: tr is the maximum mean bulk temperature during transport, tf is the temperature in degrees celsius of the liquid during filling, and a is the mean coefficient of cubical expansion of the liquid between the mean temperature of the liquid during filling (tf) and the maximum mean bulk temperature during transportation (tr) both in degrees celsius. b. For liquids transported under ambient conditions may be calculated using the formula: (image) Where: d15 and d50 are the densities (in units of mass per unit volume) of the liquid at 15 C (59 F) and 50 C (122 F), respectively.

TP12 - This material is considered highly corrosive to steel.

DOT Packaging Exceptions (49 CFR 173.xxx) : 154

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 1 L

DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 30 L

DOT Vessel Stowage Location : C - The material must be stowed "on deck only" on a cargo vessel and on a passenger vessel.

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MSDS-12 : Sulphuric Acid (Continue...)**Sulfuric Acid, ACS****Safety Data Sheet**

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DOT Vessel Stowage Other : 14 - For metal drums, stowage permitted under deck on cargo vessels
 Other information : No supplementary information available.

SECTION 15: Regulatory information**15.1. US Federal regulations**

Sulfuric Acid, ACS (7664-93-9)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Not subject to reporting requirements of the United States SARA Section 313 Subject to reporting requirements of United States SARA Section 313	
RQ (Reportable quantity, section 304 of EPA's List of Lists)	1000 lb
SARA Section 302 Threshold Planning Quantity (TPQ)	1000 lb
SARA Section 311/312 Hazard Classes	Health hazard - Skin corrosion or Irritation Health hazard - Serious eye damage or eye irritation

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

Chemical(s) subject to the reporting requirements of Section 313 or Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986 and 40 CFR Part 372.

Sulfuric Acid, ACS	CAS-No. 7664-93-9	100%
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15.2. International regulations**CANADA**

No additional information available

EU-Regulations

No additional information available

National regulations

Sulfuric Acid, ACS (7664-93-9)	
Listed on IARC (International Agency for Research on Cancer) Listed as carcinogen on NTP (National Toxicology Program)	

15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

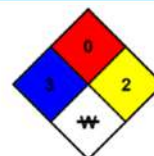
SECTION 16: Other information

Revision date : 02/28/2018

Full text of H-statements: see section 16:

H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.

NFPA health hazard : 3 - Materials that, under emergency conditions, can cause serious or permanent injury.
 NFPA fire hazard : 0 - Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.
 NFPA reactivity : 2 - Materials that readily undergo violent chemical change at elevated temperatures and pressures.
 NFPA specific hazard : W - Materials that react violently or explosively with water.



MSDS-12 : Sulphuric Acid (Continue...)

Sulfuric Acid, ACS

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Hazard Rating	
Health	: 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given
Flammability	: 0 Minimal Hazard - Materials that will not burn
Physical	: 2 Moderate Hazard - Materials that are unstable and may undergo violent chemical changes at normal temperature and pressure with low risk for explosion. Materials may react violently with water or form peroxides upon exposure to air.
Personal protection	: H H - Splash goggles, Gloves, Synthetic apron, Vapor respirator

SDS US LabChem

Information in this SDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this SDS. The user must determine suitability of this information for his application.

MSDS-13 : Thionyl Chloride

Sr no - 75	TIL-EKB-SFT-FF-37
<u>TRANSPEK INDUSTRY LTD.</u>	
<u>Material Safety Data Sheet (MSDS)</u>	
Revision : 04	Product : THIONYL CHLORIDE
Published Date : 01.10.2019	

1	CHEMICAL PRODUCT AND COMPANY IDENTIFICATION
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Product Name	Thionyl Chloride
Common Chemical Name	Thionyl Chloride
Synonyms	Sulphurous Oxy Chloride
Chemical Formula	Cl ₂ OS
CAS No.	77 19-09-7
EINECS Number	231-748-8
Supplier's Name & Address	Transpek Industry Limited, At & Post. Ekalbara Tal. Padra, Dist : Vadodara - 391440, Gujarat (India)
Incase of Emergency, Contact	+912662-244444, 244289, 244309, 244318, +912662-244276
Fax	+912662-244439

2	COMPOSITION / INFORMATION ON INGREDIENTS
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CHEMICAL NAME	CAS NO.	SYMBOL	R-PHRASES	% (W/W)
Thionyl Chloride	77 19-09-7	C	R - 14,20/22,29,35,40,34,20/21/22	99

3	HAZARD IDENTIFICATION
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PHYSICAL / CHEMICAL HAZARDS

On contact with water, it hydrolyses to give acidic products

ENVIRONMENTAL HAZARDS

On contact with water it gives out acidic fumes

EFFECTS OF (OVER) EXPOSURE**INHALATION**

Rapid & difficult breathing. It causes pulmonary edema & bronchospasm

INGESTIONUlceration of mucous membrane of Gastro intestinal tract leading to perforation of stomach which may end in shock, convulsion **SKIN CONTACT**

It causes profound damage to tissues & burns. Burns may be very painful.

EYE CONTACT

Inflammation ulceration of tissue opaqueness of cornea loss of sight.

AGGRAVATING CONDITIONS

If the patient is kept in similar environment without effective respirator it may cause lethal damage.



MSDS-13 : Thionyl Chloride (Continue...)



4	FIRST AID MEASURES
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Ingestion

Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation

Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen. DO NOT use mouth-to-mouth respiration. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

SKIN CONTACT

Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes

EYE CONTACT

Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation is required (at least 30 minutes).

PROTECTION TO FIRST- AIDERS

Not required if working in a non-contaminated area.

5	FIRE FIGHTING MEASURES
----------	-------------------------------

Flash Point

105°C

EXTINGUISHING MEDIA SUITABLE FOR FIGHTING PROCEDURES

Foam type / dry chemical powder fire extinguishers

HAZARDOUS THERMAL DECOMPOSITION AND COMBUSTION PRODUCTS :

Reacts violently with water liberating hydrogen chloride and sulphur dioxide

SPECIAL FIRE FIGHTING PROCEDURES

Please use foam type / dry chemical powder fire extinguisher

PROTECTION TO FIRE FIGHTERS

Use positive pressure, self-contained breathing apparatus.

6	ACCIDENTAL RELEASE MEASURES
----------	------------------------------------

SPILLS

If possible transfer main bulks into suitable container or pick up with chemical binder or dry sand.

ENVIRONMENTAL PRECAUTIONS

Never use direct water jet. Clear the area of all personnel

METHODS FOR CLEANING UP

Clear the spillage with dry sand and sawdust. Scrub the spill area with Soda Ash

REMARKS

Dispose off in accordance with all local government rules

MSDS-13 : Thionyl Chloride (Continue...)

7	HANDLING AND STORAGE
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STORAGE

Store in dry place away from excessive heat.

Store in shade place and away from direct sunlight.

Store in dry place protected from moisture and humidity.

Store away from incompatible materials like water, metals, ammonia, dimethylsulfoxide, dimethyl formamide, lithium sodium and alkalis.

PACKING MATERIALS

G. I. Barrels, Lead Lined Tankers, or ISO Tanks & Lined with suitable materials.

HANDLING

Keep container tightly closed. Do not get on skin or in eyes. Do not ingest or inhale. Use with adequate ventilation. Do not allow contact with water. Discard contaminated shoes.

8	EXPOSURE CONTROLS / PERSONAL PROTECTION
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Engineering measures

Not known

Hygienic measures

Do not eat or drink during work

RESPIRATION

Use self contained, positive pressure breathing apparatus.

SKIN / BODY

Avoid skin/body contact because serious chemical burns can result from the contact of TC with the skin. All responding personnel should be equipped with self contained breathing apparatus, full protective clothing including an Acid type splash suit and rubber safety shoes.

HANDS

Use Acid and Alkali proof rubber hand gloves.

EYES

Use safety goggles while handling the material.

Occupational exposure limited TLV (USA)

NIOSH REL: C 1 ppm (5 mg/m³)

9	PHYSICAL AND CHEMICAL PROPERTIES
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Appearance	Colorless to slight yellow liquid.
Color	Colorless to slight yellow
Odor	Pungent and irritating
Boiling Point	172 °F (78.8 °C) to 156 °F (105 °C)
Melting Point	(-105 °C)
Density	1.64 g/cm ³ (20 °C)
Vapour Density (air=1)	4.1
Specific Gravity Solubility in water Octanol / Water coefficient	1.625 to 1.635 at 25 °C Reacts violently giving toxic fumes Not applicable 100 mm Hg 70
Vapour pressure	97 (20 °C)
pH	Acidic
Flash Point	Not applicable
Auto ignition Temp.	Not applicable
Lower Explosion limit	Not applicable
Upper Explosion limit	Not applicable

MSDS-13 : Thionyl Chloride (Continue...)

10	STABILITY AND REACTIVITY
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DATA Stability

The product is stable in dry atmosphere.

Condition to avoid

Avoid contact with water.

Thermal Decomposition

Decomposition begins at 140 °C

Hazardous Decomposition Products

Formation of Chlorine , Sulphur Dioxide & DiSulphur Dichloride during Thermal Decomposition

Hazardous Reaction

Reacts violently with water, liberating hydrogen chloride & Sulphur Dioxide

11	TOXICOLOGICAL
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INFORMATION Acute Toxicity

Inhalation rate Lc 50: 500 ppm / 1H. TLV CL 1 ppm CL : ceiling concentration

12	ECOLOGICAL INFORMATION
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Do not allow to escape in to water, waste water or soil.

13	DISPOSAL CONSIDERATIONS
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Methods of disposal :

Thoroughly scrub out the open drum with hot water and Soda ash or 5% of caustic solution. Flush and wash again until as much as Rainwater may rinse traces of poison out of a drum on to a soil or into a drainage where the toxic material eventually can reach to human beings or anyone else.

Perform all operation carefully with thoroughness.

14	TRANSPORT INFORMATION
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UN Number	1836
Proper Shipping Name	THIONYL CHLORIDE
Hazard Class	8
Packing Group	I

MSDS-13 : Thionyl Chloride (Continue...)

15	REGULATORY INFORMATION
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Label Name	Thionyl Chloride
Hazard Symbol	Corrosive
Risk Phrases	R - 14,20/22,29,35,40,34,20/21/22
R - 20/22 Harmful by inhalation and if swallowed	
R - 29 Contact with water liberates toxic gas.	
R - 35 Causes severe burns	
R - 40 Limited evidence of a carcinogenic effect	
R - 34 Causes burns	
R - 20/21/22 Harmful by inhalation, in contact with skin and if swallowed	
Safety Phrases	S - 26,36/37/39,45,28,27
S - 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice	
S - 36/37/39 Wear suitable protective clothing, gloves and eye/face protection	
S - 45 In case of accident or if you feel unwell, seek medical advice immediately (show label where possible)	
S - 28 After contact with skin, wash immediately with plenty of ... (to be specified by the manufacturer)	
S - 27 Take off immediately all contaminated clothing	

16	DISCLAIMER
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All information given by or on behalf of Transpek as to properties, specification, use etc. is based on literature research and is believed to be reliable. Transpek can not assume any responsibility for the performance and results obtained through the use of this product or information.

Transpek assume no liability for infringement of trademarks, patents or any other rights owned or controlled by third parties by reason of your manufacture, formulation, use or sale of the products and information.

MSDS-14 : Toluene

Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet

Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene Catalog Codes: SLT2857, SLT3277 CAS#: 108-88-3 RTECS: XS5250000 TSCA: TSCA 8(b) inventory: Toluene CI#: Not available. Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol Chemical Name: Toluene Chemical Formula: C ₆ H ₅ -CH ₃ or C ₇ H ₈	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
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Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

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

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

p. 1

MSDS-14 : Toluene (Continue...)**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

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

Inhalation:

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

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. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. 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. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

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

Fire Hazards in Presence of Various Substances:

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: Not available.

Special Remarks on Explosion Hazards:

Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide; concentrated nitric acid, sulfuric acid + nitric acid; N₂O₄; AgClO₄; BrF₃; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

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

MSDS-14 : Toluene (Continue...)**Large Spill:**

Toxic flammable liquid, insoluble or very slightly soluble 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**Precautions:**

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. 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. Avoid contact with skin and eyes. 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:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

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: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States] TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States] TWA: 375 STEL: 560 (mg/m3) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

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

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

MSDS-14 : Toluene (Continue...)**Vapor Pressure:** 3.8 kPa (@ 25°C)**Vapor Density:** 3.1 (Air = 1)**Volatility:** Not available.**Odor Threshold:** 1.6 ppm**Water/Oil Dist. Coeff.:** The product is more soluble in oil; log(oil/water) = 2.7**Ionicity (in Water):** Not available.**Dispersion Properties:** See solubility in water, diethyl ether, acetone.**Solubility:**

Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l @ 25 deg. C.

Section 10: Stability and Reactivity Data**Stability:** The product is stable.**Instability Temperature:** Not available.**Conditions of Instability:** Heat, ignition sources (flames, sparks, static), incompatible materials**Incompatibility with various substances:** Reactive with oxidizing agents.**Corrosivity:** Non-corrosive in presence of glass.**Special Remarks on Reactivity:**

Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride. Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C. Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.**Polymerization:** Will not occur.**Section 11: Toxicological Information****Routes of Entry:** Absorbed through skin. Dermal contact. Eye 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): 636 mg/kg [Rat]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Other Toxic Effects on Humans:

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

Special Remarks on Toxicity to Animals:

Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

Special Remarks on Chronic Effects on Humans:

Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:

MSDS-14 : Toluene (Continue...)

Acute Potential Health Effects: Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin. Eyes: Causes mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abrasions. This usually resolves in 2 days. Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia,), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite. Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation. Chronic Potential Health Effects: Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophosphatemia), severe, muscle weakness and Rhabdomyolysis. Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

Section 12: Ecological Information**Ecotoxicity:**

Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

BOD5 and COD: Not available.

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 products of degradation are less toxic than the product itself.

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 : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information**Federal and State Regulations:**

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene California prop. 65 (no significant risk level): Toluene: 7 mg/day (value) California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene Connecticut hazardous material survey.: Toluene Illinois

MSDS-14 : Toluene (Continue...)

toxic substances disclosure to employee act: Toluene Illinois chemical safety act: Toluene New York release reporting list: Toluene Rhode Island RTK hazardous substances: Toluene Pennsylvania RTK: Toluene Florida: Toluene Minnesota: Toluene Michigan critical material: Toluene Massachusetts RTK: Toluene Massachusetts spill list: Toluene New Jersey: Toluene New Jersey spill list: Toluene Louisiana spill reporting: Toluene California Director's List of Hazardous Substances.: Toluene TSCA 8(b) inventory: Toluene TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92 SARA 313 toxic chemical notification and release reporting: Toluene CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 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-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. S29- Do not empty into drains. S33- Take precautionary measures against static discharges.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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