

District Crisis Group Plan for Gandhinagar District 2026



GANDHINAGAR DISTRICT CRISIS GROUP PLAN 2026

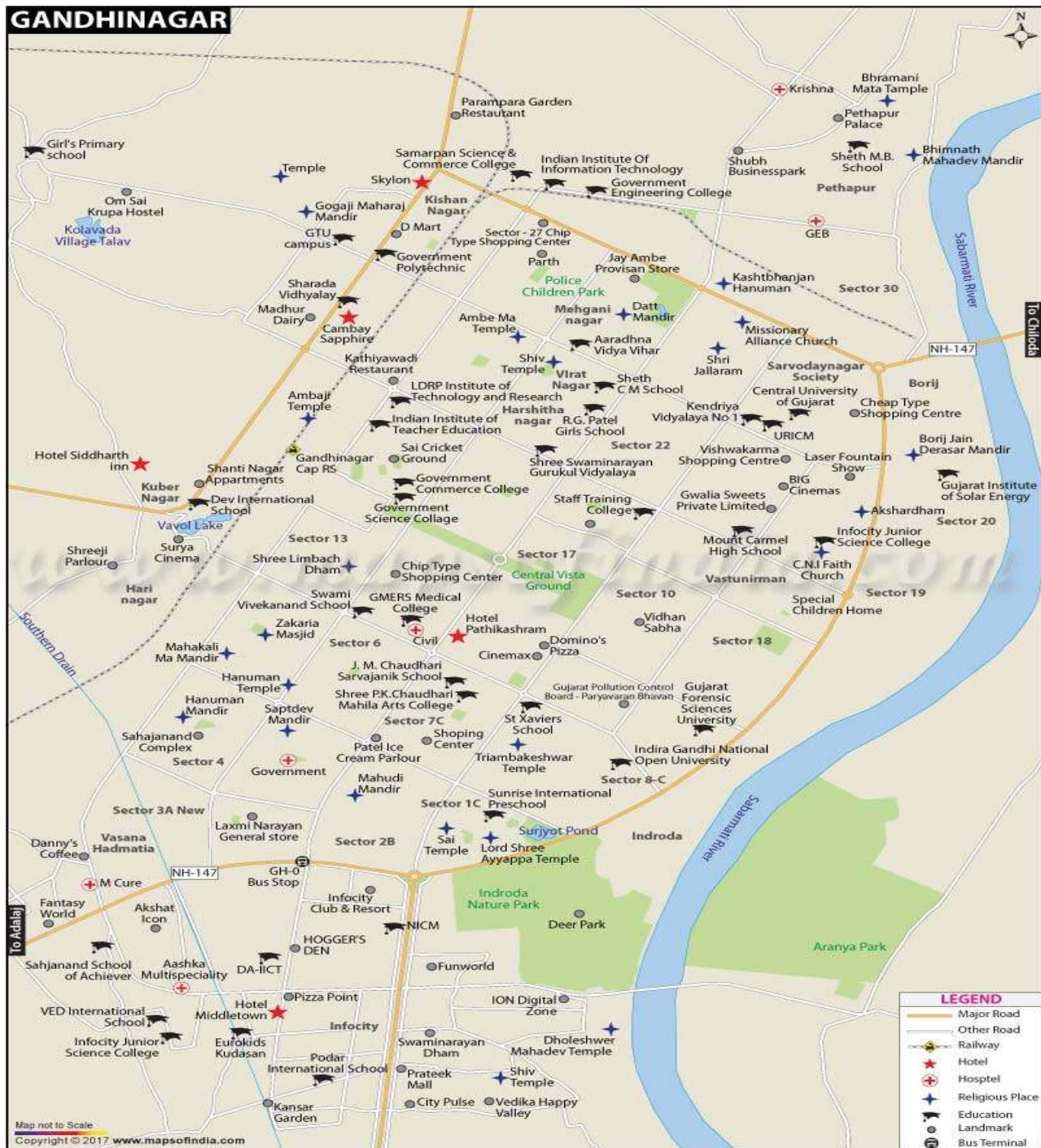


District Crisis Group Plan for Gandhinagar District 2026



**DEPARTMENT OF INDUSTRIAL SAFETY AND HEALTH
GANDHINAGAR DISTRICT, GUJARAT, INDIA.**

OFF SITE EMERGENCY PLAN FOR DISTRICT GANDHINAGAR OF GUJARAT STATE 2025



DEPARTMENT OF INDUSTRIAL SAFETY & HEALTH
GANDHINAGAR DISTRICT, GUJARAT, INDIA.



GOVERNMENT OF GUJARAT

PREFACE

Each and every part of the world faces variety of disasters from time to time. At any moment some part of the earth and its habitants are attacked with some kind of disaster, Gandhinagar District in particular is a multi-hazard prone district and of course by Industrial and Chemical Disasters.

I am very happy to place on record that Dy. DISH, Gandhinagar office has prepared the District Disaster Management Plan of Gandhinagar District for Chemical Disaster. Apart from the Training programs, there are other many important functions to be fulfilled during the occurrence of chemical disasters to make a disaster management plan successful. After a long thought, team work has been created, where head to head responsibility has been decided. It has a fire and rescue team, medical paramedical assistance team, maintenance of law and order during the disaster occurrence.

The Industrial sector of the District has been asked to prepare such action plans which can be implemented during chemical disasters. The full scale mock drill of District Disaster Management Plan shall be carried out at least once in a year and report of its weakness and strength shall be sent to the State Crisis Group.

The guideline issued by The Home Ministry, National Disaster Management Authority & Ministry of Environment and Forest, Government of India and Ministry of Gujarat State, Labor & Employment Department, Gujarat Disaster Management Authority, DISH have been kept in focus in preparation of this plan.

I hope that each and every administrative unit of the district, District Crisis Group, Local Crisis Groups and industrial stake holders will use this action plan in the true spirit. We wish that no disasters ever occur, but in case of their occurrence, this action plan and preparedness at macro to micro level will be very helpful to the people of the district and state as a whole.

I wish all the great success to combat the chemical disaster.

Date: -

Place: - Gandhinagar

(J.B. BODAT)

**Dy. Director, Industrial Safety & Health
and Member Secretary District Off-site
Emergency Plan**

**Ravindra Khatale, IAS
District Collector of Gandhinagar &
Chairperson District Crisis Group,
Gandhinagar**

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ABBREVIATIONS

AERB	Atomic Energy Regulatory Board
CCG	Central Crisis Management Group
CFO	Chief Fire Officer
CMG	Crisis Management Group
CIFT	Central Institute of fisheries Technology
CWC	Central Water Commission
DCG	District Crisis Management Group
DCR	District Control Room
DDO	District Development Officer
DEOCs	District Emergency Operation Centres
DG	Director General
DGHS	Directorate General of the Health Services
DIG	Director General of Police
DSO	District Supply Officer
DSP	District Superintendent of Police
DISH	Director Industrial Safety & Health
DM	Disaster Management
ERCs	Emergency Response Centres
ERTs	Emergency Response Teams
GEB	Gujarat Electricity Board
GIDC	Gujarat Industrial Development Corporation
GIDM	Gujarat Institute of Disaster Management
GMB	Gujarat Maritime Board
GPCB	Gujarat Pollution Control Board
GSDMA	Gujarat State Disaster Management Authority
GWSSB	Gujarat Water Supply & Sewerage board
HAZCHEM	Hazardous Chemicals
IMD	Indian Meteorology Department

IRC	Indian Road Congress
ISR	Institute of Seismological Research
ISRO	Indian Space Research Organisation
LCG	Local Crisis Management Group
MAH	Major Accident Hazard
MOEF	Ministry of Environment and Forest
MSIHC	Manufacture, Storage & Import of Hazardous Chemicals
NCCM	National Crisis Management Committee
NDMA	National Disaster Management Authority
NDRF	National Disaster Response Force
NGO	Non Government Organization
PESO	Petroleum and Explosive Safety Organization
PPE	Personal Protective Equipments
R & B	Dept. Roads & buildings Department
SCG	State Crisis Management Group
SEOC	State Emergency Operation Centre

1.0 INTRODUCTION

The growth of chemical industries has led to an increase in the risk of occurrence of incidents associated with hazardous chemicals (HAZCHEM).

A chemical industry that incorporates the best principles of safety can largely prevent such incidents. Common causes for chemical accidents are deficiencies in safety management systems and human errors, or they may occur as a consequence of natural calamities or sabotage activities.

Chemical accidents result in fire, explosion and/or toxic release. The nature of chemical agents and their concentration during exposure ultimately decides the toxicity and damaging effects on living organisms in the form of symptoms and signs like irreversible pain, suffering and death.

Meteorological conditions such as wind speed, wind direction, height of inversion layer, stability class, etc., also play an important role by affecting the dispersion pattern of toxic gas clouds. The Bhopal Gas tragedy of 1984 - the worst chemical disaster in history, where over 2000 people died due to the accidental release of the toxic gas Methyl-Isocyanate is still fresh in our memories. Such accidents are significant in terms of injuries, pain, suffering, loss of lives, damage to property and environment. A small accident occurring at the local level may be a prior warning signal for an impending disaster. Chemical disasters though low in frequency have the potential to cause significant immediate or long-term damage.

A critical analysis of the lessons learnt from major chemical accidents exhibited various deficiencies. Laxity towards safety measures, non confirmation to techno-legal regimes and a low level of public consultation are a few such shortcomings. The scenario called for concerted and sustained efforts for effective risk reduction strategies and capacity development under a national authority to decrease the occurrence of such incidents and

lessen their impact. Although tremendous efforts have been made to minimise such accidents and to improve emergency preparedness at all levels, substantial efforts are still required to predict the occurrence of disasters, assess the damage potential, issue warnings, and to take other precautionary measures to mitigate their effects. Another pressing need is to properly assess the potential of chemical emergencies and develop tools for emergency planning and response to minimise the damage in case of any eventuality.

1.1. OBJECTIVE

The objective of a Disaster management plan is to localize a Disaster and contain its effect to the greatest extent so as to minimize its impact on life, environment and property. Response to any disaster, in the absence of a well-defined plan, would be arbitrary, leading to overemphasis of some actions and absence of other critical actions. A formal plan for Managing Disaster is therefore necessary. This Disaster management plan has a strong preparedness focus which aims at reducing our vulnerability to disasters and at the same time, it includes a plan of action/response mechanism for dealing with earthquakes, floods, cyclones, epidemics, industrial and chemical accidents, road accidents and fires.

This document provides basic information required for the management of disasters in Gandhinagar District by:

- Defining the Risks and Vulnerabilities of citizens of the district to different disasters
- Identifying private and public sector stakeholders with prime and supporting responsibilities to reduce or negate these vulnerabilities
- Defines actions to be taken by these parties to avoid or mitigate the impact of possible disasters in the district
- For major industrial sites located in the district (Off-site Emergency plan for Industrial Accidents available with DISH)
- Through Standard Operating Procedures (SOPs) of Line Departments detailing how specific disaster response actions will be accomplished.

Developing and maintaining SOPs are the responsibility of parties with designated prime or supporting tasks assigned by this plan.

Keeping in view all the possible aspects of the aforesaid problem in mind and to keep the Administration prepared in all possible ways to respond properly to various Disaster situations with minimum delay, possible Disaster situations have been identified and the component plans have also been identified & mentioned in detail in this document.

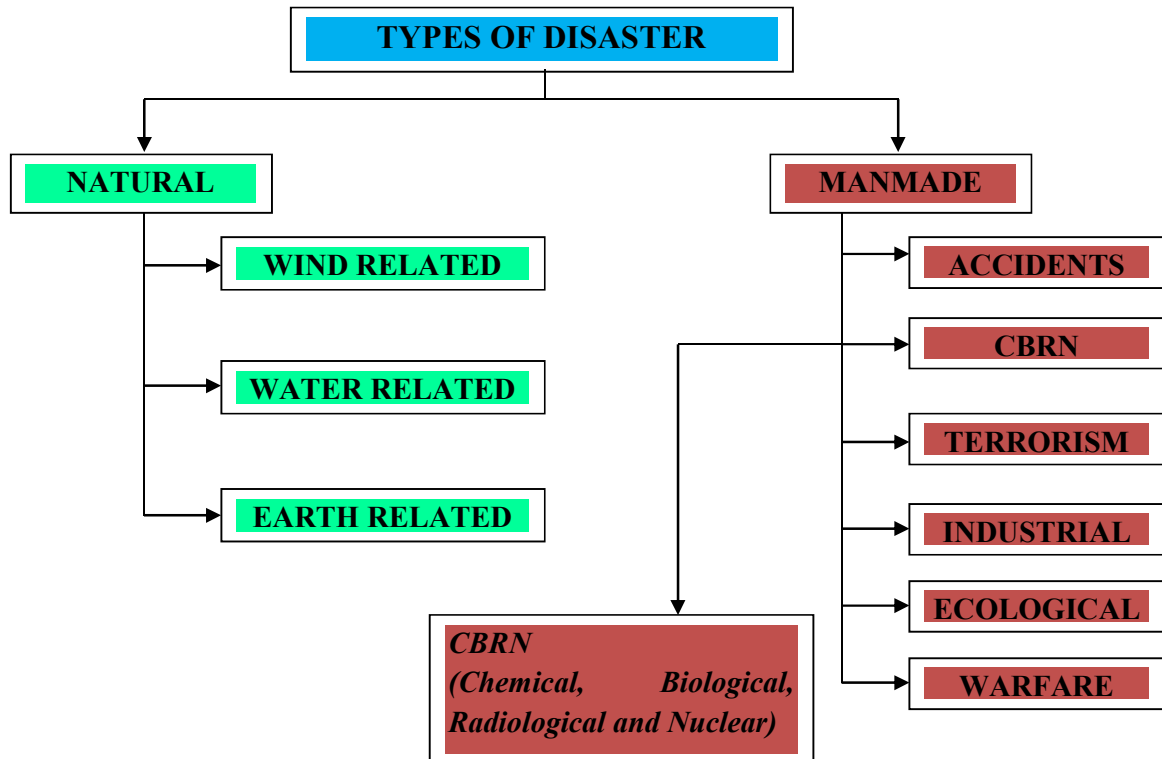
(A) Natural Calamities

- Floods
- Earthquake
- Cyclone
- Fire
- Biological Disaster or Epidemic of Human/livestock/crops

(B) Man Made Calamities

- Industrial Disaster
- Radiological Disaster
- Accidents
- Railways
- Road
- Air
- Building Collapse
- Bomb Blast (Terrorist Activities)
- Stampede at crowded Places
- Food Poisoning

- Disaster can be categorized into natural and man-made disaster



1.2. RISKS POSED BY HAZCHEM

Increased industrial activities and the risks associated with HAZCHEM and enhanced vulnerability lead to industrial and chemical accidents. Chemical accidents may originate in the manufacturing or formulation facility, or during the process operations at any stage of the product cycle, material handling, transportation and storage of HAZCHEM. Vulnerability is sometimes compounded due to the location of Major Accident Hazard (MAH) industries closer to densely populated areas. Chemical and industrial accidents generally occur due to technical failures that can be anticipated. The risk associated with them can thus be predicted and reduced effectively by identification of risk areas, risk assessment and designing pre-operative measures. The occurrence of chemical accidents and probability thereof, manifesting in a disaster, remain a cause of concern.

Disaster threatens sustainable economic development worldwide. In the past twenty years, earthquakes, floods, tropical storms, droughts and other calamities have killed millions of people, inflicted injury, disease and caused homelessness and misery to around one billion others in the world. These have caused damage to infrastructure worth millions of rupees. Disaster destroys decades of human effort and investments, thereby, placing new demands on society for reconstruction and rehabilitation. Disaster management thus requires proactive approach. The community, civil society organizations, media and the proverbial man on the street, everyone has to play a role in case such exigency occurs. The various prevention and mitigation measures outlined below are aimed at building up capabilities as also how to deal with disasters.

Handling large quantities of HAZCHEM in installations, isolated storages, and during transportation, poses the grave risk of a sudden release of copious quantities of toxicants in the environment. There are about 1900 MAH units in India, handling a large number of chemicals as raw materials, in processes, products, and wastes, with flammable, explosive, corrosive, toxic and noxious properties. Any accident involving these may have an adverse impact on both the community and the environment. Large quantities of chemicals are also

stored/ processed in industries that are located in densely populated areas. Inappropriate and haphazard construction and the lack of awareness and preparedness on the part of the community further enhance their vulnerability. The potential of heavy losses and adverse consequences on the environment due to a chemical accident calls for further improvement of safety measures in all processes /procedures and the adoption of appropriate methods for handling HAZCHEMs.

The Bhopal Gas Disaster in December 1984 brought into sharp focus the unprecedented potential of HAZCHEM like Methyl-Isocyanate in terms of loss of life, health, injury and the long term effects on the population and environment. It created compelling evidence to approach DM and chemical safety holistically. The era of restructuring with the induction of new HAZCHEM control systems and procedures all over the world in the wake of the Bhopal disaster also resulted in the strengthening of institutional mechanisms at local, district, state and central levels for the management of chemical disasters in India. The consolidation of these institutional mechanisms and the mobilisation of corporate support for the preparation and implementation of emergency plans is an integral part of these Guidelines.

1.3. CHEMICAL ACCIDENTS

- i) Manufacturing and formulation installations including during commissioning and process operations, maintenance and disposal.
- ii) Material handling and storage in manufacturing facilities and isolated storages, warehouses and go-downs including tank farms in ports and docks and fuel depots.
- iii) Transportation (road, rail, air, water, and pipelines).

Chemical disasters, in general, may result from:

- I. Fire
- II. Explosion
- III. Toxic release
- IV. Poisoning
- V. Combinations of the above

Industrial Chemical Accidents (1974-1989)

Year	Location	Origin of Accident	Chemical Involved	Deaths	Number of Injured	Evacuated
1.	2.	3.	4.	5.	6.	7.
1974	Allahabad	Explosion (Rail Transport)	Fireworks	42	--	--
1980	Mandi Asod	Plant Explosion	Explosions	50	--	--
1983	Dhulwari	Explosion	Gasoline	41	>100	--
	Dhurabari	Fire	Oil	70	>60	
1984	Bhopal	Leakage	Methyl Isocyanate	2800	50000	200000
1985	Tamilnadu	Transport	Gasoline	60	--	--
	Padaval	Fire Release	Gasoline	>43	82	--
	New Delhi	Release	Sulphuric Acid	1	340	>10
1988	Mumbai	Fire in Refinery	Oil	35	16	--
	Jhurkully	Leakage	Sulphur Dioxide	--	500	--
1989	Bhatinda	Leakage	Ammonia	--	500	--

Chemical disasters may occur due to process deviations concerning the chemistry of the process, pressure, temperature and other identified parameters with regard to the state of the

substance i.e., solid, liquid or gas, proximity to other toxic substances and the probability of a runaway reaction due to the incidental mixing of two or more HAZCHEMs 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 (BLEVE) may occur due to sparks, shocks or frictional forces on the chemicals during transportation.

Major Chemical Accidents in India (2002-2005)

Sr. No.	Name of the Unit	Date of Accident	Source
1.	2.	3.	4.
1.	M/s. GACL, Vadodara	05-09-2002	Chlorine Gas Explosion
2.	M/s. IPCL, Gandhar	20-12-2002	Chlorine Gas – Release
3.	M/s. IOC Refineries, Digboi, Assam	07-03-2003	Fire in Motor Spirit Tank
4.	M/s. Ranbaxy Laboratories Ltd., Mohali, Punjab	11-06-2003	Toluene
5.	M/s. BPCL Bottling Plant, Dhar	05-10-2003	LPG leak from Tank lorry
6.	M/s. Orient Paper Mills, Amla, Shahdol, MP	13-10-2003	Liquid Chlorine
7.	M/s. IDL Gulf Oil, Hyderabad	25-11-2003	Explosion
8.	M/s. Anil Enterprises, Rohtak	28-04-2004	Fire in LPG fired oven
9.	M/s. HIL Udyogmangal, Kerala	06-07-2004	Toluene Fire
10.	Shyamlal Industries, Ahmedbad	12-04-2004	Benzene Fire
11.	M/s. Chemplast, Mettore, Tamil Nadu	18-07-2004	Chlorine leak
12.	Chemical Factory, Dombivli	31-05-2004	Hexane release and fire

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Sr. No.	Name of the Unit	Date of Accident	Source
1.	2.	3.	4.
13.	Gujarat Refinery, Vadodara	29-10-2004	Explosion in slurry settler
14.	M/s. Ranbaxy Laboratories Ltd., Mohali, Punjab	30-10-2004	Fire in Dryer Room
15.	M/s. Kekule Pharma Ltd.,	23-11-2004	Explosion
16.	PWD Premises	1-12-2004	Chlorine Release
17.	M/s. Gujarat Refinery	15-06-2005	Fire
18.	M/s. Coromandal Fertilizer Ltd., Ennore	22-07-2005	Ammonia
19.	M/s. Shree Shyam Pulp & Board Mills Ltd., Kashipur, Uttarakhand	01-05-2006	Sodium Chlorate
20.	M/s. Kanoria Chemicals Ltd., Renukoor, Distt. Sonebhadra, UP	Nov., 2005	Chlorine

1.4. NATURAL CALAMITIES

The Indian subcontinent is highly prone to natural disasters, which can also trigger chemical disasters. Damage to phosphoric acid sludge containment during the Orissa super cyclone in 1999 and the release of acrylonitrile at Kandla Port during an earthquake in 2001 are some of the recent examples.

1.5. TERRORIST ATTACKS/SABOTAGE

Vulnerability to chemical disasters is further compounded by likely terrorist and warfare activities, which include sabotage and attack on HAZCHEM installations and transportation vehicles. This can occur at sources listed in Para 1.1 anywhere and at any time. Guidelines for the management of chemical warfare agents and chemical weapons of mass destruction will be issued separately.

1.6. ORGANIZATION OF PLAN

The present plan document identifies the roles and responsibilities of the organizations in key identified sectors. Taskforces have been constituted for taking response measures in specific sectors. Each task force consists of a lead organization/department supported by other organizations/ departments. Action plan has been prepared for each taskforce, which covers their roles and responsibilities in different phases of disaster.

The mode, degree and extent of response to fight out any Disaster depend upon the nature, degree and extent of Disaster, but some points are common to all kinds of situations. For example, first and foremost, appropriate and adequate steps for preventing the disaster should be undertaken. Secondly, preparedness is required to contain the damages and casualties resulting from the Disaster. Thirdly, steps for rehabilitation and restoration of community life within a reasonable time should be focused on.

Hence, some necessary and common steps are as below:

1. Establishment of Central Control Rooms and capacity enhancement of Emergency Operation Centers.
2. District Disaster Management Committee to meet post early warning or immediately post disaster occurrence.
3. A general line of action and some special duties to various officers and departments will have to be assigned, keeping in mind a timeline for finishing specific tasks.

4. Voluntary Organizations may have to be involved and their role will have to be clearly specified and coordinated.
5. Media may have to be briefed to suppress all kinds of rumors.
6. Information regarding resource inventory of Health Services, Transport Services, Evacuation & Rehabilitation Centers and Food etc. needs to be kept handy so that resources can be deployed where required.
7. Consistent follow-up of relief operations and constant reporting of pre and post disaster work.

To achieve the above objectives, different tasks have to be performed by Government Departments and other agencies before, during and after the Disaster. Each Department's role and responsibilities have to be clearly identified and an action plan needs to be drawn up by each department. For close cooperation between the various Department and Agencies, close coordination is required between the Collector at the District Headquarters and Prant Officers (SDM) at the Sub-division or Taluka level. The responsibility to manage any type of Disaster in the district rests with the District Disaster Management Committee headed by the Collector Gandhinagar, who may depending upon the gravity of the situation seek the help of State Disaster Management Committee and the National Disaster Management Committee. This tiered and hierarchical structure ensures that the best possible response is accorded to any disaster situation, depending upon the severity of damage.

1.6.1. DISASTER MANAGEMENT PLAN DOCUMENT

Disaster management plan document needs to include:

- a. Name and location of the industry
- b. Details of incident commander
- c. Details of members of DM committee
- d. Demographic and techno-social profile of industry
- e. Block-wise details of industrial units
- f. Details of shelters, open spaces, relocation of units with high/grave unmanageable risks from proximity to population
- g. Details of members of different task forces
- h. Details of toxic gases manufactured and their anti-dotes
- i. Emergency response procedures
- j. Location of hospitals including private ambulance services etc.

It is important to clearly define the roles and responsibilities in terms of emergency escape procedures and routes, procedures for employees who will perform or shut down critical operations before an evacuation, procedures to account for all employees, visitors and contractors after an evacuation is complete, rescue and medical duties for assigned employees; procedures for reporting emergencies, and names of persons or departments to be contacted for information regarding the plan. In addition, critical review is required to be followed by conduction of training and revised by table-top, mock exercise with management, every worker, frequent visitors, contractors, community responders, etc.

1.7. LEVELS OF DISASTER

For operational expediency, the level of Disasters have been categorized and classified as under:

L concept has been developed to define different levels of disasters in order to facilitate the responses and assistances to States and Districts.

L0 level denotes normal times which will be utilized for close monitoring, documentation, prevention and preparatory activities. Training on search and rescue, rehearsals, evaluation and inventory updation for response activities will be carried out during this time.

L1 level specifies disaster that can be managed at the District level. However, the State and center will remain in readiness to provide assistance if needed.

L2 level disaster situations are those which require assistance and active participation of the state, mobilization of its resources for management of disasters.

L3 level disaster situation is in case of large scale disaster where the State and District authorities have been overwhelmed and require assistance from the Central Government for reinstating the State and District machinery as well as for rescue, relief, other response and recovery measures. In most cases, the scale and intensity of the disaster as determined by the concerned technical agency like IMD are sufficient for the declaration of L3 disaster.

1.8. PLAN CONSIDERATIONS

This plan is prepared considering compact and to be easily understood by users, mitigation, prevention and preparedness aspects are addressed adequately.

Recognizing the fact that most tasks and actions before and following a disaster are common at the district level, the Gandhinagar district administration has used industrial disaster approach while developing disaster management plan for the district.

The present plan is not intended to provide comprehensive explanations and background information about a disaster or serve as a training manual on how to respond to a disaster or conduct a disaster related task. The approach taken is that plans and SOPs should be limited to the extent of sufficient information need to respond to a specific disaster or undertake a disaster related task. Steps to address disaster specific requirements can be covered in procedures related to actions. This approach does require that task forces develop disaster specific procedures where appropriate.

In other words, this plan is intended for use by persons who are technically competent in the tasks or responsibilities set out in the plan.

How we can improve our intelligence?

- Conduct of effective Program for specific industries to build **Awareness and Vigilance**.
- Communication to increase dialogue and consultation for fostering cooperation between.
 - Manufacturing Industries
 - Sales and Distribution Agencies
 - Government
 - Community
- Periodical revisit assessment studies, emergency plans, indicators, best practices.
- Conduct Mock Drills using scenarios of international attacks.
- Ready reckoner of key contacts, industrial associations, lessons learned during exercises.

1.9. AUTHORITY AND RESPONSIBILITIES

The requirement for district and subsidiary plans is set by the Gujarat State Disaster Management Authority (GSDMA) under the authority of the Gujarat State Disaster Management Act of 2003. The Act authorizes the collector to secure cooperation and assistance from other parties in efforts to avoid or reduce the impact of disasters.

The Collector (Specifically) and Government authorities (generally) are responsible for managing hazards and disasters that affect a district, with support from GSDMA, the Relief Commissioner and other public and private parties as may be needed. The roles, responsibilities and obligations of the Collector and other key parties are set out in detail in the Act and are considered as part of this plan.

1.10. PREPARATION AND REVISION OF THE PLAN

The District Collector is responsible for the preparation and revision of the District Disaster Management Plan in collaboration with the line departments and other organizations in the district.

The plan should be reviewed annually and updated:

- When significant changes occur in the nature of hazards
- Lessons learnt following any major disaster or
- When there is any significant change to the organization or responsibilities of primary members of the task forces defined in the plan.

1.11. LEGAL BACKUP

The main goal of NDMA and ministries in the Central Government is to promote the cooperation between the different sections of the government, stakeholders and the society for the promotion of Chemical Disaster-Resilient Society and the implementation of CDM action plan. Guidelines have been formulated through an inclusive and participatory process in which wide consultations were held with all important stakeholders like representatives of major MAH Units, hospitals, professional bodies, federations of industrial bodies and medicos/paramedics/scientists/technocrats/bureaucrats from central ministries, Departments and concerned states.

Constituents of National CDM Plan

National CDM Plan shall include:

- (i) Measures to be taken for prevention of Chemical disasters (leading to zero tolerance), or mitigation of their effects (leading to avoidable morbidity and mortality)
- (ii) Measures to be taken for integration of mitigation procedures in the development plans
- (iii) Measures to be taken for preparedness and capacity building to effectively respond to any threatening Chemical (Industrial) disaster situations or disasters.
- (iv) Roles and responsibilities of different Ministries or Departments of the Government of India, Industry, Community and NGOs in respect of measures specified in the clauses.

Disaster management plans prepared by the nodal ministry (MoEF), Central ministries/departments concerned and the states will finally be approved by NDMA and respective SDMA as specified in Section 23, Sub-section 3, of DM Act, 2005, respectively.

Preparation of Disaster Management Plan is one of the mandatory provisions under The Gujarat State Disaster Management Act-2003 and The National Disaster Management Act-2005. In respect to above, National Disaster Management Authority has issued guidelines for preparation of State Disaster Management Plan.

- I. As per the GUJARAT STATE DISASTER MANAGEMENT ACT, 2003 under CLAUSE 15. Sub section (1), (2) & (3) Of CHAPTER VI FUNCTIONS OF THE AUTHORITY, the authority shall develop or cause to be developed guidelines for the preparation of disaster management plans and strategies.
- II. Under the provision of the DISASTER MANAGEMENT ACT, 2005
 - a. Section 18 subsection (1), (2) & (3) subject to provisions of this Act, a State Authority shall have the responsibility for laying down policies and plans for disaster management in the State.

The DMC will follow the techno-legal regime set up by the SDMA and other government Acts and Policies. It shall periodically review the extent of compliance to some of the key regulative provisions.

Trigger mechanism for putting the plan into action

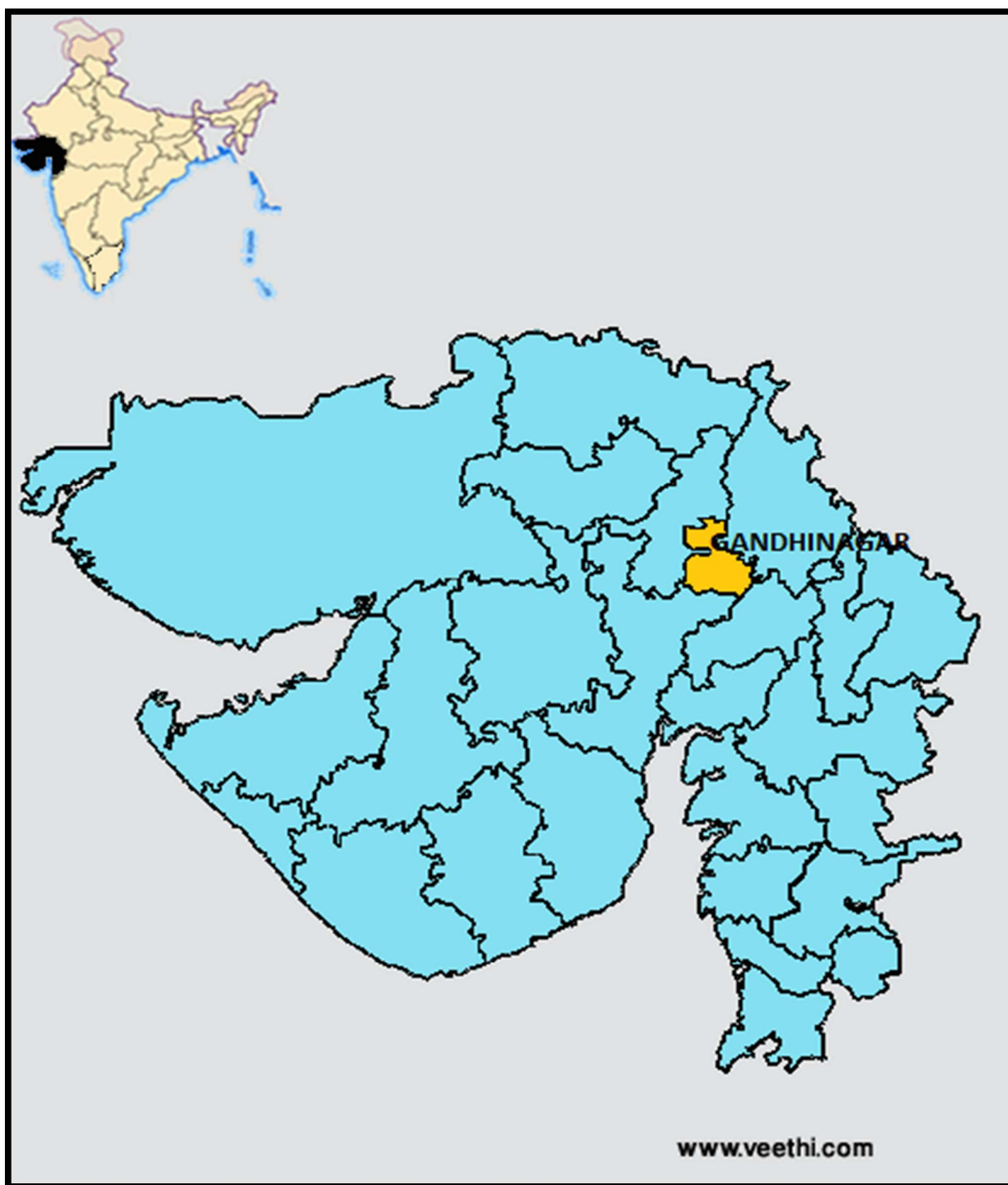
Chapter XIII, Section 32 of Gujarat Disaster Management Act 2003 clearly defines the process of declaring an area as disaster affected or disaster prone, which acts a trigger mechanism for putting relevant DM plan into action. These provisions are where there is threat of an impending disaster or where a disaster has occurred-

- (a) In an area spread over more than one district; the Commissioner, and
- (b) In an area restricted to a district, the Collector –may immediately make a report to that effect to the State Government.

If the State Government is of the opinion that there is a threat of an impending disaster or that a disaster has occurred in an area of the State and that it is expedient, for the purposes of preventing such disaster or of coping with its effects, it may, by notification published in the Official Gazette and in any one or more newspapers having widest circulation in the area, declare such area to be disaster prone area or disaster affected area. The respective

authorities (including State authority, Commissioner, Collector, Departments and other agencies) shall perform the duties of Disaster Management in accordance to the act until the time period of declaration. This period can be extended, if required by the competent authority. The Authority, the Commissioner, the Collector and all other agencies, shall cease to perform their functions in the affected area, on the expiry of the period.

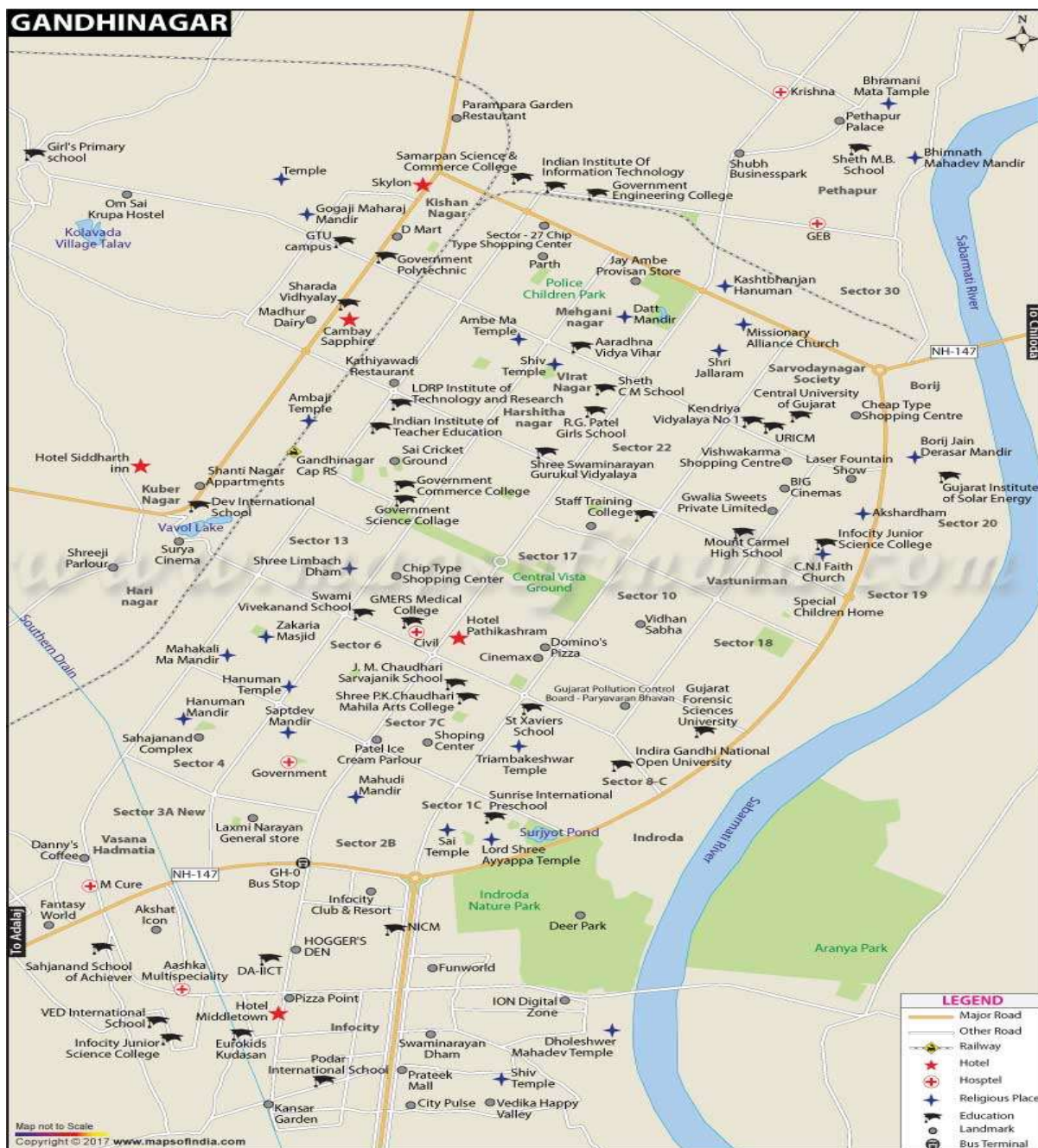
2.0. GANDHINAGAR DISTRICT PROFILE



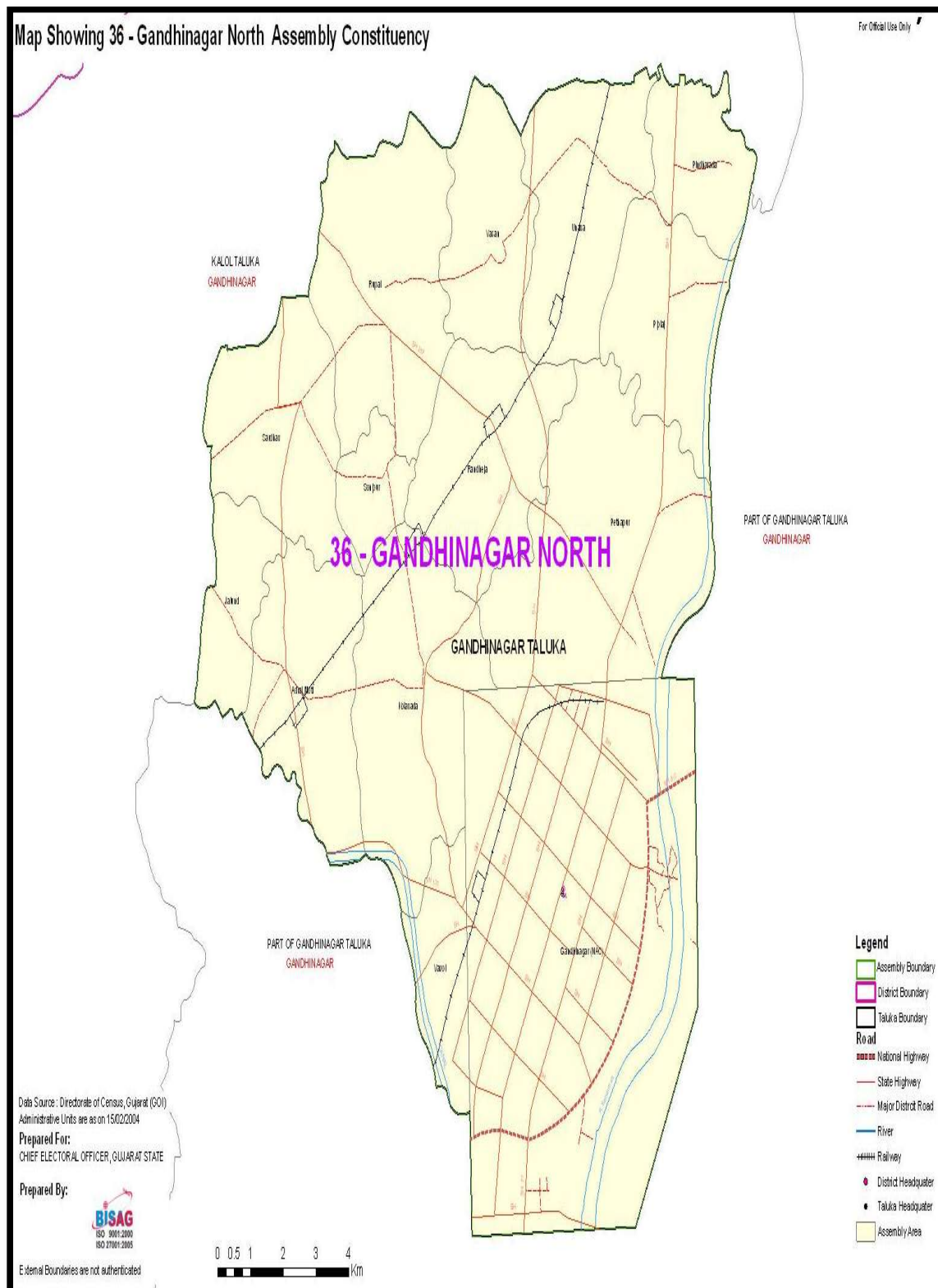
Gandhinagar district (Gujarati: ગાંધીનગર જિલ્લો) is one of the 33 administrative districts of the state of Gujarat in western India. Gandhinagar district is an administrative division of Gujarat, India, whose headquarters are at Gandhinagar, the state capital. It was organized in 1964. It has an area of 2140 km² and a population of 1,391,753 of which 35.02% were urban (as per 2011). The district includes Gandhinagar with three Suburbs – Motera, Adalaj. The four tehsils are – Gandhinagar, Kalol INA, Dahegam and Mansa and 294 villages.

2.1. GANDHINAGAR DISTRICT MAP

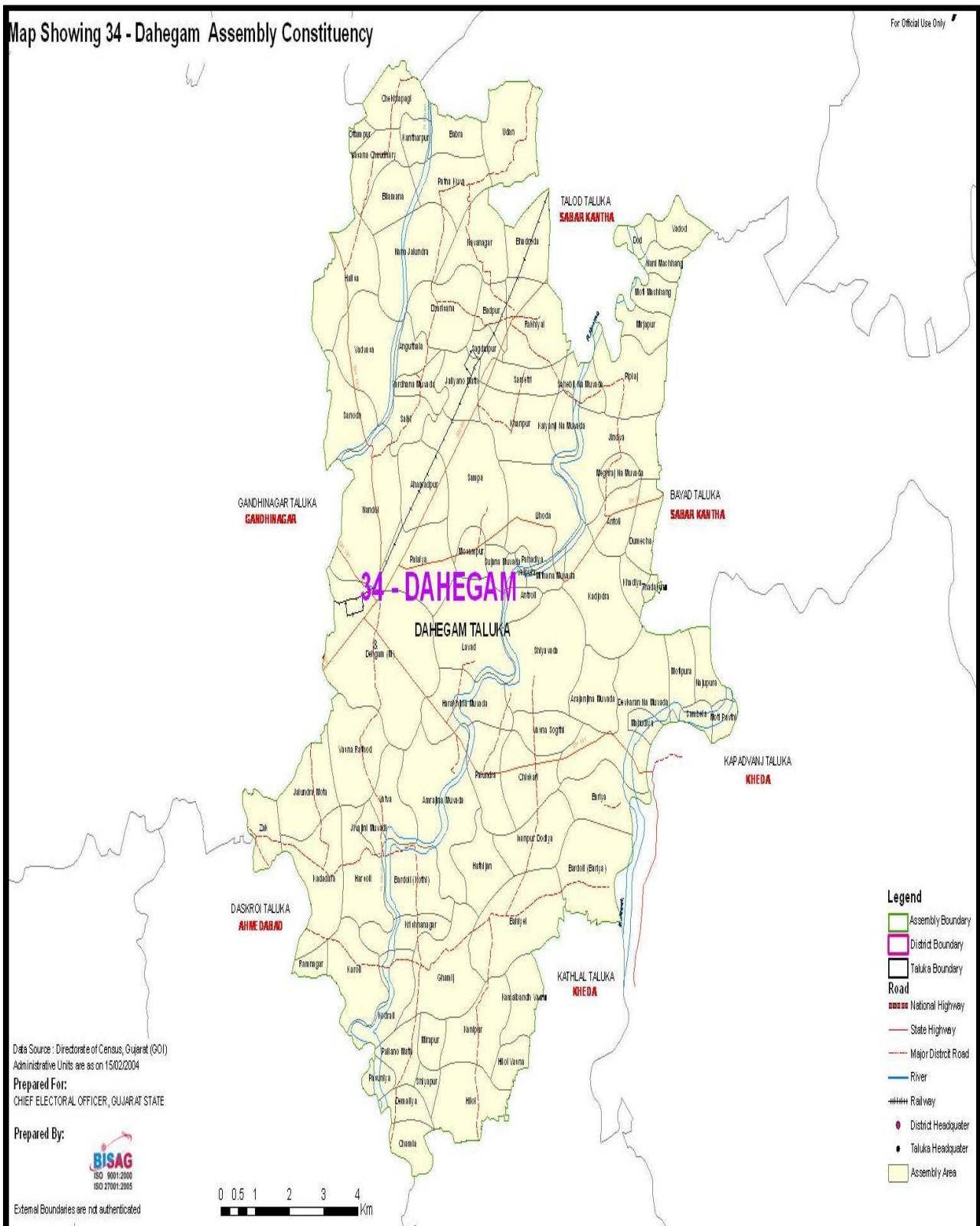
(National Highways, Major Roads, and Railways of Gandhinagar Taluka)

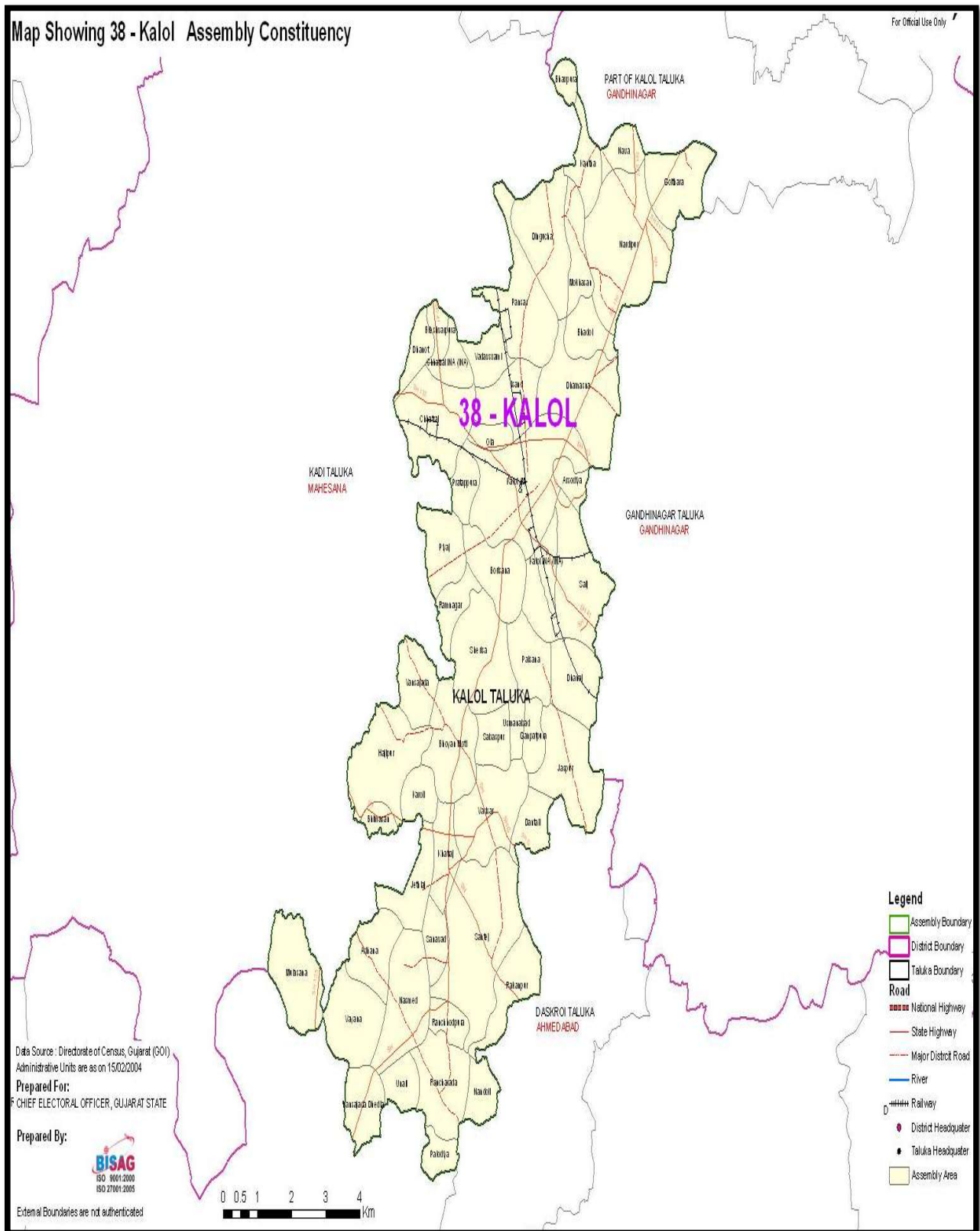


GANDHINAGAR District Map highlights the National Highways, Major Roads, District Headquarter, etc.



District Crisis Group Plan for Gandhinagar District 2026





Map Showing 37-Mansa Assembly Constituency



➤ ROAD

- National Highway 147 passes through the district connecting it to Gandhinagar and Ahmedabad (44 km) Districts.
- Gandhinagar is also connected to Ahmedabad (28 km), Vadodara (141 km), Nadiad (80 km), Kheda (68 km), Anand (116 km), Ankleshwar (222 km), Mahesana (65 km), Himmatnagar (65 km), Modasa(98 km), Surendranagar(150 km).
- A Four-Lane Expressway connected the Gujarat State Highway to National Highway 48.

RAIL

- Gandhinagar Capital is located in Sector 14. Many trains running on the western zones pass through Gandhinagar. Currently there are five trains running from this station in which three are express trains and two are MEMU trains.

AIR

- Nearest Airport is in Ahmedabad which is about 18 km far away from Gandhinagar district.

PORT

- There is no port in Gandhinagar district and nearby.

2.2. ORIGIN OF THE NAME

Gandhinagar got its name from the Father of the Nation, Mahatma Gandhi. Gandhinagar is the capital city of Gujarat and is an important city in Gujarat in India. History of Gandhinagar states that the city was established around 1960. The city got an identity of its own when the state of Mumbai was divided into two separate states of Gujarat and Maharashtra. Mumbai since then became a part of Maharashtra and Gandhinagar became a part of Gujarat as a state. Gandhinagar emerged as the new capital for the state of Gujarat as the situation demanded for a new capital city.

2.3. HISTORY

The city Gandhinagar was planned by Chief Architect H. K. Mewada, educated at Cornell University and his assistant Prakash M. Apte. On 1st May 1960, Gujarat was created out of the 17 northern districts of former State of Bombay. These districts were further subdivided later on. There are 33 administrative districts in the state. Gandhinagar is a politics hub for the state of Gujarat. Congress won the municipality election in 2011. Mahendrasinh Rana became the first mayor of the city.

2.4. ECONOMY

The capital of the state of Gujarat, Gandhinagar is famous for its hospitality and tourism. With the industrialization and commercial growth, Gandhinagar is rapidly emerging as the fastest growing city after Ahmadabad and Surat. The Garima Park campus set up by Tata Consultancy Service (TCS) has boosted the growth of IT/ITeS industry in the city. The proposed Ahmadabad-Gandhinagar Metro rail corridor project Phase 1 is likely to be completed in July 2020 and Phase 2 is expected to be completed in March 2026 and several other important infrastructure projects are expected to escalate the industrial and commercial growth of Gandhinagar making it the most preferred IT destination in the country.

Economical Development

Economy of the Gandhinagar district depends on services in the public sector, Electrical and Electronics, Textiles, Ceramics, Food Processing, and Office Stationery. Agriculture is also an imperative backbone of the economy of Gandhinagar District. The city is known for its small and medium scale industries. There are approximately eight thousand small scale industries (SSIs) in Gandhinagar, which provide employment to nearly 40,000 people.

Textiles, Wood products, Mineral based industries and Engineering are the major small scale industry sectors of Gandhinagar district. New sectors, such as agricultural machinery, industrial, instruments, leather and leather goods and infrastructure projects have witnessed good investments in recent years. Office stationery and household goods have also witnessed a major surge in investments. The Food Processing industry of the district is well developed because of the nearness to agricultural districts such as Ahmedabad, Mehsana, Sabarkantha, Kheda, Anand etc.

Infrastructure development is another sector that has opened up new opportunities for investment and employment in Gandhinagar. With the recent rush in investments in the IT/ ITeS sector, Gandhinagar district is more and more shaping into an attractive destination for IT/ ITeS companies. The state government has rolled out several initiatives to create pro industry environment in Gandhinagar. The proposed Ahmadabad-Gandhinagar Metro rail corridor project Phase 1 is likely to be completed in July 2020 and Phase 2 is expected to be completed in March 2026 and several other important infrastructure projects are expected to escalate the industrial and commercial growth of Gandhinagar making it the most preferred IT destination in the country.

2.5. METEOROLOGICAL DATA

CLIMATE

Gandhinagar has a tropical wet and dry climate with three main seasons: Summer, monsoon and winter. The climate is generally dry and hot outside of the monsoon season. The weather is hot to severely hot from March to June when the maximum temperature stays in the range of 36 to 42 °C and the minimum in the range of 19 to 27 °C. It is pleasant in the winter days and quite chilling in the night during December to February. The average maximum temperature is around 29 °C, the average minimum is 14 °C and the climate is extremely dry. The average annual rainfall is around 803.4 mm (31.63 in).

2.6. GEOGRAPHY

The Geographical data is Latitude 23.1 to 23.56 Eastern and Longitude 72.33 to 72.83 Northern. Gandhinagar has an average elevation of 81 meters. The city sits on the banks of the Sabarmati River, in north-central-east Gujarat. The 20543 km² area around Gandhinagar is defined by Gujarat capital territory. It spans an area of 205 km². The river frequently dries up in the summer, leaving only a small stream of water. Gandhinagar is India's tree capital with 54% green cover on its land area.

2.7. INDUSTRIAL PROFILE

Textile goods, Urea, Ammonia, Rolled MS Sheets, Milk Products, Fertilisers & Pesticides, Auto gears & accessories, TMT Bars and Ceramic products are major exportable items manufactured by the Large and Medium Scale enterprises in the Gandhinagar District. New sectors like industrial instruments, agricultural machinery, leather goods and infrastructure projects witnessed new investment worth Rs. 121 Crore during 1998-2007. Investment in food processing industry is increased from Rs. 245 Crore to Rs. 314 Crore during 1998-07 period. Office stationery and household goods witnessed a major surge in investments

during 1998-07 period. Miscellaneous machinery, engineering and ceramics industries are other emerging sectors in the district.

The Government of Gujarat has been playing a very active role in promoting the State as a potential investment destination through a series of Vibrant Gujarat Global Investor's Summits (VGGIS) organized every two year period. IT\ITeS, Biotechnology, Tourism, Textiles, Agro, Electronics, Engineering and auto industries have attracted maximum investment in the district during the last decade. There are nearly 8,000 small scale industries in Gandhinagar providing employment to over 40,000 persons. Textiles, Wood products Mineral based industries and Engineering industries are the major small scale sectors in the district. Textile sector has attracted an investment up to the tune of Rs.1456 Crore highest among the investments in all the sectors in the district.

There are major industries in the district:

Indian Farmers Fertilisers Coop. Ltd. (IFFCO), Chemplast Industries, HPCL Bottling plant, Mahalaxmi Industries, Mutual Chemicals, Sahajanand Chem Industries, Saibaba Surfactants Pvt. Ltd., Sanginita Chemical, Shree Vallabh Chemical.

➤ INDUSTRIES LIST WITH CATEGORY

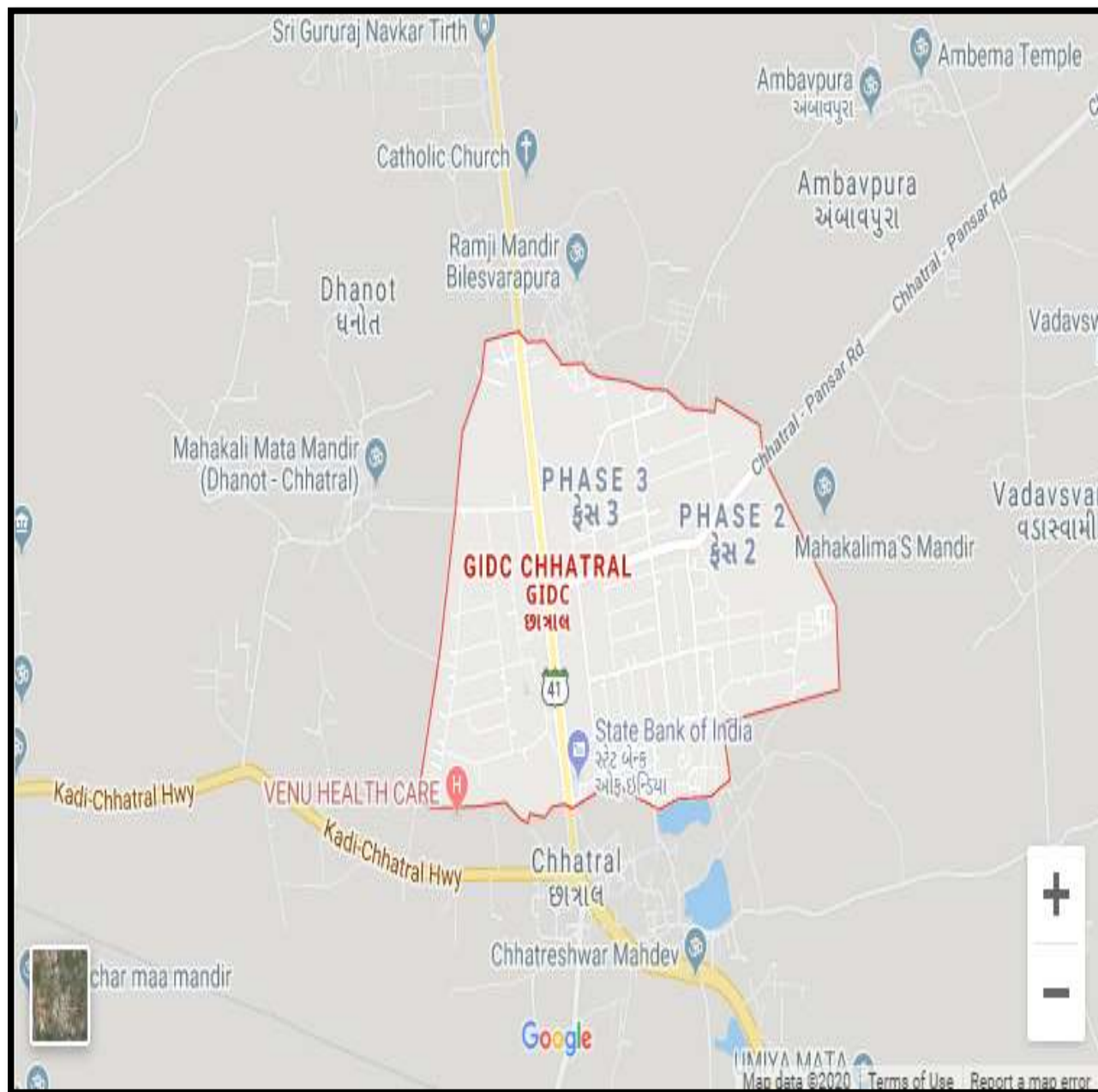
Sr. No.	Numbers of Factories	Name of Chemicals	Remarks
CATEGORY-A			
1.	138	Ammonia, Chlorine	
CATEGORY-B			
2.	32	Methanol, EO, HCL, Sulphuric Acid etc.	
CATEGORY-C			
3.	18	Other Chemicals	

Chemical and Industrial Hazard

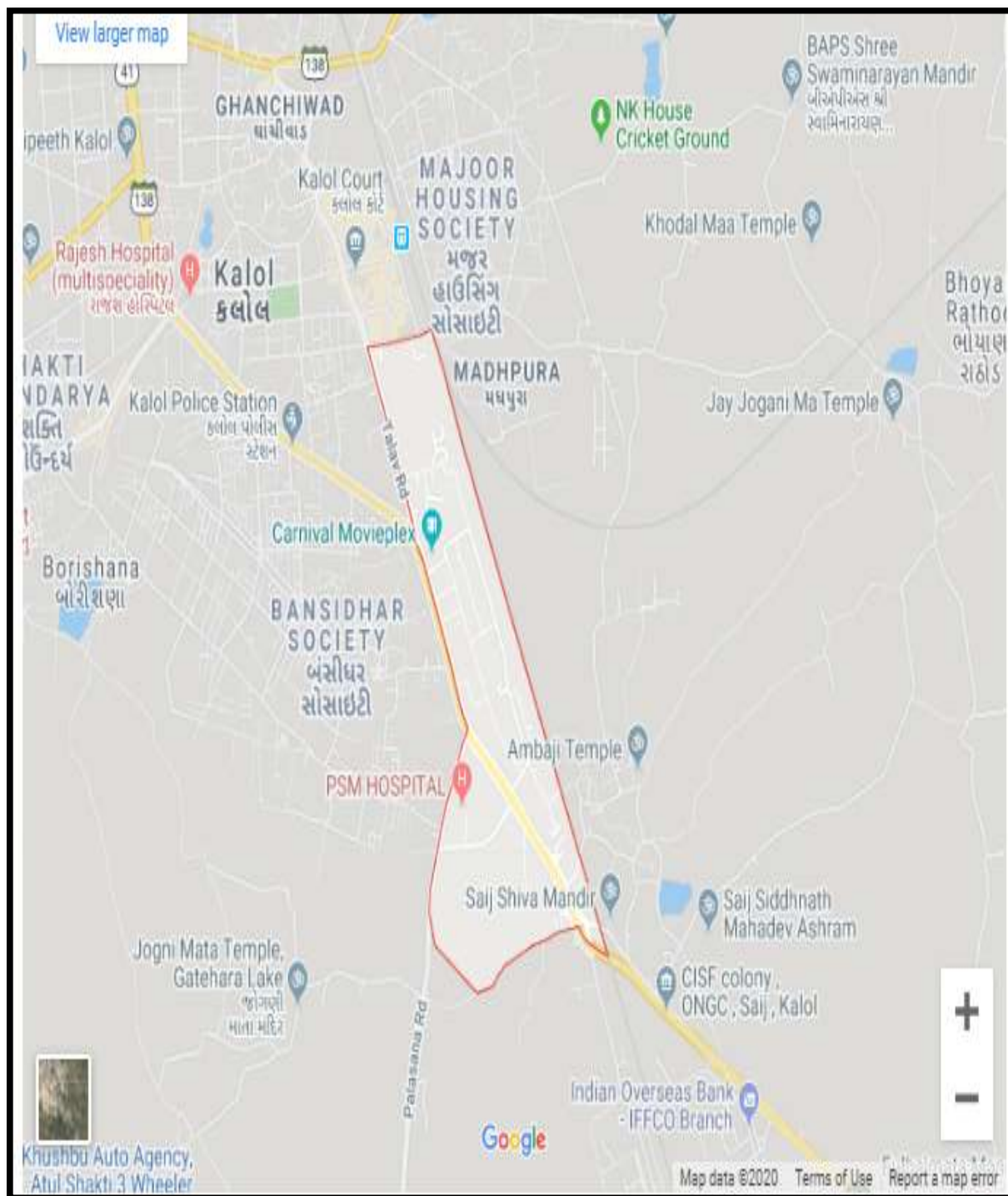
Sr. No.	Category	Districts
1.	2.	3.
1.	AA Category (Highly Hazardous)	Bharuch and Vadodara
2.	A Category (Hazardous)	Ahmedabad, Gandhinagar , Jamnagar, Kachch, Rajkot, Surat and Valsad
3.	B Category (Less Hazardous)	Anand, Bhavnagar, Gandhinagar , Kheda, Mehsana, Panchmahals and Porbandar
4.	C Category (Much less Hazardous)	Amreli, Banaskantha, Dahod, Dang, Junagadh, Narmada, Navsari, Patan, Sabarkantha and Surendranagar

➤ G.I.D.C ESTATES IN GANDHINAGAR DISTRICT

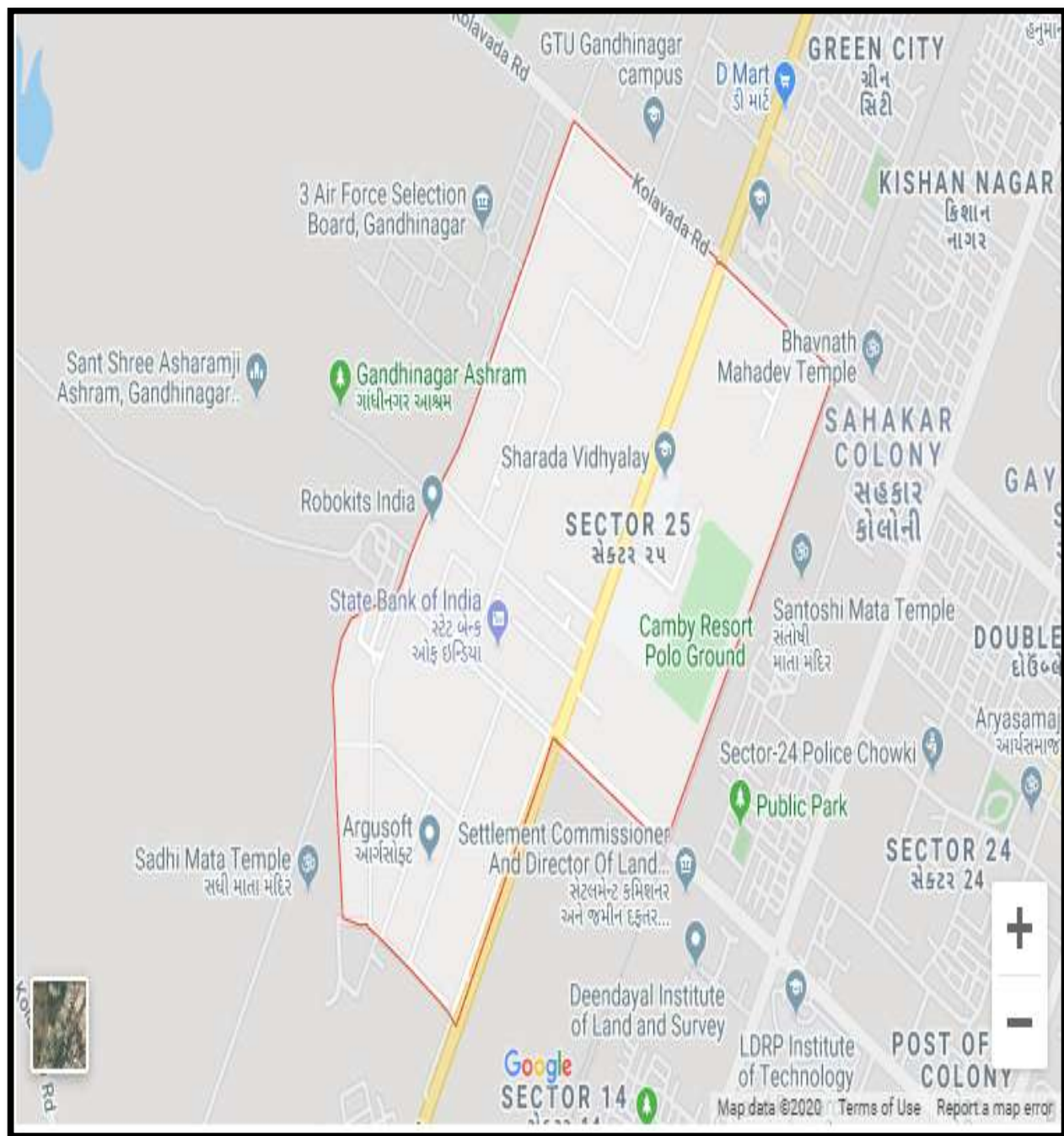
1. G.I.D.C Estate, Chhatral, Kalol



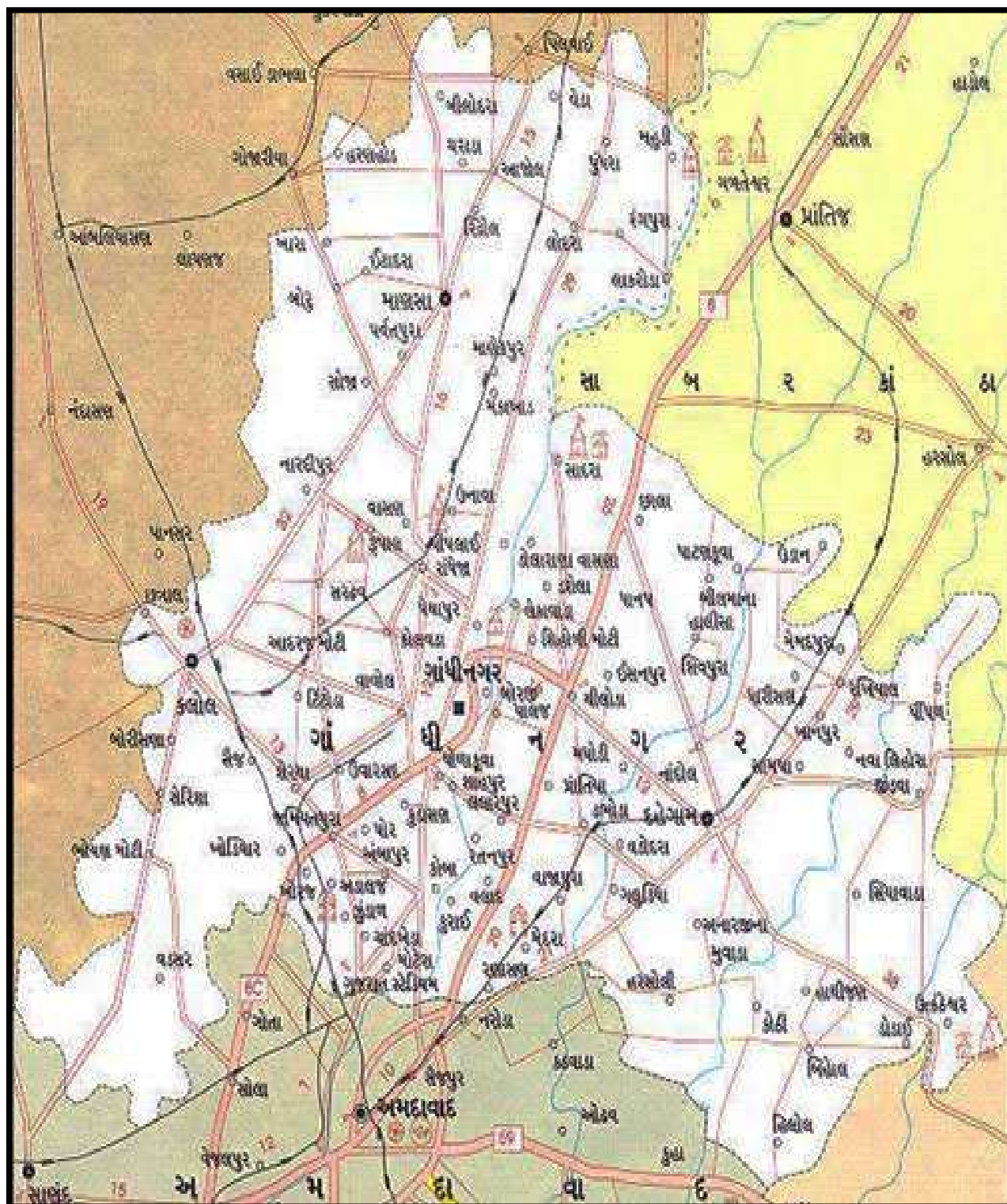
2. G.I.D.C. Estate Bhat, Gandhinagar



3. G.I.D.C. Electronic Estate, Sector – 26



2.8. GANDHINAGAR DISTRICTS MAP AND DETAILS.



➤ MAP SHOWING GANDHINAGAR DISTRICTS DETAILS

GANDHINAGAR FACTS FILE	
Country	India
State	Gujarat
Head town	Gandhinagar
Area	2140 square kilometers
Latitude	23.56 to 23.01 N
Longitude	73.33 to 72.33 E
Average Rainfall	803.4 mm (1987 - 2017)
Density of Population	650 people per square kilometer
Literacy Rate	84.16%
Total Male Population	723864
Total Female Population	667889
STD Code	02712
No. of towns	7
No. of Talukas	4
No. of Villages	294
Boundaries of Gandhinagar District	North: Sabarkantha
	South: Ahmedabad
	East: Aravali
	West: Mehsana

➤ THE DISTRICT COMPRISES 4 TALUKAS

SR.NO.	TALUKAS	VILLAGES	POPULATION
1.	2.	3.	4.
1.	Gandhinagar	80	560497
2.	Kalol	67	356127
3.	Dehgam	96	268562
4.	Mansa	51	206567

(As per Census 2011 data) **1,391,000** Total Population.

2.9. DEMOGRAPHICS

As of 2011, India census, Gandhinagar had a population of 1,391,000. Males constitute 53% of the population and females 47%. Gandhinagar has an average literacy rate of 84.16%. Male literacy is 95.18%, and female literacy is 86.52%. In Gandhinagar, 11% of the population is under 6 years of age. Over 95% of the population of Gandhinagar are **Hindus**.

2.10. CULTURE

Gandhinagar a representative of ancient Gujarati culture and legacy is expert at some of the most important Gujarati arts and crafts including wood carvings. These wood carvings can be spotted abundantly in the numerous ornately carved temples, mansions and palaces of Gandhinagar. Not only that, the masterly craft of the artisans of Gandhinagar is also evident in the small objects used for daily routines as well as the ritualistic objects and utensils. All the native tribes of Gandhinagar are expert at terracotta work and making unique ethnic jewellery.

2.11. GANDHINAGAR DISTRICT: CENSUS 2011 DATA.

An official Census 2011 detail of Gandhinagar, a district of Gujarat has been released by Directorate of Census Operations in Gujarat. Enumeration of key persons was also done by census officials in Gandhinagar District of Gujarat.

In 2011, Gandhinagar had population of 1,391,753 of which male and female were 723,864 and 667,889 respectively. In 2001 census, Gandhinagar had a population of 1,334,455 of which males were 697,999 and remaining 636,456 were females. Gandhinagar District population constituted 2.30 percent of total Maharashtra population. In 2001 census, this figure for Gandhinagar District was at 2.63 percent of Maharashtra population.

There was change of 4.29 percent in the population compared to population as per 2001. In the previous census of India 2001, Gandhinagar District recorded increase of 21.73 percent to its population compared to 1991.

District Crisis Group Plan for Gandhinagar District 2026

➤ GANDHINAGAR DATA

Description	2011	2001
Actual Population	1,391,753	1,334,455
Male	723,864	697,999
Female	667,889	636,456
Population Growth	4.29%	21.73%
Area Sq. Km	2140	2140
Density/km ²	650	617
Proportion to Gujarat Population	2.30%	2.63%
Sex Ratio (Per 1000)	923	912
Child Sex Ratio (0-6 Age)	847	813
Average Literacy	84.16	76.59
Male Literacy	92.01	87.74
Female Literacy	75.76	64.58
Total Child Population (0-6 Age)	167,337	185,696
Male Population (0-6 Age)	90,604	102,406
Female Population (0-6 Age)	76,773	83,290
Literates	1,030,494	879,834
Male Literates	582,686	522,575
Female Literates	447,808	357,259
Child Proportion (0-6 Age)	12.03%	13.92%
Boys Proportion (0-6 Age)	12.52%	14.67%
Girls Proportion (0-6 Age)	11.49%	13.09%

➤ GANDHINAGAR DISTRICT URBAN/RURAL 2011

Out of the total Gandhinagar population for 2011 census, 43.16 percent lives in urban regions of district. In total 600,627 people lives in urban areas of which males are 315,428 and females are 285,199. Sex Ratio in urban region of Gandhinagar district is 904 as per 2011 census data. Similarly child sex ratio in Gandhinagar district was 831 in 2011 census. Child population (0-6) in urban region was 67,614 of which males and females were 36,923 and 30,691. This child population figure of Gandhinagar district is 11.71 % of total urban population. Average literacy rate in Gandhinagar district as per census 2011 is 87.53 % of which males and females are 93.13 % and 81.39 % literates respectively. In actual number 466,521 people are literate in urban region of which males and females are 259,381 and 207,140 respectively.

As per 2011 census, 56.84 % population of Gandhinagar districts lives in rural areas of villages. The total Gandhinagar district population living in rural areas is 791,126 of which males and females are 408,436 and 382,690 respectively. In rural areas of Gandhinagar district, sex ratio is 937 females per 1000 males. If child sex ratio data of Gandhinagar district is considered, figure is 858 girls per 1000 boys. Child population in the age 0-6 is 99,763 in rural areas of which males were 53,681 and females were 46,082. The child population comprises 13.14 % of total rural population of Gandhinagar district. Literacy rate in rural areas of Gandhinagar district is 81.57 % as per census data 2011. Gender wise, male and female literacy stood at 91.13 and 71.50 percent respectively. In total, 563,973 people were literate of which males and females were 323,305 and 240,668 respectively.

All details regarding Gandhinagar District have been processed by us after receiving from Govt. of India. We are not responsible for errors to population census details of Gandhinagar District.

2.12. HEALTH FACILITIES

District Health Department is managed by Chief District Health Officer, District Panchayat.

Health Branch Schemes

1. School Health Programme
2. Chiranjeevi Yojana
3. Bal Sakha Scheme
4. Mamta Taruni Abhiyan
5. Rashtriya Swasthya Bima Yojana
6. MA Yojana
7. Janani Suraksha Yojana
8. Janani Shishu Suraksha Karyakaram (JSSK)

2.13. RISK AND VULNERABILITY ANALYSIS-DISTRICT LEVEL

❖ EARTHQUAKE

Year	Very dangerous incident	Number of Vulnerable villages	Number of dead person	Number of dead animal	Property sabotaged	Financial loss (In lakh)
1.	2.	3.	4.	5.	6.	7.
2019 to 2024	0	0	0	0	0	0

❖ FLOOD

Year	Migration of people	Number of dead person	Number of dead animal	Number of Sabotage property
1.	2.	3.	4.	5.
2014	0	0	0	12
2015	387	--	--	327
2016	--	--	--	--
2017	2400	--	--	696
2018	--	--	--	--
2019 to 2024	--	--	--	--

Vulnerable Villages due to flood in Gandhinagar District are Isanpur mota, Magodi, Dabhoda, Vadodara, Galundan, Basan, Vankanerda, Sonarda, Raypur, Lodra, Shahpur.

❖ CYCLONE

Year	Migration of people	Number of dead person	Number of dead animal	Number of Sabotage property
1.	2.	3.	4.	5.
2014	--	--	--	--
2015	--	--	--	--
2016	--	--	--	--
2017	--	--	--	--
2018	--	--	--	--
2019 to 2024	--	--	--	--

3.0 ORGANISATION STRUCTURE AND ROLES AND RESPONSIBILITIES

3.1 ROLES & RESPONSIBILITY OF SOME OF THE FIRST RESPONDERS DURING CHEMICAL EMERGENCY

Functions of the District Crisis Group: -

- 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;
- Without prejudice to the functions specified under subtitle, the District Crisis Group shall,
 - Assist in the preparation of the district off-site emergency plan
 - Review all the on-site emergency plans prepared by the occupier of Major Accident Hazards installation for the district off-site emergency plan
 - Assist the district administration in the management of chemical accidents at a site lying within the district
 - Continuously monitor every chemical accident
 - Ensure continuous information flow from the district to the Central and State Crisis Groups regarding accident situation and mitigation efforts
 - Forward a report of the chemical accident within fifteen days to the State Crisis Group.

Function of the Local Crisis Group: -

- The Local Crisis Group shall be the body in the industrial pocket to deal with chemical accidents and coordinate efforts in planning, preparedness and mitigation of a chemical accident,
- Without prejudice to the functions specified under sub-rule (1), the Local Crisis Group shall,
 - Prepare local emergency plan for the industrial pocket
 - Ensure dovetailing of the local emergency plan with the district off-site emergency plan
 - Train personnel involved in chemical accident management
 - Educate the population likely to be affected in a chemical accident about the remedies and existing preparedness in the area
 - 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
 - Respond to all public inquiries on the subject

COMPOSITION OF THE STATE CRISIS GROUP

[SCHEDULE 6 (Rule 6(2))]

SR. NO.	AUTHORITY	POSITION
1.	2.	3.
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.	Chair State Pollution Control Board/ Pollution Control Committee in case of Union Territories	Member
8.	4-Experts (Industrial Safety and Health) to be nominated by the State Government	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

COMPOSITION OF THE DISTRICT CRISIS GROUP**[SCHEDULE 7 (Rule 8)]**

SR. NO.	AUTHORITY	POSITION
1.	2.	3.
1.	District Collector	Chair Person
2.	Inspector of Factories	Member-Secretary
3.	District Emergency Officer	Member
4.	Chief Fire Officer	Member
5.	District Information Officer	Member
6.	Controller of Explosives	Member
7.	One Representative from the Industry to be nominated by the District Collector	Member
8.	Superintendent of Police	Member
9.	District Health Officer/Chief Medical Officer	Member
10.	Commissioner, Municipal Corporations	Member
11.	Representative of the Department of Public Health Engineering	Member
12.	Representative of Pollution Control Board	Member
13.	District Agriculture Officer	Member
14.	4 Experts (Industrial Safety and Health) to be nominated by the District Collector	Member
15.	Commissioner (Transport)	Member
16.	Chair-person/ Member-Secretary of Local Crisis Group	Member

COMPOSITION OF THE LOCAL CRISIS GROUP
[SCHEDULE (Rule 8)]

SR. NO.	AUTHORITY	POSITION
1.	2.	3.
1.	Sub-divisional Magistrate/District Emergency Authority	Chairperson
2.	Inspector of Factories	Member-Secretary
3.	Industries in the District/Industrial area/industrial pocket	Member
4.	Transporters of Hazardous Chemicals (2 Numbers)	Member
5.	Fire officer	Member
6.	Station House Officer (Police)	Member
7.	Block Development Officer	Member
8.	One Representative or 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 Representative of Non-Government Origination 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

1. POLICE

- Control and divert the traffic near the affected areas.
- Ensure law and order at the incident site during chemical emergency/disaster and at evacuation centres too.
- Provide security in evacuated areas
- As per GSDM Act 2003, Give warning, carry out S & R operation and carry out relief & rehabilitation operation too.
- The DG will issue an alert to the DIG and the surrounding districts. He will direct all the police officials and forces in adjacent Districts to be deployed if necessary. The DG will ensure that the police forces required for traffic management, evacuation and law and order are available with the District administration.
- The DIG will review the dissemination of warning and the need for evacuation. He will help the Fire & Emergency Services and the Deputy Director, Industrial Safety and Health with Police Wireless sets, so that there is continuous communication among the first responders in the emergency situation.
- The DIG will ensure that the police force will not enter the area under disaster without the permission of the Fire & Emergency Services and Health officials.
- In case of big explosion and fire, the DIG will assess the situation and suggest a Plan of Action based on his assessment of the immediate causation.
- The DIG will order deployment of the police force for evacuation of the people from the zone of the danger.
- The DIG will send instructions for the cordoning off of the area. People should not be allowed access anywhere close to the site of the disaster.
- The DIG will review the traffic management in the area. The primary aim would be to ensure the transport of the injured to the hospital, easy access for emergency responders and safe evacuation of the people from the danger zone.
- The DIG will also issue directives that all the Private and Public Transport (trains and buses) be diverted from the disaster area.

District Crisis Group Plan for Gandhinagar District 2026

- The DIG will contact the DGP and ask him to organize the deployment of police force from other Districts, based on the need assessment.

GANDHINAGAR DISTRICT POLICE

OFFICER NAME	POST	PHONE NO.	MOBILE NO.
1.	2.	3.	4.
Shri Ravi Teja Vasamsetty	IPS, S.P.	23210901	9978405070
Shri H.S pathan	ASP Gandhinagar	-	8840044368
Shri P.D. Manavar	SDPO Kalol	9978408589	9825210420
Shri R.I .Desai	DySP HQ	9426309758	9978406063
Shri B.A Chudasma	DySP Salamati Shakha	-	9904172895
Shri D.T Gohil	DySP GAN. division	-	9998110624
Shri Aayush Jain	IPS, ASP	-	9694029665
Shri p.d manvar	DySP Kalol division	-	9825210420
Shri S.M. chodhri	DySP S.C.S.T.L	-	8000006836
Shree B.N Chavda	P.I Control Room	-	9979538786
Shri R.R damor	P. I. LIB	9225998987	9979859243
Shri d.b vala	P. I. LCB	6359629134	9898431111
Shri P. B. Chauhan	P. I. Traffic	6359626245	95745 33101
Shri v.d .vala	P. I. SOG	6359629141	9825448798
Shri L P Desai	P. I. Lady	6359626248	9727766024, 6359629129
Shri P.R.Chaudhari	P. I. Sector 21	6359624903	79906 93567, 6359624903
Shri B.B. Goyal	P. I. Sector 7	6359624912	9909946709, 6359624914
Shri V.R.Kher	P. I. Infocity	6359624922	6359624921
Shri. M. N. Desai	P. I. Pethapur	6359624939	6359629126, 9974949232
Shri R.R.Parmar	P. I. Chiloda	6359624924	9426852623
Shri J. D. Khambhl	P. I. Dabhoda	6359624929	6359624928

District Crisis Group Plan for Gandhinagar District 2026

OFFICER NAME	POST	PHONE NO.	MOBILE NO.
1.	2.	3.	4.
Shri V. B. Desai	P. I. Dahegam	6359624932	6359624930, 9099042772
Shri. H.G. Desai	P. I. Kalol City	6359624956	9879546263, 6359624960
Shri U.S. Patel	P. I. Kalol Taluka	6359624967	9426701746, 6359624966
Shri S.R. Muchhal	P. I. Santej	6359624971	9016390948
Shri P.J. Chudasama	P. I. Mansa	6359624954	6359624953, 91044 46869
Shri K.B. Sankhla Shri P.N.Dhandhliya	P. I. Adalaj(1) P. I. Adalaj(2)	6359624942	7046209396, 7433881929
Shri D.H.Nandaniya	I/C PI, wireless	-	9825291845
Shri J.D Patel	P.S.I M.T Shakha	-	9409674714
Shri D.J.Jadeja	P.S.I Mounted	-	9879367791
Shri N.M sisodiya	P.S.I Reader Shakha	23210107	9586374555
Shri R.D Parmar	I/C Superintendent of office, GAN.	-	9824254192
Shri Adaivyat Gandhi	I/C DY.Supretendent of office, sachivalay sankul	-	9925183939

(As

per

website:<https://spgandhinagar.gujarat.gov.in/spgandhinagar/CMS.aspx?orgchart=true>)

2. FIRE AND SEARCH & RESCUE

- Reach at the site soonest possible and assess the situation. (information about the chemical leak/spill, the action taken and current status)
- In case of fire, start firefighting with suitable media and also take care of surrounding storages/tanks to be over heated so that reduce the chances of ‘domino effect’.
- In case of chemical leak, try to plugging/stopping of leak with the use of proper PPE. DISH will coordinate redeployment of GIDC Fire Tenders from other places, as required.
- Search and identify the risk and nullify the sources of leak / toxic release. If any unclear or unidentified substance or source is identified or detected, the team should send them immediately to the laboratory for further investigation / analysis.
- To search and evacuate the affected population from the site of the incident.

GANDHINAGAR DISTRICT FIRE BRIGADE

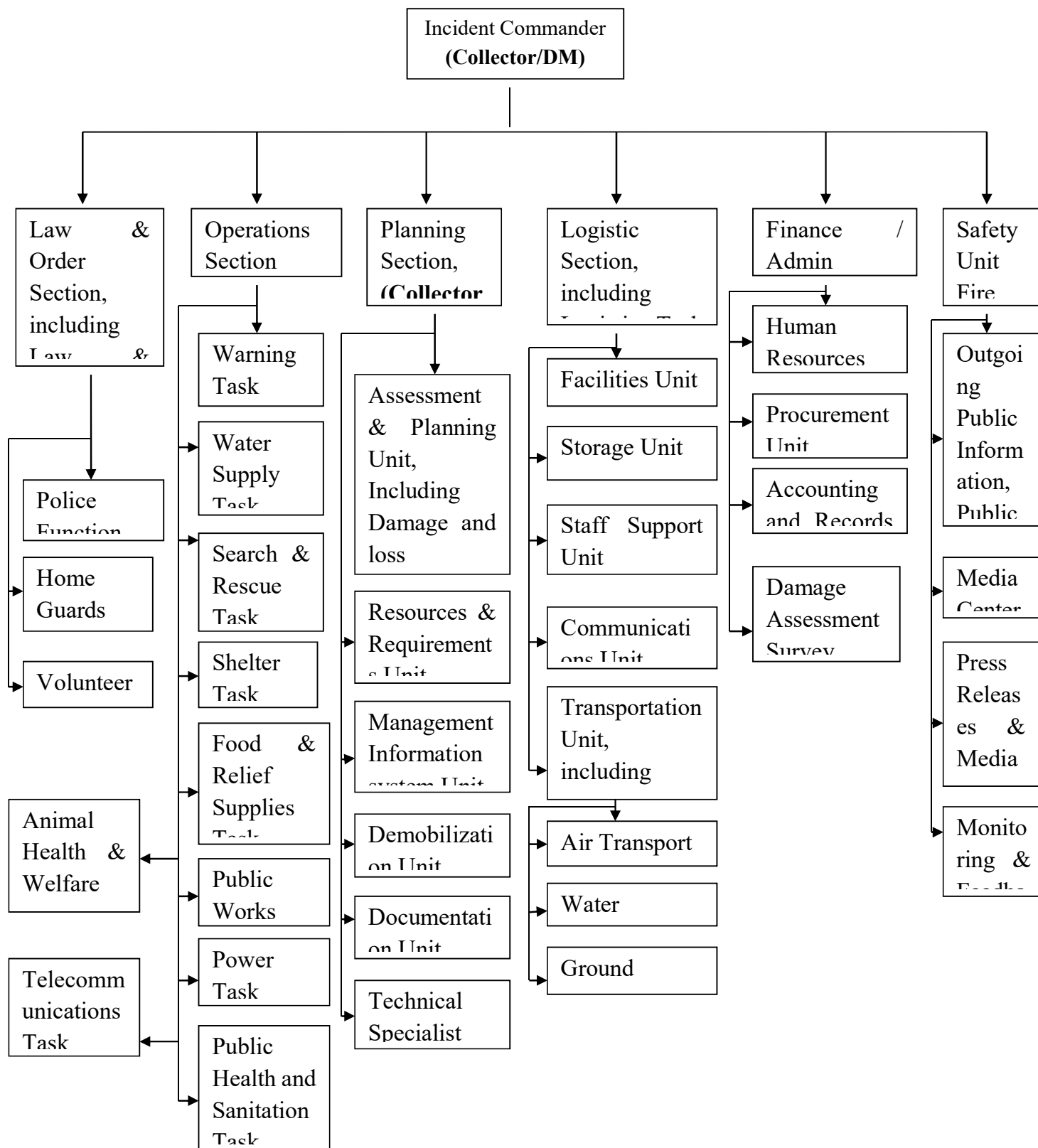
Sr. No.	Address of fire Brigade Talukawise	Fire brigade Telephone No.	Mobile No.
1.	2.	3.	4.
1.	Gandhinagar	079-23222742 079-23222141	6358218289
2.	Mansa	02763 273001	8160395723
3.	Dahegam	02716 232626	7698520352
4.	Kalol	02764 250033	6359876209

3. MEDICAL SERVICES

- The relevant agency for emergency medicine in the Government of India is the Directorate General of the Health Services (DGHS) in the Ministry of Health and Family Welfare. The DGHS has set up the Emergency Medical Relief cell, for dealing with these contingencies.
- The DHO will review the administrative support required for the situation, which includes communications, transport of the victims and of the personnel, feeding of the personnel and patients, and supplies.
- The DHO will collect information on the number of deaths and persons injured; the nature of injuries and the likely long-term consequences.

The DHO must assess the medical needs of the area on the basis of likely long-term consequences and take steps to equip local medical facilities for treating people on a long-term basis. The DHO must also make financial provision for spending on long-term treatment.

3.2 INCIDENT COMMAND STRUCTURE OF GANDHINAGAR DISTRICT



3.3. ROLE OF EMERGENCY ORGANIZATION AGENCIES

3.3.1. DISTRICT EMERGENCY AUTHORITY (DEA – DISTRICT COLLECTOR)

- The District Collector shall be the Overall Incident Command Officer of emergency operations as the District Gandhinagar Emergency Authority and she/he shall provides suitable instruction to the District Crisis Group.
- The Collector shall seek help from Chief Secretary, Chairman, State Crisis Group, Gujarat State, Gujarat State Disaster Management Authority and National Defense Response Force depending upon the state of emergency. For this he shall be in touch with State Control Room, Gandhinagar or Chief Secretary, Gujarat State for progress of emergency.
- Take overall responsibility for combating the Off-site emergency
- Ensure the Police and Fire, personnel combat the emergency
- Arrange, if necessary, for warning and evacuating the public, through the Department of Police
- Communicate with Media to disseminate vital information to public
- Arrange for dispensing vital information to public using arrangements like mass-SMS, public announcement using pre-recorded tapes
- Direct the team of Doctors headed by the Medical Officer
- Direct the local chief of State Transport Corporation to arrange for transport of victims and evacuation of people trapped within the hazard zone, if necessary
- Direct the Electricity Board officials to give uninterrupted power supply
- Direct the official in-charge to provide uninterrupted water supply as required
- If evacuation of population is necessary direct the Revenue officer and the Supply officer to provide safe shelters, food and other life sustaining requirements for the evacuees, if required
- Co-ordinate with the media
- Arrange for, release and provide necessary funds at various stages of disaster mitigation
- Direct railways to stop train, if required.

District Crisis Group Plan for Gandhinagar District 2026

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
Collector & DM (Chair-Person, DCG)	• Training and Rehearsals • Develop disaster management plans at all levels down to the village level. • Hold regular meetings on disaster management including government, NGOs and private sectors. • Check warning, communications and other systems, is including the use of drills. • Mobilize task forces at all levels (District, Taluka, village depending on disaster) • Telecommunications Media Task Forces. • Assign/guide district departments for preparedness task as & when required.	• Shall provide suitable instruction to the District Crisis Group, Local Crisis Group of Gandhinagar. • Provide reinforcement and support for emergency response from the district resources, Such as technical expert opinion combating fire fighting. • Evacuation of people, rescue operation to save the life of people in case of disaster. • Effective working of communication system, traffic control, evacuated property security, maintain law and order and cordon of area, environment	• Start Rehabilitation activities. • Conduct detailed survey of damage and needs. • Restore all public and private sector services. • Final Report/Case Study • Lessons Learned from meeting. • Assign/guide district departments for relief & rehabilitation work as & When required.

District Crisis Group Plan for Gandhinagar District 2026

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
		monitoring, disease control, demolition and reconstruction of structure, transport facility for evacuation, • Provide relief & shelter after/during emergency, damage assessment & funeral process. • Shall asked help from Chief Secretary, Chairman, State Crisis Group, Gujarat State depending upon the status of emergency. • Shall Instruct Superintendent of railway to stop train in case of any emergency.	

District Crisis Group Plan for Gandhinagar District 2026

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
		• Establish regular liaison with State Control Room. • Assign/guide district departments for relief & rescue work as & when required.	
Resident Additional Collector (RAC)	• Training and Rehearsals • Develop disaster management plans at all levels down to the village level. • Hold regular meetings on disaster management including government, NGOs and private sectors. • Check warning, communications and other systems, is including the use of drills. • Mobilize task forces at all levels (District, Taluka, village depending on	• Shall provide suitable instruction to the District Crisis Group, Local Crisis Group of Gandhinagar Control Room. • Provide reinforcement and support for emergency response from the district resources, Such as technical expert opinion combating fire fighting. • Evacuation of people, rescue	• Start Rehabilitation activities. • Conduct detailed survey of damage and needs. (Damage Assessment Task Force) • Restore all public and private sector services. • Final Report/Case Study • Lessons Learned from meeting and reporting to State office. • Assign/guide district departments for relief & rehabilitation work as & when required.

District Crisis Group Plan for Gandhinagar District 2026

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
	disaster) (Telecommunication, Media Task Forces). Assign/guide district departments for preparedness task as & when required	operation to save the life of people in case of disaster. - Effective working of communication system, traffic control, evacuated property security, maintain law and order and cordon of area, environment monitoring, disease control, demolition and reconstruction of structure, transport facility for evacuation, - Provide relief & shelter after/during emergency, damage assessment & funeral process.	Effective working of communication system, traffic control, evacuated property security, maintain law and order and cordon of area, environment monitoring, disease control, demolition and reconstruction of structure, transport facility for evacuation

District Crisis Group Plan for Gandhinagar District 2026

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
		• Shall ask Superintendent of railway to stop train in case of any emergency. • Establish regular liaison with State Control Room. • Assign/guide district departments for relief & rescue work as & when required. • He will perform general roll during emergency as stated in District.	
District Development Officer (DDO)	• Before disaster/emergency, he/she will prepare plan of district for Relief and shelter work & damage assessment. • With the help of village level worker; he will circulate intimation of the emergency.	• As per instruction of a District collector or message, DDO will do operation of relief and shelter with their staff, group members & their staff and NGOs with their	• Starts Rehabilitation operation with staff, group members & • NGOs as required with their equipment as facilities under guidance of Collector.

District Crisis Group Plan for Gandhinagar District 2026

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
	• He/she will keep the panchayat staff ready for possible relief and damage assessment. • Prepare departmental Disaster & Management Plan and submit copy to the collector.	• equipment and facilities. • He/she will look after the duty performs by their staff member's i.e. TDMC, VDMC as per disaster management plan. • He/she will arrange for relief and shelter camps in the rural areas. • He/she ensure ground staff at headquarter during disaster.	• He/she will provide cash dolls, shanty house/ building relief, house grocery relief, death relief, food, water, clothes, utensils etc. • He/she will assess the damage occurred due to disaster/emergency with staff & Group members.
SDM & Deputy Collector	• Liaison Officer will conduct meeting of Taluka flood relief co-ordination committee and will do proper planning for mitigation of effect in case of flood, cyclone, and heavy rain fall.	• He will assist the Collector in the relief and rescue operation along with his staff. • Take necessary step as per DMP plan of the district collector	• District supply officer will arrange for distribution of essential commodity to the affected areas through Gujarat State civil supply corporation & NGO's.

District Crisis Group Plan for Gandhinagar District 2026

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
	• Monitor Preparatory work at Taluka level		• Final Report/Case Study • Lessons Learned from meeting.
Mamlatdar	• In case of flood, cyclone, war, earthquake. • Industrial, transport, water & air pollution, pipeline etc. disaster / emergency and for mitigation of effect, he will prepare plan for incident control group of DCG & LCG. • He/She will perform general roll before emergency as stated in district off site emergency plan. • He/She as vice chairman of incident control group of DCG & Chairman of incident control group of LCG will look out overall all the function at incident place through their members and team.	• As per instruction of District Collector or SDM or message received from other source of flood, cyclone, war, earthquake, industrial, transport, water and Air pollution, pipeline etc. disaster / emergency he/she will send respective member of to combat and to mitigate effect at incident place. He will proceed towards incident place and will look out overall	• He/She will look out overall the function of incident place • Rescue • Health & Medical treatment of victims • Traffic security law and order • Toxic and disease control • Rehabilitation • Relief and Shelter • He/she will perform general roll after emergency as stated in IC group of district off site emergency plan and chairman of IC team of LCG plan. • He/She will provide cash dolls, shanty house, building relief, house

District Crisis Group Plan for Gandhinagar District 2026

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
	• He/She will keep office open with staff as control room in case of disaster / emergency i.e. flood, cyclone etc. will provide to and for information to disaster control room / district authority.	function i.e. Evacuation and rescue operation, Fire / Toxic control and toxic monitoring, Public warning and communication, Traffic control, security, law & order, cordon of area, Medical treatment at first aid centre, causality centre, Disease control, Demolition, Reconstruction and rehabilitation • Transport • Public relation and mass media communication • Relief and shelter • He/she will perform general roll during	grocery relief, and death relief. • He/She will assess the damage occurred in city area due to disaster emergency.

District Crisis Group Plan for Gandhinagar District 2026

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
		emergency as stated in IC group of district off site emergency plan and chairman of IC team of LCG plan. • He/She will inform progress report of emergency to SDM of district authority from incident place.	
Taluka Development Officer – TDO	• With the village level team warning disseminate to the community • Keep staff ready for relief and damage assessment. • To coordinate & collect information of resources & equipments from line departments, stakeholders & village.	• Taluka Development Officer will provide their staff e.g. VDMC team for public information and evacuation operation to DSP/SDM in case of flood, cyclone, and heavy rainfall or other disaster / emergency.	• He will arrange for relief and safe shelter camps in the rural areas based on VDMP • He/she will provide cash dolls, shanty house/ building relief, house grocery relief, death relief, food, water, clothes, utensils etc.

District Crisis Group Plan for Gandhinagar District 2026

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
		To coordinate & support with stakeholders for resources & equipments to avail for relief & rescue teams.	He/she will assess the damage occurred due to Disaster emergency with staff & Group members.
District municipal officer & Chief Officer Nagarpalika	- Nagarpalika operated hospitals keep ready state with Operation Theatre, equipments and medical facilities in working condition - Nagarpalika shall keep approach road of water sources, pumps in working condition, water leakage will be prevented through pipe, pipe joints and valve. Water storage tank will keep clean and will keep water without unwanted impurities - Nagarpalika shall maintain good fire fighting facility and rescue equipments.	- Nagarpalika shall do rescue operation with well equipped equipment and trained staff. - Nagarpalika shall provide good medical treatment to victims in case of emergency in their hospital. - Nagarpalika shall provide fire tender for fire fighting operation.	- Nagarpalika will restore drainage system in affected area. - Nagarpalika will restore pure drinking water in affected area. - Whenever possible, he will arrange for transportation of dead body through special vehicles. - Immediate start Sanitation work and give update work progress report to collector. - Coordinate with mamlatdar and

District Crisis Group Plan for Gandhinagar District 2026

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
	- Nagarpalika will provide bus, mini bus, trucks, and trigger, earth moving machinery for evacuation and rescue operation and transferring people from nagarpalika area. - Nagarpalika will keep their mobile public address system in working condition to give information to public.		liaison officer of the taluka.

➤ CIVIL SUPPLIES DEPARTMENT

- Arrangement to provide food and clothing as necessary, to the evacuees and all others affected and involved in emergency controlling operations.

➤ ANIMAL HUSBANDRY DEPARTMENT

- Arrange for taking care of cattle - especially milch animals living in affected zone
- If evacuation of cattle is required, identify the evacuation area and shelter
- Transport arrangements for evacuation
- Fodder, drinking water arrangements for cattle.
- Arrange for veterinary doctor

3.3.2. POLICE

Communicate and co-ordinate with

- MAH unit
- DEA
- Fire Services
- Transport authorities
- Medical Department
- Media
- Civil Defence and Home Guards
- Local Army establishment as required
- Warn and advice the people in the affected area
- Regulate and divert traffic
- Arrange for evacuation

District Crisis Group Plan for Gandhinagar District 2026

- Maintain law and order in the area
- Ensure protection of life and property of evacuees
- Deal sternly with people exploiting opportunism in wake of a disaster

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
Superintendent of Police	• He/She will keep their wireless set, public address system in working condition to warn public about disaster. • As per instruction of district collector or message of possible emergency received from other source to or feel him/herself for possible emergency, He/she will do operation such as Evacuation public warning, traffic control, cordon of area etc. required in possible affected areas of the district. • Prepare departmental	• He/She will perform general roll during emergency as stated in District. • He/She will keep their wireless set, public address system in working condition to inform public. • As per instruction of district collector or message received from other source, He will do operation of Evacuation & Rescue, Public warning, Communication Control, Traffic Control, Security	• He/She will arrange funeral process of human bodies. • He/She will provide security to protect properties in effected area. • He/She will perform general roll after emergency as stated in District • He/She will assess the human death. • He/She will lodge of FIR & doing of the panchanama if required in the affected area.

District Crisis Group Plan for Gandhinagar District 2026

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
	Disaster Management Plan and submit copy to collector.	law & order, cordon of area, Funeral etc. required in affected area of the district.	

➤ CIVIL DEFENSE

- 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

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
Civil defence		Civil Defence Inspector will conduct meeting and will do proper planning for mitigation of effect in case of chemical emergency. He will also train the large amount of people to mitigate the effect of chemical emergency. He will provide staff and trained person for rescue operation.	

➤ 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

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
Home Guard Commandant		The District Home Commander will assist D.S.P. for Public Information and evacuation through their Home guards in case of emergency. He shall make available the required number of home guard as and when inform by the Collector /Superintendent of Police as well as keep the updated list of swimmers for rescue work.	

3.3.3. FIRE SERVICE DEPARTMENT

- Perform fire-fighting operations by deploying men and appliances
- Perform rescue operation in the affected area.
- Communicate and co-ordinate with Police, Medical Department of necessary information

- Keep knowledge on appropriate response to different chemical emergency scenarios
- Keep adequate stock and resource information on necessary means, material, appliances required to deal with particular emergency situations with updated details of suppliers and stockists

3.3.4. MEDICAL DEPARTMENT

- Arrange for preparing casualties to be sent to government/private hospitals
- Set up temporary medical camp and ensure medical facilities at affected location and neighbourhood
- Keep knowledge on appropriate response to different cases of toxic consumption and injuries
- Set up temporary mortuary, identification of dead bodies and post-mortem

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
CDHO And Civil Surgeon	• In case of disaster / emergency, he/she will prepare plan for health & medical treatment and toxicity & disease control monitoring and submit to the collector. • He will keep adequate quantity of medicines and maintain Operation Theatre, equipments, medical	• As per instruction of District collector or message received from other sources disaster / emergency he will do operation of Health & Medical treatment & Toxicity & Disease control / monitoring etc. required in affected areas of the district with their staff group	

District Crisis Group Plan for Gandhinagar District 2026

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
	facilities in working condition • He will keep list of hospitals, available doctors & paramedical staff, available medical faculties, list of medical stores, list of medical stockiest in the district. • He will keep list of all chemical antidotes and about their quick availability in small & large quantities of them in district, country or abroad. • Will keep medical team ready along with the required drugs i.e. chlorine tablets, ORS powder etc. for possible affected areas. • He will maintain Ambulance in working condition with updated location list. • Prepare trained medical team for chemical disaster.	members & their staff as requires with available equipment & facilities. • He will perform health & medical control as well as toxicity & disease controlling & monitoring. • He will arrange providing vaccine, antidotes & medical treatment to victims. • He will ask more help from state, central Govt. through district authority in disaster /emergency. • Will take all possible steps to prevent the spread of disease, toxicity and epidemic.	

3.3.5. FACTORY INSPECTORATE DEPARTMENT

- Provide necessary direction to MAH unit and assistance to DEA, Fire 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 accident

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
Dy. Director Industrial Safety & Health (DISH), Gandhinagar	• Deputy Director Safety & Health/Member Secretary will conduct meeting of District Crisis Group at least once in 45 days. • Factory Inspector/Member Secretary of Local Crisis Group will conduct meeting at least once in month and will do proper planning for mitigation of effect in case of	• He/She shall reach to the site and will assist & guide for incidence control in case of chemical/ industrial disaster and will ensure the closure of supply lines of harmful chemical immediately in the affected area in case of fire or chemical disaster	• He/She will investigate regarding accident of fire, toxic release etc. • Submit incident/situation report to collector. • In case of Natural disaster, submit safety assurance report of industrial area to the collector

District Crisis Group Plan for Gandhinagar District 2026

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
	chemical accident. • He will prepare offsite emergency plan under guidance of collector. • He will ensure disaster preparedness in factories and safety aspect in industries during inspection and regular visit. • Prepare updated Chemical database from Industries to face any chemical disaster and submit to the collector.		

3.3.6. OCCUPIER OF MAH UNIT

- Identify the Major accident hazards
- Take adequate steps to prevent such major accidents and to limit their consequences to persons and the environment
- Provide to the persons working on the site with the information, training and equipment including audit antidotes necessary to ensure that safety and health
- Prepare on-site emergency plan as per schedule 8-A of the factories act and schedule 12 of MSIHC rule, 1989 and keep updated
- Ensure that the mock drill of on-site emergency plan is conducted at least once in every six months
- Detailed report of mock drill conducted shall be made immediately available to the inspector and chief inspector
- Communicate promptly, any foreseeable disaster, to the DEA, Police, Fire Service and Inspector of Factories in-charge of the District
- Communicate changes within the factory that may require inclusion or suitable modification in the off-site plan to the DEA of the Plan

3.3.7. TECHNICAL EXPERTS

- Promptly respond to provide the necessary technical advice to MAH unit, DEA, 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 DEA, Factory Inspector(s) to provide for appropriate technical assistance

3.3.8. REGIONAL TRANSPORT AUTHORITY

- To investigate into the cause of road accident involving hazardous goods carrier and take necessary action

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
Regional Transport Officer ARTO	• He will keep up to date list of available vehicles i.e. buses, minibus, trucks, earth moving machineries, cranes etc.	• He will arrange to provide available vehicles i.e. buses, minibus, trucks, earthmoving machineries, cranes etc. to respective authority if needed in case of emergency • He will perform duties during emergency as directed by collector.	• Arrange and provide Vehicles for relief & rehabilitation work under guidance of collector.
Divisional controller GSRTC	.	• He will inform public through his control, also he will arrange buses if required for evacuation in case of disaster/emergency	• Arrange and provide Vehicles for relief & rehabilitation work under guidance of collector.

3.3.9. PWD, R&B, Water Supply Board

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
Executive Engineer R & B	• He will prepare plan for operations like Demolition, Reconstruction & Rehabilitation and also arrange the rehearsal of plan for such activities. • He will keep the list of available vehicle in the district as well as outside district i.e. trucks, triggers, crane, dumper, bulldozer, truck, JCB etc as required in case of disaster/emergency and also ensure that it's in working condition • He will keep the list of available movable diesel generator set in the district as well as outside district.	• As per instruction of district collector or message received from other source for disaster/emergency he will do operation of Demolition, Reconstruction and Rehabilitation required in affected area, with their equipments and facilities. • He will arrange to provide vehicle for demolition & reconstruction. • He will perform general roll during emergency as stated in district emergency plan • If required more help, he will ask from state & central Govt. through district Authority	• He will assess the damage to govt. property and will submit the report to district authority. • He will immediate restore damage road for traffic movement. • He will restore government building for use i.e. hospitals • He will work in coordination of line departments for restoring power, drinking water, telephone and communication system, and essential services.

➤ WATER SUPPLY BOARD

- Arrange for supply of water to evacuees and all others involved in emergency control operations

➤ PUBLIC WORKS DEPARTMENT

- Ensure adequate water supply for fire- fighting
- Arrange for drinking water for evacuated persons at rallying posts, parking yards and evacuation centres Arrange water for cattle.

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
Executive Engineer GWSSB	• Will keep water resources, pumps in good working condition, water leakage will be prevented through pipes, pipe joints and valve. Water storage tank will keep clean and will keep water without unwanted impurities. • Prepare departmental disaster	• Will keep drainage system in working condition. • Will provide pure drinking water. • Will provide dewatering pump in case of flood emergency. • Coordinate distribution of water and storage and provision of information on safe water use.	• Assess status and damage to water systems. will restore pure drinking water system in affected areas • Will conduct lessons learned meeting and submit report to the collector. • Prepare & implement long term mitigation project in

District Crisis Group Plan for Gandhinagar District 2026

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
	management plan and submit copy to the collector.		Gandhinagar district.
Executive Engineer Irrigation	• Prepare departmental disaster management plan and submit copy to the collector. • Department will keep their wireless set always in working condition to inform govt. department/public in case of emergency.	• Constant monitor Progress of dams/check dam level and inform to district collector control room. • Constant monitor water flow of river and upper catchment areas rain and update information for further course of action during disaster.	

3.3.10. ELECTRICITY BOARD

- 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

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
Executive Engineer Electricity Department	• All safety arrangements should check. • He will keep surplus stock of equipments and arrangement for testing equipments urgently in case of emergency. • Prepare departmental disaster management plan and submit copy to the collector.	• Will arrange to provided generator as and when require by District Collector. • Will keep electricity flow continuous and if required, stop electricity for safety purpose.	• Assess damage of Electricity property in case of disaster / emergency. • Coordination with govt. & private Electricity companies for rehabilitation work and report to the collector.

3.3.11. POLLUTION CONTROL BOARD

- 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
- GPCB will ensure environment monitoring equipment in working condition and also perform the decontamination activity in affected area. GPCB will also solve the emergency due to water pollution.

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
GPCB(Gujarat Pollution Control Board)	Cheking of Industries Related Pollution Control & make corrective Action & make ready all measuring equipment to check Pollution	GPCB will ensure environment monitoring equipment in working condition and also perform the decontamination activity in affected area. GPCB will also solve the emergency due to water pollution	Dispose of hazardous chemicals waste & water as per guidlines

3.3.12. RAILWAYS

- Act as per the direction of DEA to stop incoming trains, if required
- Arrange for evacuation, if required

Roles and Responsibilities of Different Key Departments	Before Emergency	During Emergency	After Emergency
1.	2.	3.	4.
Superintendent of railway	To make ready alternate ways to transfuse rail during emergency	Superintendent of Railways will stop railway as per instruction pass by District Collector or SDM in case any emergency & will provide railway train – goods train for public transfer and emergency work distribution.	transfuse rail to alternate ways during emergency

3.3.13. MEDIA MANAGEMENT

The role of media, both print and electronic, in informing the people and the authorities during emergencies becomes critical, especially the ways in which media can play a vital role in public awareness and preparedness through educating the public about disasters; warning of hazards; gathering and transmitting information about affected areas; alerting government officials, helping relief organizations and the public towards specific needs; and even in facilitating discussions about disaster preparedness and response. During any emergency, people seek up-to-date, reliable and detailed information.

Gandhinagar Collector office has established an effective system of collaborating with the media during emergencies. Both print and electronic media is regularly briefed at

predetermined time intervals about the events as they occur and the prevailing situation on ground. A similar set up is also active at the Taluka Control room (i.e. Mamlatdar office).

3.4. OVERVIEW OF THE RESPONSIBILITIES FOR PREPAREDNESS ACTIVITIES

Sr. No.	Prevention & Mitigation Activity	Primary Responsibility	Secondary Responsibility
1.	2.	3.	4.
1.	Ensure safety of chemical storage vessels regulated by PESO	PESO	DISH
2.	Ensure overall chemical safety of the unit including process safety, PPE, staff training, etc.	Industry	DISH
3.	Ensure no or minimal environmental impact owing to operations and possible accidents at the site	GPCB	DISH
4.	Reduce use of toxics through minimizing use and/or storage volumes	Industry	DISH
5.	Implement risk management programs and install passive and active mitigation systems	Industry	DISH
6.	Ensure onsite emergency plans for MAH units and Type A & Type B industries	DISH, PESO, GIDC	Industry
7.	Ensure onsite emergency plan for Hazardous Waste Management Facilities (TSDF)	Treatment, Storage and Disposal Facility (TSDF)	Regional Office GPCB
8.	Prepare onsite emergency plans and enforce MSIHC rules in intermediate, minor and private ports in addition to major ports	Respective Port Authority	Regional Office GPCB, DISH
9.	Plan sheltering in place and/ or evacuation programs with proper public warning systems	Revenue Department	Information Dept Local Bodies

3.5 INDUSTRIAL DISASTERS, FIRES AND CHEMICAL ACCIDENTS ACTION PLAN

3.5.1. LOCAL RESPONSE TO CHEMICAL EMERGENCY - EMERGENCY ORGANISATION STRUCTURE

The response to a chemical disaster is always local with resources segmented from district and state levels. Under MSIHC Rules, the LCG is the lowest level of group available at the industrial cluster level the DCG is the next level of response. In the case the LCG is not available; the DCG is the lowest level of response.

At the State level, agencies such the GSDMA, DISH, GPCB, PESO, GIDC etc. are responsible for regulation, planning, and management. The response plan detailed out in this report establishes a concept of operations and assigns specific functional responsibility to departments, agencies, and organizations within Gandhinagar for chemical and industrial disasters. Chemical disasters can be classified per their scales as: Minor, Moderate, Major and Catastrophic.

3.5.2. RESPONSE TO HAZCHEM TRANSPORTATION EMERGENCIES

The organization structure for response, concept of emergency operations, and roles and responsibility of key stakeholders remains almost the same in case of emergencies involving the transportation of hazardous chemicals. The special considerations while responding to transportation emergencies are:

Pipeline Transportation - In case of pipeline transportation the initial notification may be done by the occupier/owner of the pipeline or by the local community or by the contractor who caused the damage to the pipeline. Therefore, it is important that all pipelines nodes and routes

clearly display the emergency contact information in case of any accident with the pipeline. Once the initial notification of an accident is obtained the response operations are similar to other chemical accidents.

Road Transportation - In case of an emergency involving a road tanker carrying hazardous chemical, the driver of the tanker is expected to be well-trained to handle emergency situations and have up-to-date contact information. The consigner and consignee may also make these calls. The tanker must display the emergency information panel and driver should carry the Transport Emergency Card or TREMCARD which has detailed instructions on response actions for fire, spillage or leakage. The driver should take the first protection actions by stopping traffic and general citizens from approaching the accident site until police arrive for help. The driver can try to stop the leak (if any) only if he is adequately trained and equipped to do so. The police officer on site will most likely be the first IC until a more qualified response team arrives. The most important action by the police is to cordon off the site of the accident, divert and regulate traffic, and evacuate/shelter in place citizens in close proximity on a priority basis. It is also important that untrained and unequipped first responders should not try to stop the leak or enter the hot zone and should instead wait for a qualified response.

3.5.3. EMERGENCY RESPONSE & EVACUATION GUIDE OF CHLORINE

Formula: Cl_2

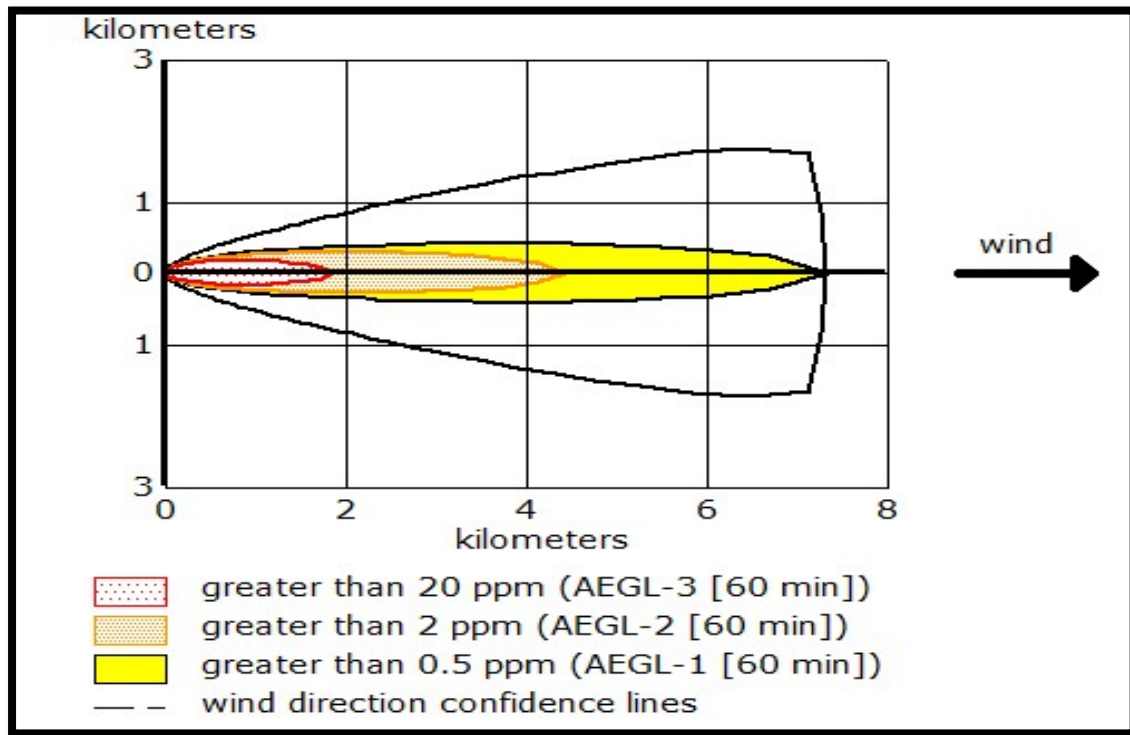
Greenish-yellow colour Gas/amber liquid with Pungent and irritating odour, Highly Corrosive in moist conditions (Chlorine gas is heavier than air and Dispersion is slow).

- Flammable : NO
- Flash Point : N.A.
- LEL- UEL : N.A.
- Toxic : Yes
- IDLH : 10 PPM
- TLV : 0.5 PPM

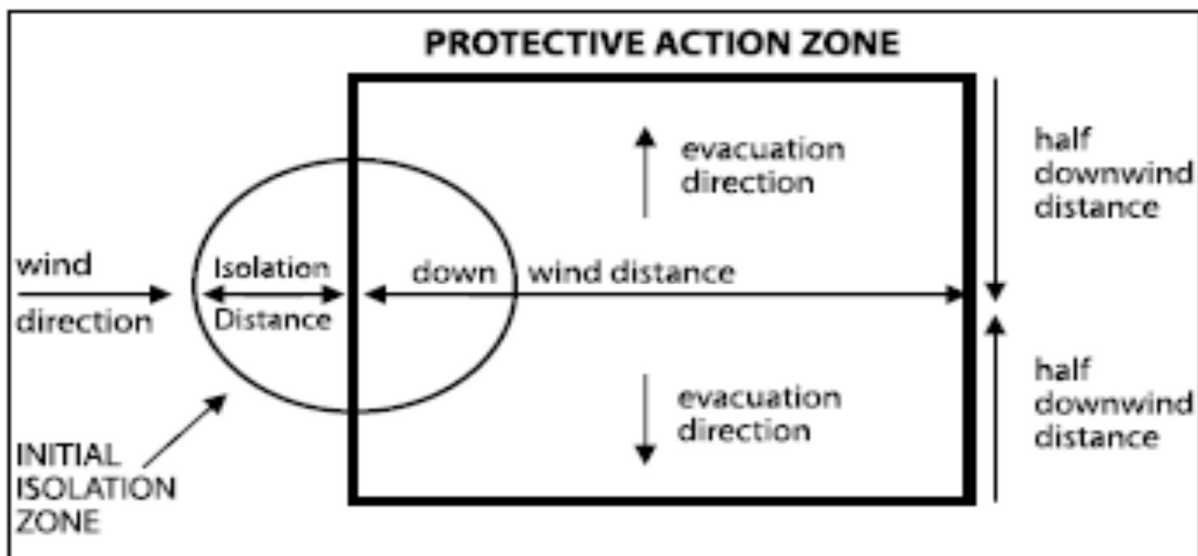
A. General Response Action

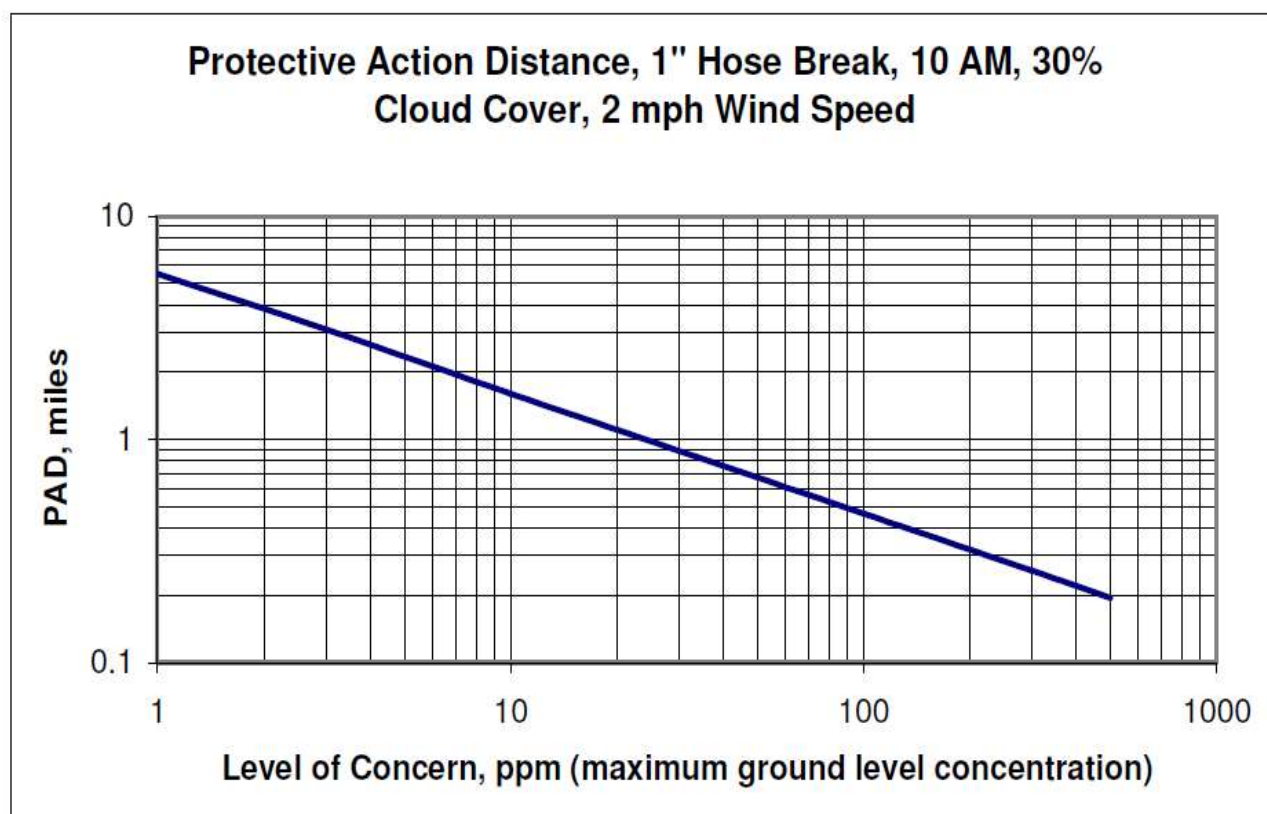
- On-Site: Stop Chlorine Leakage, if possible safely
- Wear self contained Breathing Apparatus (SCBA) and use Chlorine emergency kit
- Inform people to stay confined indoor with door & window tightly shut and ventilators & ACs off
- Shelter and Confine un-housed people to an indoor area outside likely cloud travel path
- Use water spray / fog to disperse and dilute vapours
- Collect runoff for disposal as potential hazardous waste

Toxic Thread Zone of Chlorine (1 Tonner, 1 inch Hole)



B. Evacuation Zone Dimensions





Sr. No	Mass of Release (Tonners)	Approx. Distance (m) (in the direction of wind)	Vulnerable (in the direction of wind)	Approx. time to reach Max. Vulnerable Dist. (Min)
1.	2.	3.		4.
1	1.0	1800		10

C. Fire

- Chlorine is non flammable, so the cascading effects in case of fire explosion is absent. Hence no Domino Effect.
- However, It may ignite or explode on contact with comustible materials.

Suggested Action

- Use water spray / fog as extinguishing medium
- Do not use dry chemicals, carbon dioxide or Halogenated extinguishing agents
- For Large Fires- Flood with fine water spray

D. Medical

Danger

- Poisonous if inhaled. Fatality may be caused due to inhalation when concentration in air is greater than 10 PPM (IDLH)
- Low level exposure to chlorine in air will cause eye/ skin / airway irritation, sore throat, and cough
- At higher levels of exposure, sign and symptoms may progress to chest tightness, wheezing, dyspnoea and bronchospasm
- Low level exposures to chlorine gas will cause eye and skin irritation. Higher exposures may result in severe chemical burns or ulcerations. Exposure to compressed liquid chlorine may cause frostbite of the skin and eyes

Suggested Action

- Inhaled chlorine poisoning can be treated with supportive care and can include administration of humidified oxygen, bronchodilators, and airway management.
- Pulmonary edema may be delayed and therefore patients should be monitored for up to 24 hours following severe inhalation exposures.

Antidotes: explained in plan

Pollution

- A leak of chlorine vapours poses a significant air pollution hazards
- Chlorine is heavier than air and dispersion is slow. Hence state of emergency will last longer.

E. Chemical Information

Chemical Reactivity

Chlorine is sparingly soluble in water. The Water solubility of chlorine is 0.7% @ 20 > °C.

Reactivity with Common Material

- Chlorine is aggressive to certain non metallic material like natural rubber and many plastics, therefore equipment and hoses must be suitable for chlorine.
- Chlorine is chemically stable. It is incompatible with Strong oxidizers.
- It does not react with common material but may react with oxidizing material.
- Olefinic impurities may lead to narcotics effects or it may act like a simple asphyxiate.

Polymerisation

Hazardous polymerization will not occur.

Combustion Products

N.A. since chlorine is not flammable gas.

Properties

- Physical State is Gas at 15 °C and 1 Atm. pressure
- TLV: 1 PPM
- IDLH: 10 PPM
- Molecular weight: 70.906 gm/mole
- Boiling Points: -34.0 °C
- Freezing Points: -101 °C
- Vapour Pressure: 6.9 bar @ 20 °C
- Vapour Density: (air=1) 2.45
- Liquid Density: (Water=1): 1.468 gm/l @ 0 °C, 3.65 atm
- Liquid Vapour conversion: 1: 457

3.5.4. EMERGENCY RESPONSE & EVACUATION GUIDE FOR AMMONIA

Formula: NH_3

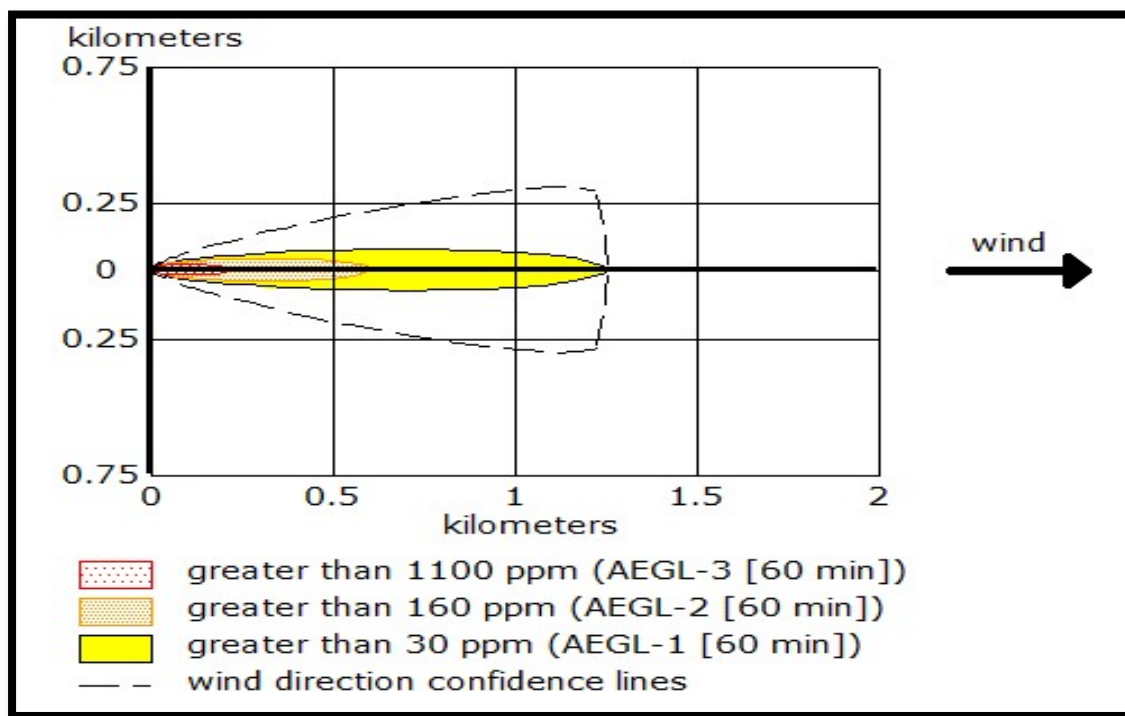
Colourless gas or liquid with pungent odour

- Flammable : Air – Ammonia mixture is inflammable
- Boiling Point : $-33.4\text{ }^{\circ}\text{C}$
- LEL- UEL : 16% - 25%
- Toxic : Yes
- IDLH : 300 PPM
- TLV : 25PPM

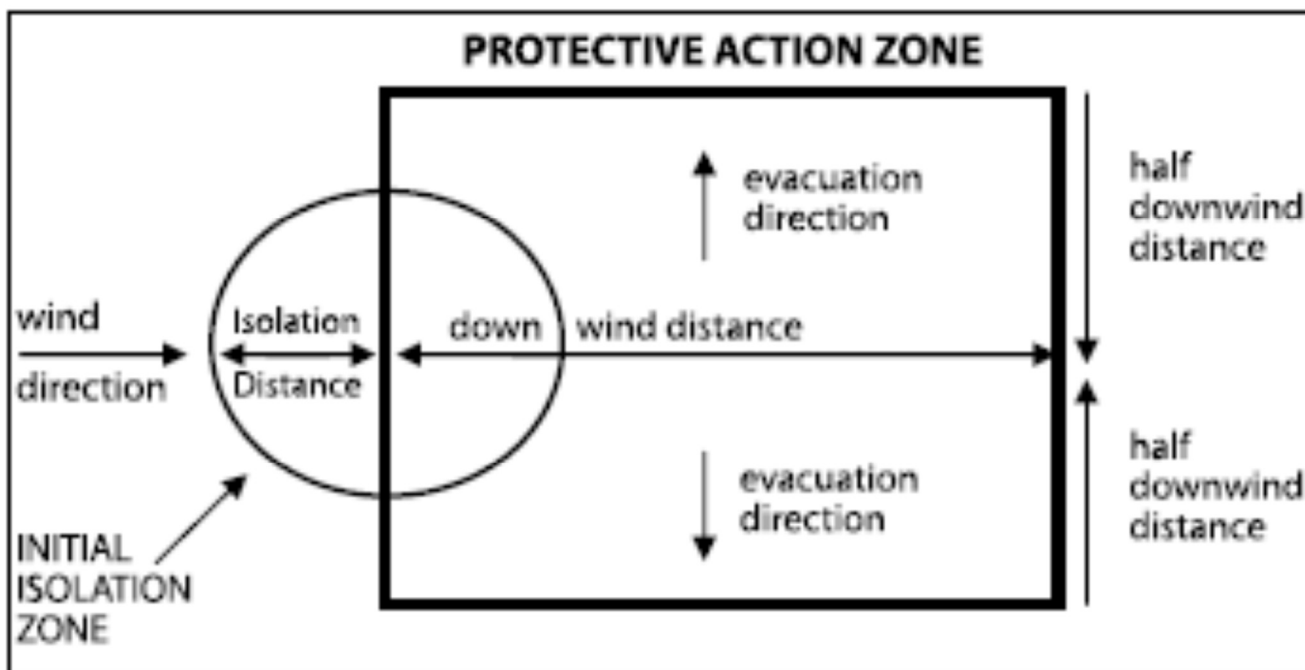
A. General Response Action

- On-SITE: Stop Ammonia Leakage, if possible safely
- Wear self contained Breathing Apparatus (SCBA) and use Ammonia emergency kit
- Stay upwind, out of low areas, and ventilate closed spaces before entering. Evaluate the affected area to determine whether to evacuate or shelter-in-place by taping windows and doors, shutting off outside air intakes (attic fans, etc.), and placing a wet towel or cloth over the face (if needed). Earths-ground and bond all lines and equipment associated with the ammonia system.
- Electrical equipment should be non-sparking or explosion proof.
- Use water spray / fog to disperse and dilute vapours
- Wear PVC Suit, Goggles, Hand gloves

Toxic Thread Zone of Chlorine (1 Tonners, 1 inch Hole)



B. Evacuation Zone Dimensions



Sr. No	Mass of Release (No. of cylinder of 50 kg)	Approx. Vulnerable Distance (m) (in the direction of wind)	Approx. time to reach Max. Vulnerable Dist. (Min)
1.	2.	3.	4.
1	1	250 m	2

C. Fire

- Ammonia is inflammable. Fire hazards of ammonia are moderate
- Ammonia forms flammable mixture with air within certain limits (16- 25%) by volume
- Fire hazard increases in contact with oil or other combustible materials

Suggested Action:

- To extinguish the fire use CO₂, DCP or water sprays
- Cool the leaking cylinder with large amount of water
- To control the fire, stop the flow of the gas if possible

D. Medical

Danger

- Skin Contact – Irritation, Burn may be very painful
- Eye Contact - Highly painful irritation of eye & eyelids
- Watering of eye
- Serious lesions in eyes
- Inhalation – Irritation of nose, eyes and throat
- Difficulty in breathing
- Sudden death

Suggested Action

- Immediately remove the victim from the affected area & take him to the nearest shower
- Immediately administer medical oxygen under low pressure using a pulmonary

Antidotes: N.A.

Pollution

- Ammonia is harmful to aquatic life in very low concentrations and may be hazardous if it enters water intakes.
- Local health and wildlife authorities, as well as operators of water intakes in the vicinity, should be notified of water releases.

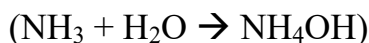
- Ammonia does not concentrate in the food chain.
- The conversion of ammonia to nitrites/nitrates by bacteria in aquatic systems can reduce the concentration of dissolved oxygen (referred to as nitrogenous oxygen demand).
- Effect on water treatment process: Chlorination will produce chloramines, which are more readily detected by taste and odour.

E. Chemical Information

Chemical Reactivity:

Reactivity with Water:

Ammonia is rapidly soluble in water. When ammonia reacts with water, it forms Ammonium Hydroxide



Reactivity with Common Material:

Ammonia is highly reactive with Sodium, Potassium at ordinary temperature

Polymerization

Hazardous polymerization will not occur

Combustion Products

Hydrogen at very high temperatures: 1544 °F (840 °C).

Properties

- Physical State is Gas at 15 °C and 1 Atm. pressure
- TLV: 25 PPM
- IDLH: 300 PPM
- Molecular weight: 17.03 gm/mole
- Boiling Points: -33 °C at 1 Atm
- Freezing Points: -77.7 °C
- Vapour Pressure: 7,523 mm Hg @ 25 °C
- Vapour Density: (air=1) 0.589 @ 0 °C
- Liquid Density: (Water=1): 0.674
- Liquid Vapour conversion: 1: 850 @ 18 °C

3.5.5. EMERGENCY RESPONSE & EVACUATION GUIDE FOR OLEUM

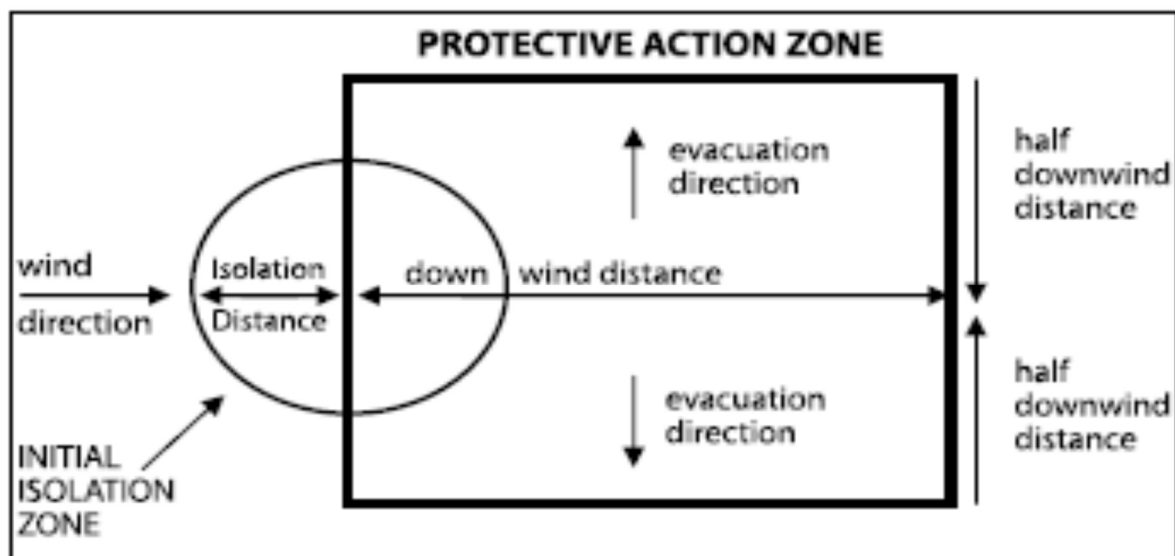
Formula: SO_3 / Sulphur Trioxide

- Liquid (Fuming oily liquid)
- Flammable : Non Flammable
- Flash Point : N.A.
- LEL- UEL : N.A.
- Toxic : Yes
- IDLH : N.A.
- TLV : 0.25 PPM

A. General Response Action

- On-site: keep container dry, keep away from heat and source of ignitions
- PPEs: Face shield, full suit and vapour respirator.

B. Evacuation Zone Dimensions



District Crisis Group Plan for Gandhinagar District 2026

Sr. No.	Mass Release (Tonners)	Approx. Distance (m) (in the direction of wind)	Approx. time to reach Max. Vulnerable Dist. (Min)
1.	2.	3.	4.
1	5	120	2
2	10	3500	20

C. Fire

- Non Flammable

Suggested Action

- Keep away from Fluorine & chlorine trifluoride

D. Medical

- Inhalation:- causes damage to human system, coughing, palmonary and olfactory changes,
- Skin & Eyes:- causes corrosive irritation and also damage to mucous membrane.

Suggested Action

- Inhalational :- Remove the victim to fresh air area, provide artificial respiration or oxygen if needed.
- Skin :- Remove the contaminated clothing and wash the affected area with plenty of water and soap.
- Eye :- Irrigate with plenty of water for 15 mins. Seek medical aid immediately.

Antidotes: N.A.

Pollution

- A leak of SO₃/ Oleum poses a significant air and land pollution hazards

E. Chemical Information

❖ Chemical Reactivity

- Reactivity with Water: It may react with violently with water to emit toxic gases
- Reactivity with Common Material Reactive with oxidizing agents, metals, alkalis moisture

❖ Polymerisation

- Will not occur

Combustion Products: Not applicable

Properties

- Physical State is Gas at 15 °C and 1 Atm. Pressure
- TLV: 0.25 PPM
- IDLH: N.A.
- Molecular weight: 80.06 gm/mole
- Boiling Points: 45.0 °C
- Freezing Points: 16.8 °C
- Vapour Pressure: 73 mm Hg @ 25 °C
- Vapour Density: (air=1) 2.8
- Liquid Density: (Water=1): 1.92 @ -34 °C

3.5.6. EMERGENCY RESPONSE & EVACUATION GUIDE FOR BROMINE

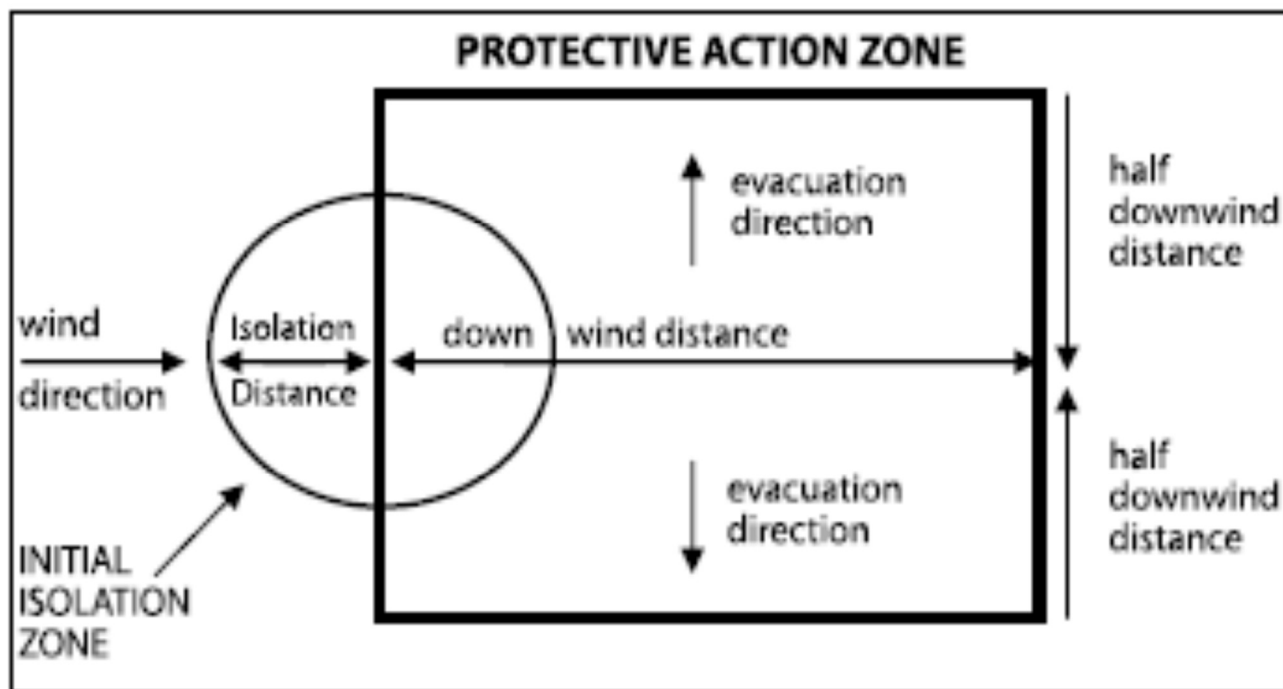
Formula: Br₂

- Heavy reddish brown fuming liquid with sharp penetrating odour
- Flammable : Non flammable
- Flash Point : N/A
- LEL- UEL : NA
- Toxic : Yes
- IDLH : 3 PPM
- TLV : 0.1 PPM

A. General Response Action

- Protect against physical damage. Store in cool, dry area, out of direct sunlight
- Separate from combustibles, organics or oxidizing materials
- Wear appropriate protective gloves
- Proof or dust-resistant goggles

B. Evacuation Zone Dimensions



Sr. No	Mass Release (Tonners)	Approx. Distance (m) (in the direction of wind)	Valnerable (in the vulnerable Dist. (Min)	Approx. time to reach Max. Vulnerable Dist. (Min)
1.	2.	3.	4.	
1	5	622		4
2	10	3100		18

C. Fire

- Non-flammable Substance

Suggested Action

- Avoid contact with reducing material which can cause fire also keep away from combustible material
- Use CO₂ / DCP FE if necessary
- Handle with care
- Do not pour water on leaking cylinder
- Keep away from moisture to prevent formation of corrosive vapours
- Cylinders being stored for excessive periods of time

D. Medical

Danger

- Health Hazards Acute and Chronic (acute exposure)
- Eyes: may cause irritation, redness, pain, blurred vision, burns
- Ingestion: burns of mouth, throat and stomach. Brown coloration and corrosion of tongue. Vomiting may cause fatal Gastroenteritis
- Skin: may cause cooling sensation followed burning. (chronic)
- Effects of overexposure: may cause headache, dizziness, coughing, nausea, copious mucous secretion, nosebleed, feeling of oppression, vertigo, stomach pains, hoarseness, chest pain, joint pain, brown skin discoloration, second & third degree burns, eye burns
- Inflamed tongue, spasms, pain in the heart region and loss of appetite

Suggested Action

- Wash immediately with water or normal saline, for 15-20 minutes until pH is normal. See doctor quickly.
- Skin: wash with soap and water. Remove soiled clothes. Get medical advice.
- Inhale: remove to fresh air. If breathing stops, give CPR. See doctor immediately.
- Ingest: Do not use gastric lavage or emesis. Dilute by drinking large amounts of water or milk. Get immediate medical attention.

Antidotes: N.A.

E. Chemical Information

Chemical Reactivity

Reactivity with Water

Br₂ is slightly soluble in water.

Reactivity with Common Material

Bromine with Al is quite vigorous resulting in large heat of reaction.

Polymerisation

Bromine undergoes violent

Polymerization in reaction with acrylonitrile

Combustion Products: N.A.

Properties

- Physical State: Gas at 15 °C and 1 Atm. Pressure
- TLV: 0.1 PPM
- IDLH: 3 PPM
- Molecular weight: 159.83 gm/mole
- Boiling Points: 58.73 °C at 1 Atm
- Freezing Points: - 7.3 °C
- Vapour Pressure: 175 mm Hg @ 25 °C
- Vapour Density: (air=1): 5.5 @ 20 °C
- Liquid Density: (Water=1): 3.119 @ 20 °C;
- Liquid Vapour conversion: 1 : 850 @ 18 °C

3.6. MITIGATION MEASURES

INDUSTRIAL (CHEMICAL) MITIGATION MEASURES IN COORDINATION WITH LCG, DCG, DISTRICT AND STATE LEVEL AUTHORITIES

Non structural Measures	Activities	Implementing Departments
1.	2.	3.
Planning	Prepare an onsite and offsite emergency plan	Occupier, DISH
	Conduct full scale mock drills at least once in year as per the chemical accidents (EPPR) rules, 1996 regulation	DCG, DISH and LCG
	Update the plan as per the requirement	Occupier, DISH, DCG, LCG
	Monitor similar activities in all the factories / industries	DISH and LCG
Capacity Building	Awareness generation to general public and medical professional residing near MAH factories for immediate steps	DCG LCG
	Organize training programmes, seminars and workshops (e.g. for drivers of HAZMAT transport, line departments officers, Mamlatdar etc)	DCG LCG
	List of experts / resource person/ subject specialist (District emergency Off site plan)	DCG, LCG
Medical	Listing of hazardous chemicals and gases.	Occupier, DCG, LCG, DISH, BHO
	Keep check on availability and validity of relevant antidotes for chemical hazards prevalent in District	Occupier, DCG, LCG, DISH,
	Workshops and trainings for medical professionals to handle potential chemical and industrial hazard	DCG, Occupier, LCG, DISH

District Crisis Group Plan for Gandhinagar District 2026

Non structural Measures	Activities	Implementing Departments
1.	2.	3.
Compliance	Environmental Protection Act, Factory Act, Mutual Aid SOPs	DISH, GPCB, DCG, LCG

At the District level, the District Crisis Management Group (DCG) is an apex body to deal with major chemical accidents and to provide expert guidance for handling them. DCG has a strength of 24 members which includes District Collector, SDM and Dy. Collector, DDO, Dy. Director – Industrial Safety & Health, DSP, PI, Fire Superintendent of the City Corporations or important Municipalities, Chief District Health Officer, Civil Surgeon, SE, Chief Officer, Dy. Chief Controller of Explosives, Commandant – SRPF, Group- XII, Dy. Director – Information, Manager DMC Gandhinagar and two name a few at Taluka level Local Crisis Management Group (LCG) is formed for coordination of activities and execution of operations.

4.0. NATURAL CALAMITIES

The Indian subcontinent is highly prone to natural disasters, which can also trigger chemical disasters. Damage to phosphoric acid sludge containment during the Orissa super cyclone in 1999 and the release of acrylonitrile at Kandla Port, during an earthquake in 2001, are some of the recent examples.

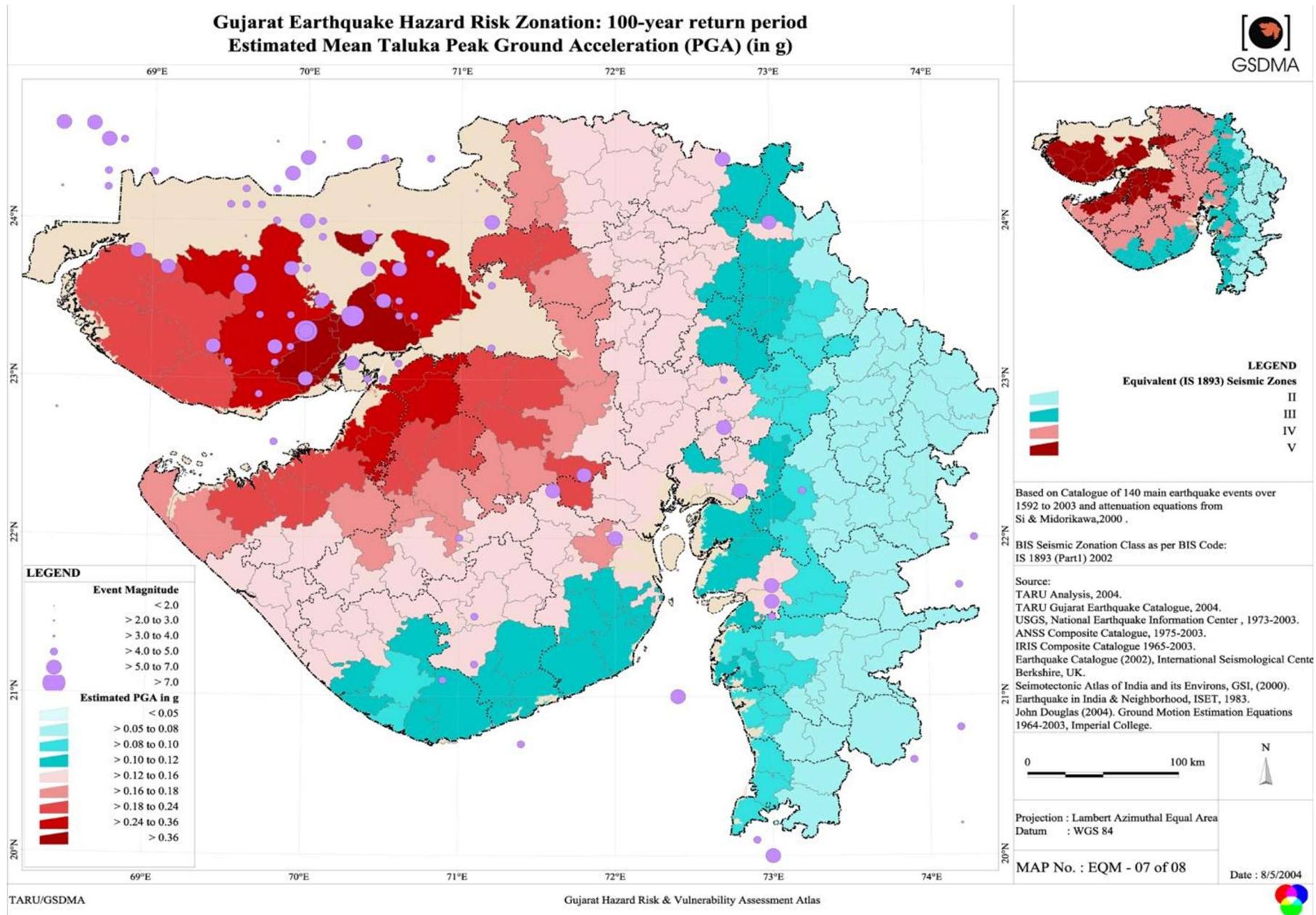
4.1. EARTHQUAKE

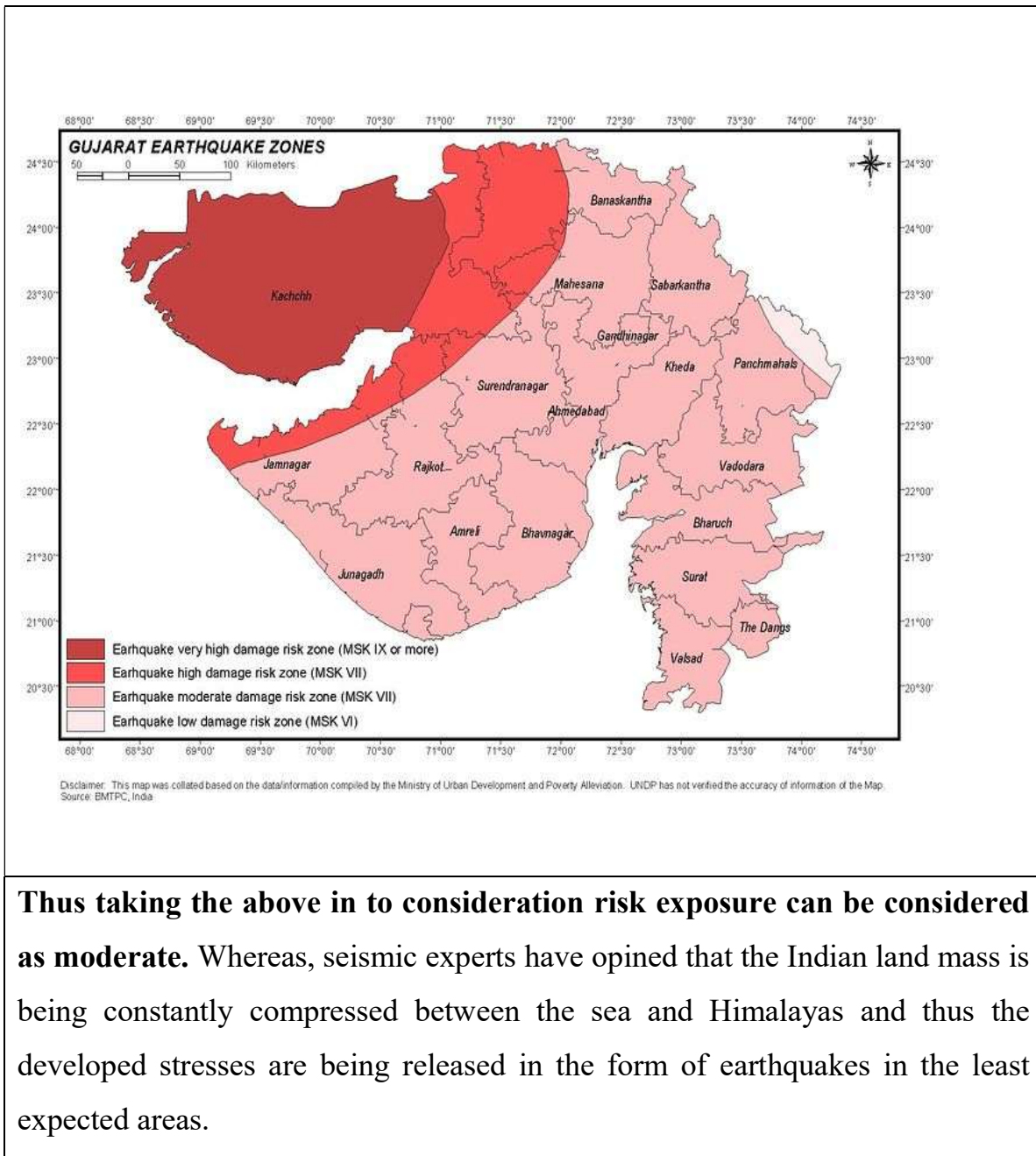
As per Indian Seismic Zone Map, Gujarat region is lies in three zones- Zone III, IV and V. Kachchh region (about 300km x 300km) lies in zone V where earthquakes of magnitude 8 can be expected. A belt of about 60-70 km width around this zone covering areas of North Saurashtra and areas bordering Eastern part of Kachchh lie in zone IV

The rest of Gujarat lies in zone III where intensity 7 can be expected due to moderate local earthquakes or strong Kachchh earthquakes.

The cities of Ahmedabad, Gandhinagar, Sabarkantha, Kheda, Mehesana Vadodara, Panchmahals, Surendranagar etc. fall into the severe intensity zone, while Bhuj and Jamnagar fall in the very severe intensity zone over this time frame.

District Crisis Group Plan for Gandhinagar District 2026





Thus taking the above in to consideration risk exposure can be considered as moderate. Whereas, seismic experts have opined that the Indian land mass is being constantly compressed between the sea and Himalayas and thus the developed stresses are being released in the form of earthquakes in the least expected areas.

➤ BEFORE EARTHQUAKE

- Consult a structural engineer to make your house earthquake resilient.
- Know your seismic zone and carry out necessary structural changes in your house.
- Preserve the design and layout drawings of your house for future reference.
- Repair deep plaster cracks on walls and ceilings.

- Fasten shelves securely to walls, place heavy / large objects on lower shelves. Provide strong support to power and gas appliances.
- Prepare an emergency kit with essential items for safety and survival.
- Develop an emergency communication and evacuation plan for your family.
- Learn the technique of ‘Drop-Cover-Hold’.
- Avoid flood plains and filled-up areas for construction as far as possible.
- Educate yourself and family members about earthquake risk.

➤ DURING EARTHQUAKE

- Stay calm. Do not panic. If you are indoors, stay inside. If you are outside, stay outside.
- Don’t use matches, candles, or any flame. Broken gas lines and fire don’t mix.
- If you are in a car, stop the car and stay inside until the earthquake stops.
- Drop under a table, Cover your head with one hand and hold the table till the tremors last.
- Stay away from mirrors and windows. Do not exit the building while the earth is still shaking.
- Move outside as soon as the tremors stop. Do not use a lift.
- When outside, move away from buildings, tress, walls and poles/electric lines.
- When inside a vehicle, pull over in an open place and remain inside, avoid bridges.
- When in a structurally safe building, stay inside until shaking stops.
- Protect by staying in the corner/ under a strong table or bed/ an inside wall away from mirrors and windows.
- If near an exit, leave the building as soon as possible.
- If inside an old and weak structure, take the fastest and safest way out.

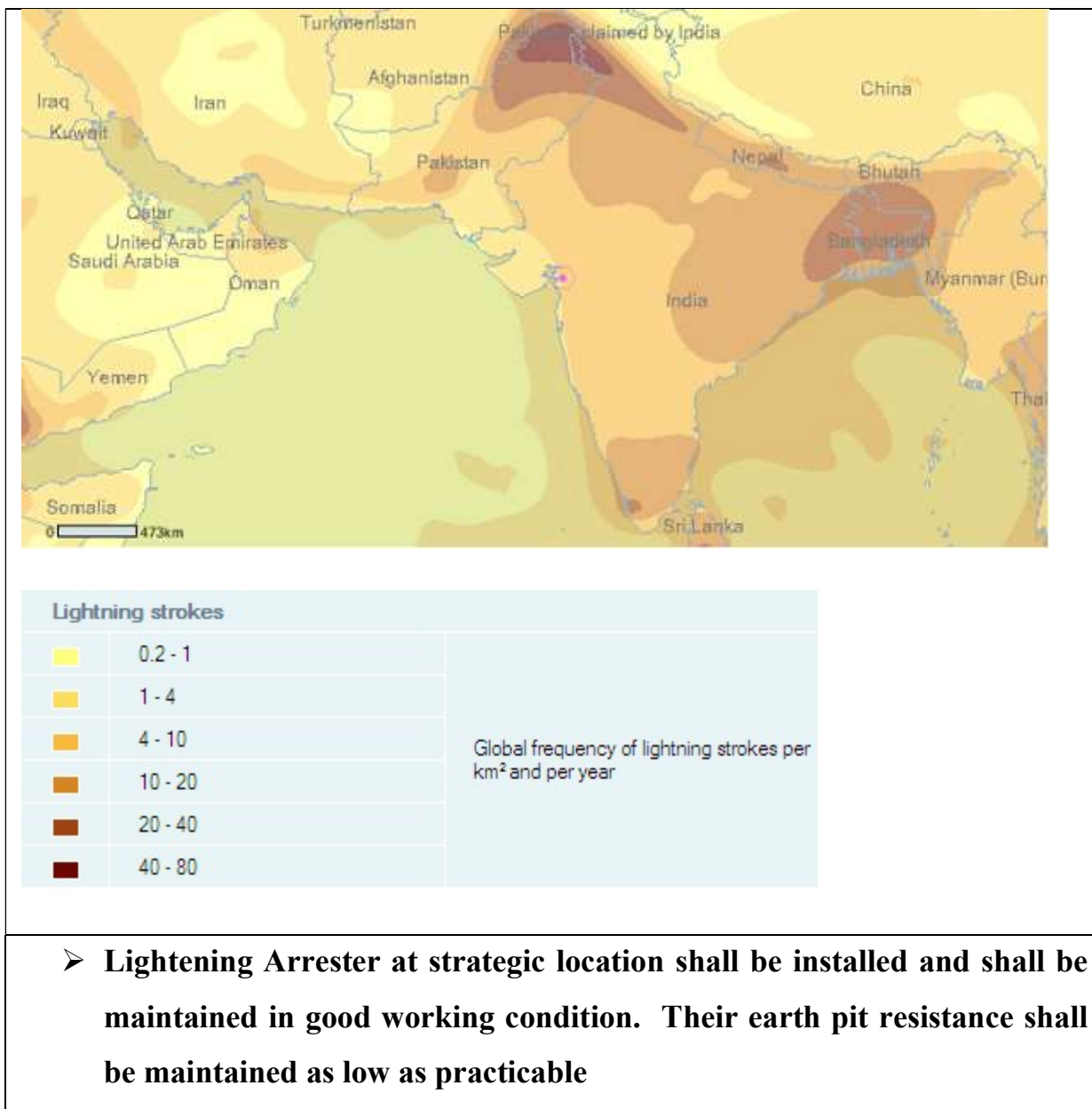
➤ AFTER EARTHQUAKE

- Do not enter damaged buildings.
- If trapped in rubble:
 - Do not light a matchstick
 - Cover your mouth with a cloth.
 - Tap on a pipe or a wall.
 - Sound a whistle
- Shout only as a last resort. This will help you conserve energy.
- Use stairs and not lifts or elevators.
- Move cautiously, and check for unstable objects and other hazards above and around you. Check yourself for injuries.
- Anticipate aftershocks, especially after a major earthquake.
- Stay away from beaches. Tsunamis and seiches sometimes hit after the ground has stopped shaking.
- Do not spread and/or believe in rumors.
- Leave a message stating where you are going if you must evacuate your house.
- Do not attempt to cross bridges/flyovers, which may have been damaged.

➤ COMMUNITY

- Practice Drop, Cover, and Hold drills regularly.
- Practice evacuation drills regularly.
- Ensure that exit routes are marked and firefighting equipment is working properly, especially in high-rise buildings.

4.2 LIGHTNING



Thunderstorm is invariably accompanied by lightening A single stroke of lightening has 125, 000, 00 volts of electricity. That's enough power to light a 100-watt light bulb for more than 3 months, or enough to seriously hurt or to skill someone. Know what steps to take in the event of an oncoming thunder storm & lightening. Lightening is something you should not be careless about, so seek a safe shelter immediately! Be warned, lightening

can and does strike just about any object in its path. When you see lightening, follow these safety rules.

➤ **BEFORE LIGHTNING**

- Cut down or trim trees that may be in danger of falling on your home.
- An important lightning safety guide is the 30-30 rule. After you see lightning, start counting to 30. If you hear thunder before you reach 30, go indoors. Suspend activities for at least 30 minutes after the last clap of thunder.
- Always keep the earthing working to avoid damage to electrical equipment.
- Consider buying surge protectors, lightning rods or a lightning protection system to protect your home, appliances and electronic devices.

➤ **DURING LIGHTNING**

❖ **If Indoors**

- Unplug all electrical equipment before the storm arrives. Don't use corded telephones, electrical devices, chargers, etc.
- Stay away from windows and doors and also stay away from verandas.
- Don't touch plumbing and metal pipes. Do not use running water.

❖ **If Outdoors**

- Get inside a house/building. Stay away from structures with tin roofs/metal sheets.
- If caught under the open sky, crouch. Don't lie down or place your hands on the ground.

- Don't take shelter near or under trees. Spread out and don't stand in crowd. Stay clear of water bodies.
- If you are outside, seek refuge in a car or grounded building when lightning or thunder begins.
- Stay in if you are inside a car/bus/covered vehicle.
- Don't use metallic objects and stay away from power/telephone lines.
- Get out of water – pools, lakes, small boats on water bodies.
- Avoid hilltops, open fields and beaches.

➤ AFTER LIGHTNING

- Watch out for fallen power lines and trees. Report them immediately.

➤ TREATING THE AFFECTED

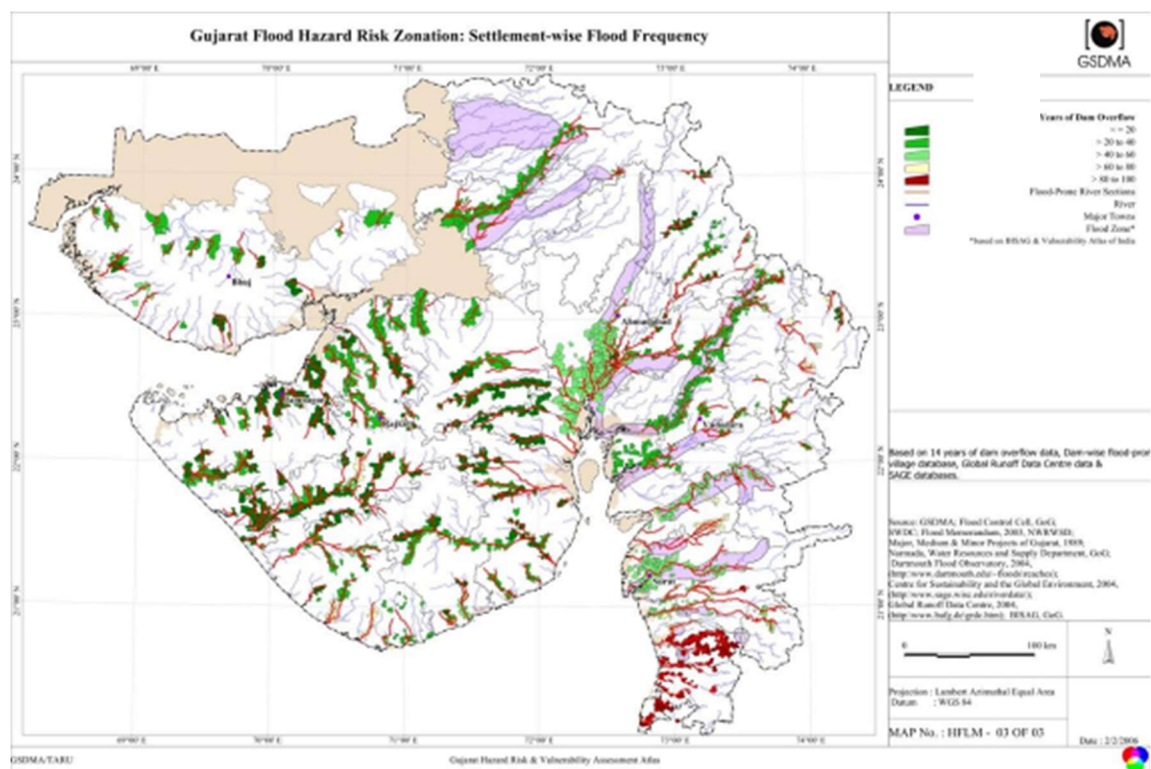
- Administer CPR (Cardio Pulmonary Resuscitation), if needed.
- Seek medical attention immediately.

4.3. URBAN FLOODS

The climatology of Gujarat is influenced by the Arabian Sea in the West and three hill ranges along its Eastern border. A long coastline makes parts of arid Saurashtra and Kutch occasionally experience very high rainfall. These occasional heavy rainstorms are responsible for most of the floods in the state.

All major rivers in the state pass through a wide stretch of the very flat terrain before reaching the sea. These flat lowlands of lower river basins are prone to flooding. Cities like Ahmedabad, Gandhinagar, Surat and Bharuch are located on the flat alluvial plains of large rivers.

Concentrated runoff resulted by heavy rainfall cause flash floods in the small river basin of Saurashtra and Kutch because of their fairly impervious catchments (rocky or black cotton soils) and steep sloping upper catchments.



➤ BEFORE FLOOD

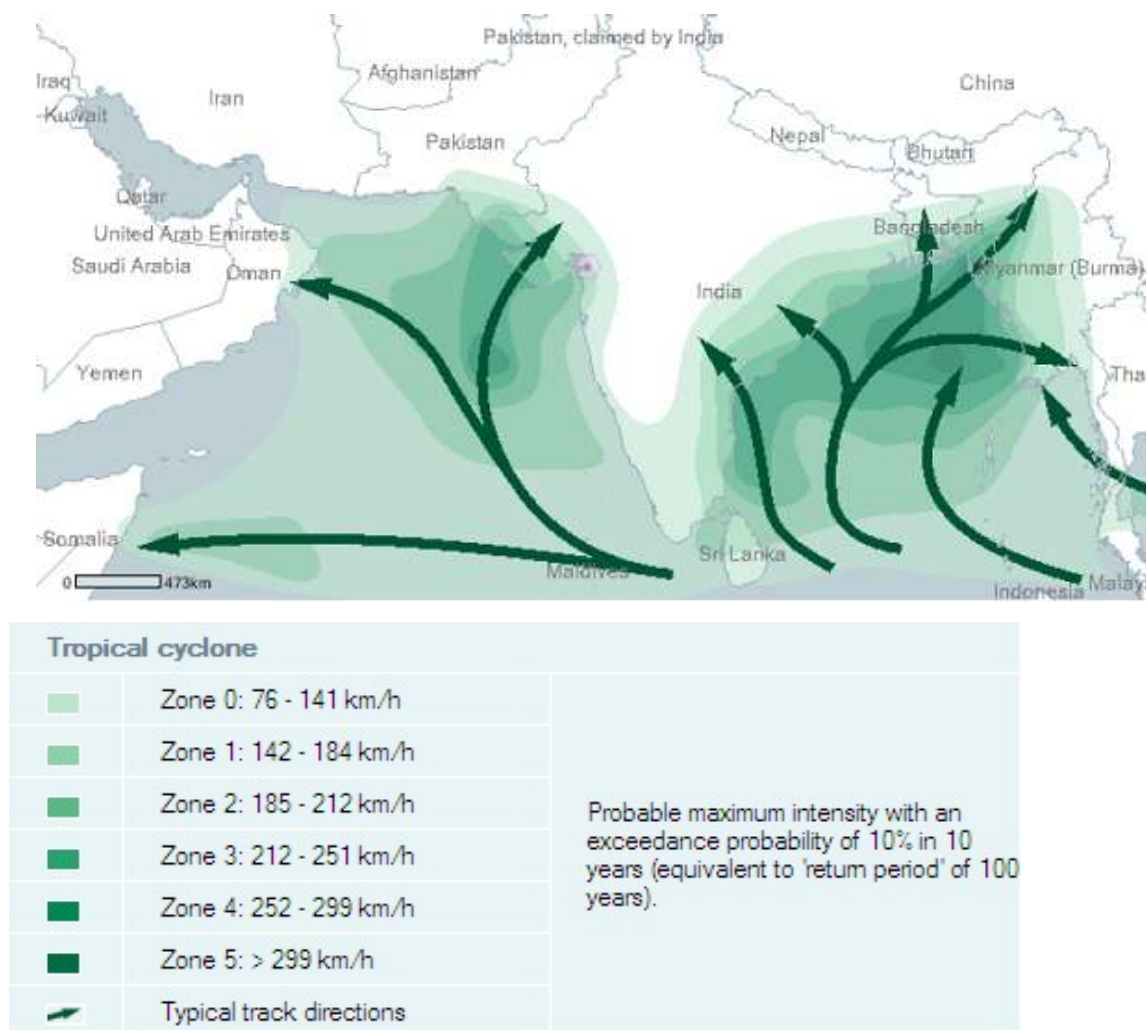
- Keep drains clean – Do not litter waste, plastic bags, plastic bottles in drains.
- Remain safe inside – Try to be at home if high tide and heavy rains occur simultaneously.
- Be informed/be alert – Listen to radio, watch TV or read newspapers for weather updates and flood warnings.
- Survival is key – Prepare an emergency kit with essential items for safety and survival.
- Keep your documents and valuables in water-proof bags.
- Do not venture into flood water.
- Do not spread and / or believe in rumors.

➤ DURING FLOOD

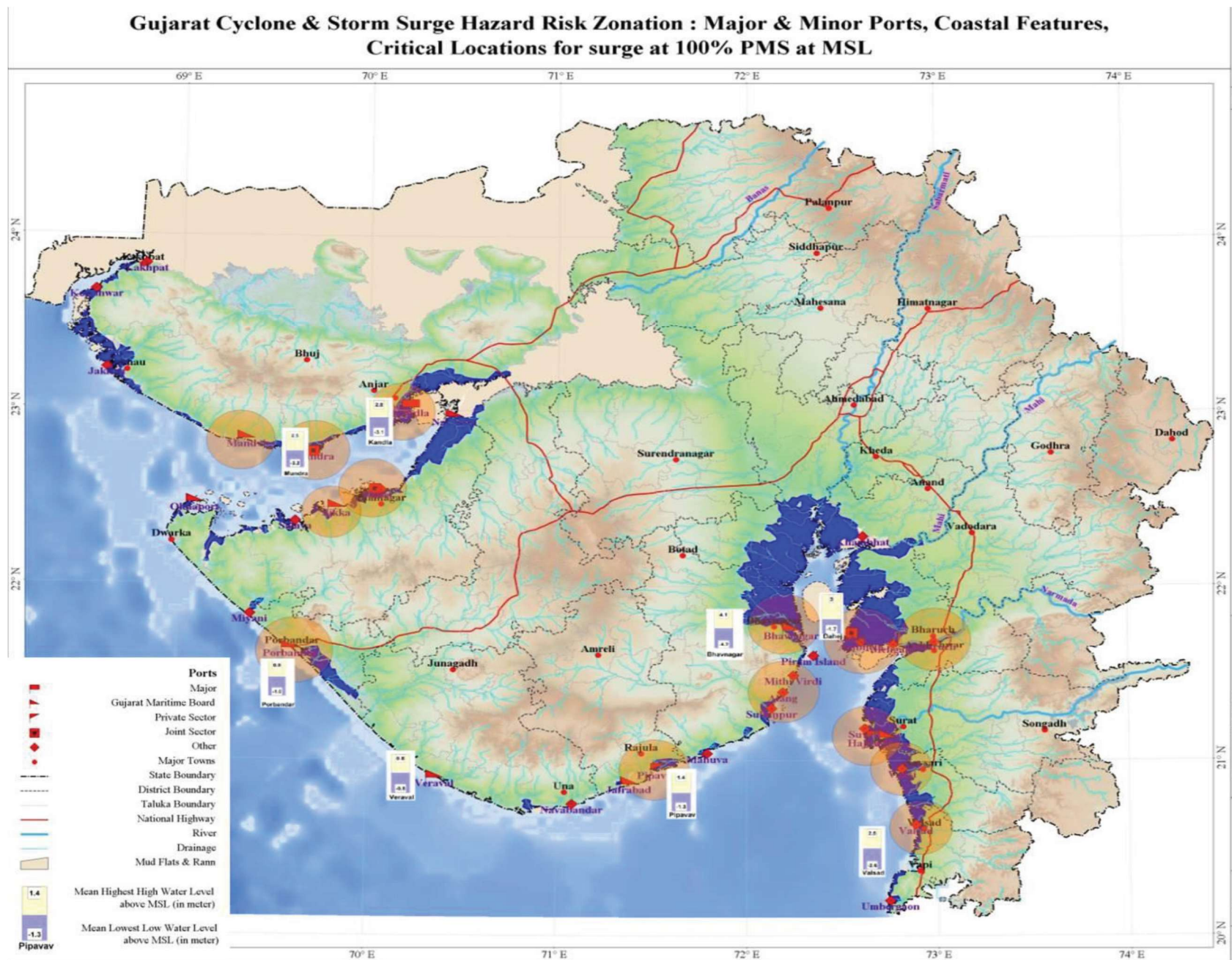
- Ensure safety – Turn off power and gas connection and be alert for gas leaks.
- Respond quickly – Evacuate low-lying areas and move to higher places.
- Evade illness – Drink boiled / chlorinated water.
- Watch your step – Stay from sewerage lines, gutters, sharp objects and debris.
- Don't get electrocuted – Stay away from electric poles and fallen power lines to avoid electrocution.
- Don't walk / swim through flowing water.
- Don't drive through flooded areas.
- Don't eat food that has come into contact with flood water.
- Don't use any damaged electrical goods.
- Don't use electrical equipment while standing on wet floors, especially concrete.

4.4. CYCLONE

Gujarat falls in the region of tropical cyclone. With the longest coast line of 1600 km in the country, it is highly vulnerable to associated hazards such as floods, storm surges etc. Most of the cyclones affecting the state are generated in the Arabian Sea. Two cyclonic storm seasons are experienced in Gujarat: May to June (advancing southwest monsoon) and September to November (retreating monsoon).



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➤ BEFORE CYCLONE

- Ignore rumors, stay calm, and don't panic.
- Keep your mobile phones charged for emergency communications, use SMS.
- Listen to radio; watch TV, read newspapers for weather updates.
- Keep your documents and valuables in water-proof containers.
- Try staying in an empty room, keep movable items securely tied.
- Prepare an emergency kit with essential items for safety and survival.
- Secure your house, especially the roof; carry out repairs; don't leave sharp objects loose.
- Keep cattle / animals untied to ensure their safety.
- In case of a storm surge / tide warning, or flooding, know your nearest safe high ground / safe shelter and the safest access route to it.
- Store adequate ready to eat food and water to last at least a week.
- Conduct mock drills for your family and community.
- Trim treetops and branches near your house with permission from the local authority.
- Close doors and windows securely.
- Evacuate immediately to safe places when directed by government officials.

➤ DURING CYCLONE

❖ If Indoors

- Switch off electrical mains, unplug all electrical appliances and gas connection.
- Keep doors and windows shut.
- If your house is unsafe, leave early before the onset of a cyclone. Reach a safe shelter.

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- Listen to radio; rely only on official warnings.
- If the building starts to crumble, protect yourself with mattresses, rugs or blankets, or by getting under a strong table or bench or by holding hold onto a solid fixture, such as a water pipe.

❖ If Outdoors

- Do not enter into damaged buildings.
- Seek a safe shelter as soon as possible.
- Never stand under a tree / electric pole.
- Beware the calm ‘eye’. If the wind drops, don’t assume the cyclone is over; violent winds may soon resume from another direction. Wait for the official ‘all clear’.

➤ AFTER CYCLONE

- Drink boiled / chlorinated water.
- Do not go out until officially advised. If evacuated, wait until advised to go back.
- Watch out for broken electric poles and loose wires and other sharp objects.
- Do not enter damaged buildings.
- Do not use damaged electrical equipment. Get them checked by an electrical first.

➤ FISHERMEN SHOULD

- Ignore rumors, Stay calm, and don’t panic.
- Keep mobile phones charged for emergency communication; use SMS.

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- Note down important and emergency phone numbers on a paper and keep it safely.
- Keep a radio set with extra batteries for update regarding cyclone and other natural calamities.
- Listen to radio; watch TV, read newspapers for weather updates.
- Keep boats or rafts tied up in a safe place.
- Don't venture out in the sea.

4.5 BIOLOGICAL EMERGENCIES

➤ BEFORE EMERGENCY

- Watch television and listen radio for news, apart from that keep update yourself from the internet for official news of any outbreak.
- Practice good hygiene and keep your premises clean.
- Use mosquito repellents or nets to protect from disease at night.
- Use boil water for drinking. Chlorinate it, if possible.
- Wash all vegetables before use or cooking or eating.
- Use insecticides to resist epidemic.
- Don't use unhygienic food.
- Immediately report any sickness with unusual and / or suspicious symptoms in the family / neighborhood to health authorities.
- Keep stock of general medication for emergency purpose.

➤ DURING EMERGENCY

- Keep distance from and avoid direct contact with the affected person.
- Avoid going to congested places.

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- Use respiratory mask and hand gloves for protection.

➤ AFTER EMERGENCY

- Follow official instructions only such as radio news or government instructions to avoid getting caught in rumors and help the authorities to dispose the contaminated items like food, poultry, crops, vectors and other materials, if advised.
- Ensure that all the required immunization steps are done and necessary precautions are taken by respected authority and citizens.

4.6 CHEMICAL EMERGENCIES

➤ BEFORE EMERGENCY

- Don't mix unknown chemicals, even common household products. Because unknown chemical mixture can create harmful situation such as ammonia and bleach mixture creates toxic gases.
- Store chemical products properly with MSDS.
- Store uneatable items in their original containers tightly with sticker for easy identification.
- Dispose unused chemicals in a proper manner because improper disposal can be harmful as it may contaminate the local water supply.
- Do not smoke or use light fire in the hazardous zones or areas because it may create explosion and damage to the surrounding area.
- Avoid staying near the industries whose chemical processes are hazardous.
- Keep emergency contact numbers handy, including that of nearby hazardous industries.

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- Participate in capacity building programs organized by the government / voluntary organizations / industrial units.
- Identify safe places and shelters along with escape routes to evacuate easily.
- Prepare a family disaster management plan for safety.
- Prepare an emergency kit and first aid kit with essential items for safety and survival.

➤ DURING EMERGENCY

- Firstly, do not panic. Evacuate yourself quickly through the designated escape route.
- Keep a wet piece of cloth on your face to get protection from unknown gases while evacuating.
- If you are unable to evacuate then close all the doors and windows tightly.
- Once you are at safe location then inform emergency authorities such as police, hospital etc.
- Don't spread and believe in rumors.

➤ AFTER EMERGENCY

- Do not consume uncovered / unhealthy food and beverages.
- Change clothes quickly because it may contain precipitates of hazardous gases or chemical that may irritate your skin and could affect your health. In addition, wash hands with soap solution properly.

➤ COMMUNITY

- Make the entire neighborhood aware about the chemical hazards and which first aid treatment is required according to treat them.

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- Listen radio or watch TV for recent updates or use internet to get information from official source.
- Provide accurate information to government officials about damaged or contaminated areas.
- Provide information to the authorities about the exact requirement of protective equipments to dealing with the hazard.

4.7 COLD WAVE

➤ BEFORE COLD WAVE

- Should have stock of adequate winter clothing. Multiple layers of clothing is also helpful.
- Prepare first aid kit and emergency supply to avoid critical situation.

➤ DURING COLD WAVE

- Stay indoors as much as possible; minimize travel to prevent exposure to cold wind.
- Keep dry yourself, if wet then change clothes quickly to avoid loss of body heat.
- Prefer mittens over gloves because mittens are warmer than the hand gloves and provides better insulation from cold.
- Listen radio or watch TV or read newspaper to get weather updates.
- Drink hot tea or coffee or water regularly.
- Don't drink alcohol because it reduces your body temperature.
- Take care of elderly people and children.
- Store adequate water at separate place because in cold wave pipes may freeze.

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- Watch out of symptoms of frostbite like numbness, white or pale appearance on fingers, toes, ear lobes and the tip of the nose.
- Do not massage the damaged / frostbitten area because this can cause more damage.
- Keep affected part of body in warm water (not hot) because the temperature of water should be comfortable to touch for unaffected parts of body.
- Do not ignore shivering. It is an important first sign that the body is losing heat and a signal to quickly return indoors.

➤ IN THE CASE OF HYPOTHERMIA

- Get the person into a warm place and change his/her clothes.
- Keep warm the victim's body with skin to skin contact, dry layers of blankets, clothes, towels or sheets.
- Give warm drinks such as water, tea or coffee to help increase the body temperature, but do not give alcohol.
- Seek for medical attention, if the condition becomes uncontrollable or worsens.

4.7 DROUGHTS

➤ WHAT YOU SHOULD DO

- Listen to the Radio and watch TV or read newspaper for warnings, recent updates and instructions about drought.
- Practice how to do rainwater harvesting.
- Repair and rejuvenate all the local water bodies before the rainy season for safety.
- Use drought resistant or low water intensity crop seeds plants.
- To protect soil moisture, plant the drought-tolerant grasses, shrubs or tress.
- Excavate deep pits to help increase groundwater level.
- Use sprinkler method/drip irrigation method for crop irrigation and irrigate crops during evenings.
- Participate in water conservation programs to improve efficiency of techniques.
- Spray used domestic water to the grasses and plants to avoid wastage.
- Use a bucket in place of a shower for bathing.
- Use wet clothes to clean and scrub floors instead of using running water.
- Construct such toilets that need less water to flush and clean.
- Regularly check tanks, taps, pipes etc. to prevent leakage of water.
- Reuse water as much as possible.
- Adapt water conservation practices in lifestyle. Follow all state and local restrictions on water use, even if you have a private well because groundwater levels could be affected by drought too.

➤ WHAT YOU SHOULD NOT DO

- Do not waste water at all.
- Do not cut trees and forests.
- Do not waste rainwater which is collected on rooftops etc.
- Do not mess with traditional water resources such as ponds, annicuts, well, tanks, rivers etc.
- Do not use high water intensity seeds or crops; don't irrigate crops during mornings.
- Do not use the flowing water during brushing, shaving, washing utensils, clothes etc.
- Avoid using handheld hose for any domestic chores.

4.8 FIRE EMERGENCY

➤ PREPAREDNESS BEFORE FIRE

- Prepare and practice a response plan for residential and office complexes for safe evacuation in fire emergency.
- Regularly carry out and practice fire rescue drills such as stop, drop and roll.
- Ensure that all residents or visitors are periodically trained to face different emergency situations and to provide first aid.
- Ensure that smoke alarms are fitted in buildings and check them periodically that they are working properly.
- Try to make your residential building, office premises etc as 'No Smoking' zones. If you really need to then construct a one separate smoking area like airports have.
- Be familiar with the exit routes of the building.

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- Keep always the exit routes or staircases free of any obstructions. Periodically check exit routes that there are no obstructions and maintain them.
- Ensure that there is enough open area and wide roads available in and around your home and office premises to ensure easy access and movement of emergency vehicles.
- Ensure that exit routes are marked and firefighting equipment is working properly in your residential and office area. Always maintain them by checking periodically.
- Ensure that your house and office premises have a first aid kit which placed at every segment or location.
- Do not leave open fire without extinguish it.
- Do not accumulate or store old newspapers or combustible materials in your house.
- Do not burn waste, dry leaves or vegetation and always dispose them through appropriate municipal channels.
- Do not store flammable liquids in the house.
- Always keep lighters and matchboxes away from your children.
- Do not put papers, clothes and flammable liquids near heaters/stoves.
- Keep LPG gas stoves on a raised platform; do not keep them on the floor.
- After cooking, do not forget to turn off the gas cylinder valve and knob of the gas stove.
- Do not throw matches, cigarette butts etc. in waste baskets.
- Don't put oil lamps, pastiles (Agarbattis) or candles on wooden floor or near combustible material.
- Don't wear loose, flowing and synthetic clothes while cooking.
- Always evaluate the electric load requirement for your premises/buildings and ensure that the power company supplies electricity accordingly to overcome overload. This will help you to avoid heating due to overload.

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- Use standard electrical appliances, switches and fuses etc. to prevent fire from electrical short circuit. Also, ensure that there are enough Earth Leakage Circuit Breakers (ELCBs) to prevent short circuit.
- Periodically check for loose electrical connections. Do not run electric wires / cords under carpets or in congested areas.
- Switch off all the electrical appliances after they have been used and remove plugs from the socket.
- Switch off the 'Main Switch' when you are leaving home for duration.
- Don't plug and use too many electrical appliances in one connection or socket.
- Ensure that there are no major electric installations in day-to-day usage area.

➤ IN CASE OF A FIRE

- Raise an alarm and inform the Fire Brigade immediately.
- Do not panic; stay calm and wait for help.
- Unplug all electrical appliances.
- Try to extinguish the fire with suitable and available equipment such as Fire Extinguisher, water etc.
- Close the doors and other openings. Place a wet cloth under the gap of doors to smoke from spreading. Use a wet cloth to cover your mouth to filter smoke or inhalation.
- Exit in a proper way if the fire is out of control.
- Do not go back for your possessions, property or valuable things.
- In case of burn injuries due to fire, pour water over burned parts until pain subsides.

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➤ IF YOU ARE TRAPPED BY A FIRE

- Stay close to the floor if smoke permeates your location.
- Before opening a door, check it if any heat radiation. Use the back of your hands to test the temperature at the top of the door, at the knob and at the frame before opening. If it is too much hot, then do not open the door.
- If you are unable to escape through a door, use a window. However, if it is too high to jump from a window, try to attract attention of people by waving hand, light or something.
- If you can leave the room, close the door behind you because it will stop or slow down the progress of the fire and escape from that place by crawling low.
- If your clothes catch fire, drop yourself to the ground and roll to the floor to extinguish the flames. If fire is too much then remove that cloth.

➤ IN CASE YOU HEAR THE FIRE ALARM

- Leave the area or premises by the nearest available exit.
- Close all doors and windows behind you.
- Do not use lifts. Use staircases to exit safely.
- On arrival of the fire service, help them to help you, guide them about all route.
- Give way the fire tenders to enable them to reach the spot quickly.
- Don't park your vehicles close to fire hydrants/underground static water tanks because it will resist the work to extinguish the fire.
- Guide firemen to water sources i.e. tube wells, ponds, static tanks etc. to take action quickly in lack of time.

4.9 FOREST FIRE

➤ PREVENTION AND PREPAREDNESS

- Keep emergency contact numbers of district fire service department and local authorities handy.
- Inform fire service department immediately if fire is out of control.
- Never leave a fire unattended in the vicinity of forested areas. Extinguish completely by dousing it with water and stirring the ashes until cold.
- Be careful while using and fuelling lanterns, stoves and heaters during camping. Make sure lighting and heating devices are cooled before refueling. Avoid spilling flammable liquids and store fuel away from appliances.
- Do not discard cigarettes, matches and smoking materials while passing through forested areas.
- Do not burn stubble, municipal waste etc. next to forest area.
- Do not burn dry waste in farms close to forest area.
- Know your exit routes to evacuate easily and keep emergency supplies ready with you.
- Practice evacuation drills periodically and determine and mark safe meeting locations.

➤ EVACUATION IN CASE OF FOREST FIRE

- Evacuate immediately on instructions from forest fire service or local authorities.
- Take precautions to get protection from flying sparks and ashes.
- Untie cattle to ensure their safety.

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➤ BEFORE LEAVING YOUR HOUSE

- Remove all combustibles materials such as firewood, yard waste, cooking gas cylinders and fuel cans etc. from your yard.
- Close all windows, vents and doors to prevent fire.
- Fill large vessels with water to limit the spreading of fire in emergency situation.
- Cut down bushes, hedges and shrubs close to the house to isolate the house from fire.
- Clear all gully and roof spaces of leaves.
- Spray water to dampen house roof, walls and any trees and adjacent to the house.
- Close shutters, blinds or any non-combustible window coverings to reduce radiant heat.
- Keep your radio ON to get official news or announcements.

➤ IF CAUGHT IN A FOREST FIRE IN AN OPEN AREA

- Use natural source or static water to reduce flame of fire such as a pond or a river.
- When there is no water or resources then try to use wet clothes, a blanket or soil till the fire passes.
- Breathe through wet or moist cloth to resist contamination. Do not try to enter smoked area.
- Take shelter with keep distance from forest fire, and make sure there is no fuel or ignition material that can cause fire.

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➤ IF TRAPPED AT HOME IN A FOREST FIRE

- First try to stay in the house and wait to pass the fire before the house burns down.
- If a closed door is hot to touch, do not try to open it as there may be fire on the other side.

➤ IF CAUGHT IN A VEHICLE IN FOREST FIRE

- Stay in car or on vehicle because it is less dangerous than trying to escape from a forest fire on foot.
- Close windows of your car or truck and don't stay at middle of forest fire, try to escape and drive the vehicle.
- Drive slowly with headlights full on
- Watch and drive carefully for other vehicles and people who are running on foot.
- Do not drive thorough heavy smoke. If you are not able to see what's ahead of it, don't put your and other's lives in danger.

➤ IN CASE YOU MUST STOP

- Park your vehicle or car as far as possible from bushes, shrubs, trees and thickets.
- Keep your lights on and turn off the engine.
- Stay on the floor of your vehicle.
- Cover your body with anything nonflammable material such as blankets or jackets.
- Do not panic if smoke and sparks enter the vehicle or car because the fuel tanks of vehicle can rarely explode.

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➤ SEASONALITY OF HAZARDS

By understanding the approximate occurrence of hazard, the Gujarat state may remain prepared for the respective hazards by activating the relevant departments for the same. The table below is only indicative of the occurrence.

Hazards	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Cyclone												
Drought												
Earthquake												
Epidemic												
Fire												
Flood												
Heat Wave												
Industrial/ Chemical Disasters												
Road/ Train Accidents												
Stampede												
Terrorist Attack												
Tsunami												
Legend	High Occurrence				Moderate Occurrence				Low Occurrence			

5.0. POST EMERGENCY PLAN

5.1 REHABILITATION

The Incident Controller will not signal the end of the emergency until he is satisfied that all fires are extinguished and there is not of re-ignition. In case of gas escapes, the emergency will be declared ended only when the source of emission has been effectively isolated and gas clouds are disbursed. Even when the All Clear has been given, great care is needed when re-entering affected areas, and no work in connection with the salvage, collection of evidence or start up should be put in hand until a thorough examination of the area has been carried out. The statutory powers of the Factory Inspectors must be born in mind before evidence is disturbed. It is particularly important to avoid the introduction of possible sources of ignition, such as diesel engines, hand or power operated tools and flame-cutting equipment and so on until it has been established that no flammable materials remain whereby they could be ignited.

Re-entry procedure in the factory and affected or contaminated area in vicinity should be prescribed and followed. The security officer should know it and guide people accordingly.

Holistic rehabilitation post disaster includes many inter linked aspects. It is critical to address all need of affected population in order to achieve early recovery and to bring back normalcy to their lives.

➤ SOCIO-ECONOMIC REHABILITATION

Socio-economic rehabilitation is aimed at revamping the social and economic fabric to the pre-disaster or a better situation. It also addresses issues like that of livelihood restoration and generation. This is done by providing required training, skill, tools and equipment to restart the previous or new livelihood options.

Care should also be taken to address the needs of various socially and economically vulnerable groups like that of women, adolescent girls, old age persons, differently able

persons, children, destitute, below poverty line population, scheduled castes, scheduled tribes, particularly vulnerable tribal groups, etc.

➤ PSYCHOLOGICAL REHABILITATION

Disasters often lead to long time stress and trauma due to loss of near and dear ones, injuries, loss of limbs, loss of housing and related property, trauma generated by facing the disaster and fearful sites, fear of repetition of the disaster, etc. If not addressed appropriately, it may lead to lifelong psychological fear and disorders, thus it is necessary to provide psycho-social first and psychological care to the affected population.

➤ ENVIRONMENTAL REHABILITATION

Environmental impacts of natural disasters can result in serious risk to life and livelihoods if not addressed. Environmental emergencies like uncontrolled, unplanned or accidental release of a substance into the environment not only impact human life in many ways but also damage environment to great extent which may be impossible or may take years to restore to original.

5.2. RECOVERY OPERATIONS

The procedures outlined in this section are intended for re-establishing normal operations at the earliest after an emergency. In addition, the procedure also provides for determining the cause of the accident, so that such incidents can be prevented in future.

➤ This section is divided into five parts

1. Incident investigation
2. Establishing a recovery team
3. Damage Assessment

4. Clean-up and restoration
5. Post-Emergency and Recovery Reporting

5.2.1. INCIDENT INVESTIGATION

Incident investigation should be taken up to determine the cause of the emergency and the means of preventing any such occurrences again.

➤ PROCEDURE

The investigation team should immediately seal off the incident scene and commence its investigation to minimize the loss of any physical evidence.

The investigation of the scene should include,

1. Photographing the area.
2. Determining the point of origin of the Fire / Leak / Explosion, if applicable.
3. Note the position of valves, controls and devices.
4. Note any unusual items in the area or any damage that is inconsistent with the type of incident which is in-cognizable . Written or recorded statements are to be taken from all operators involved, potential witnesses and others who might have pertinent knowledge about the incident.

➤ REPORT

A final report is to be prepared to include the most probable cause(s) and recommended corrective measures. The report should consider:

1. Failure of equipment.
2. Failure of maintenance.

3. Failure of procedures.
4. Inadequate training.
5. Human error etc.

➤ CORRECTIVE ACTIONS

The investigation team is also responsible for conducting a review of response activities during the emergency to evaluate the adequacy of training, equipment and procedures.

All the concerned departments are responsible for ensuring that all corrective actions to prevent recurrence of the incident are taken and to ensure better responses to emergencies, if any in future.

5.2.2. RECOVERY TEAM

➤ PURPOSE

In order to facilitate the restoration of normal operations of the company after an emergency, a team is to be constituted by In-charge to manage recovery activities, including damage assessment.

➤ ORGANIZATION

The Recovery Team's organization will vary depending on the nature of the incident and the extent of recovery operations. As a general rule, however, individuals representing Maintenance, Safety, Quality Control, Accounts, Engineering etc., should be involved.

The recovery team is responsible for damage assessment, clean-up and salvage operations and the restoration of normal Depot operations.

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A primary function of the recovery team will be to assess the damage to company structures, equipment and materials. The damage to off-site areas and environment will also be assessed along with civil authorities.

5.2.3. CLEAN-UP AND RESTORATION OPERATIONS

As soon as incident investigations are completed and restoration plans have been made, clean-up and restoration activities should commence.

➤ DAMAGED EQUIPMENT

Temporary storage facilities will be established for damaged equipment to facilitate inspection by insurance personnel. Prior to restoration of normal operation, all affected equipment is to be tested and checked according to procedures established.

➤ POST-EMERGENCY RECOVERY REPORTS

The officer-in-charge of Safety is hold review sessions with emergency response personnel to evaluate:

1. The adequacy of emergency response procedures.
2. The adequacy of the investigation of the cause of the incident.
3. Summaries the post-emergency activities.

6.0. MAINTENANCE PLAN

6.1 INTRODUCTION

Plan maintenance is a dynamic process of updating the plan on a periodic basis. The backbone of maintaining the plan is carrying out mock drills and updating the plan based on lessons learnt thereof. This is a method of identifying the gaps and putting in place a system to fill the same. Regular updating of stakeholder details, contact numbers and resource inventory is another inherent and essential function of plan maintenance.

The District Administration, Gandhinagar constituted a special committee under the Supernumerary Assistant Collector, with designated nodal officers for the same in 2013 to undertake an overall updation exercise of the DDMP. Vulnerabilities newly brought to the attention of the district administration as a result of the disasters in Gandhinagar in the last year and lessons learnt have been incorporated. Detailed meetings with Line Departments and Nodal officers have also brought forth important lessons for Disaster Risk Mitigation and Reduction. These will be incorporated in this plan, and put up for discussion for dovetailing with development plans in the district. This will ensure that the element of Disaster Mitigation achieves due attention in all-important aspects of administration.

6.2. PLAN TESTING

The Commissioner of Relief and the Collector shall prepare, review and update the District level Disaster Management plan as provided for in the GSDMA Act (Section 22 (1) (C)). He/She shall also ensure that disaster management drills and rehearsals are carried out periodically.

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While updating the plan the following aspects need to be considered by the Collector every year:

- i) Critical analysis of the outcome of exercises & mock drills as part of plan testing.
- ii) Incorporation of lessons learnt in the updated plan as a result of recommendations received from different stakeholders and as a result of mock drill exercises conducted.
- iii) Regular updation of the resource inventory and key infrastructure available in the district.

After plan testing and incorporation of lessons learnt, the Collector should send a copy of the revised and updated plan to the following officials:

- (a) Chief Secretary, Government of Gujarat
- (b) Chief Executive Officer, Gujarat State Disaster Management Authority
- (c) Principal Secretary, Revenue Department
- (d) Head of all Line Departments
- (e) State Emergency Operation Center
- (f) District Emergency Operation Center
- (g) Taluka Officers
- (h) ERCs
- (i) IMD
- (j) CWC/ACWC

The main objectives of plan testing are to:

- (i) Determine the feasibility and compatibility of back up facilities and procedures.
- (ii) Identify areas in the plan that need modification.
- (iii) Identify training needs of key stakeholders.
- (iv) Assess the ability of the organization/department to respond to disaster threats.

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All departments that have specific roles and responsibilities in the DMP must have a system to ensure that all Officers of their departments who have a specific role to play are fully conversant with their responsibilities/tasks.

6.3. DEBRIEFING AND EVALUATION-MOCK DRILLS

- After the mock exercise, debriefing and evaluation is very important. It is of critical importance that insights are collected from participants and use them to modify the plan.
- Debriefing is very effective as it is carried out immediately after the exercise. It also includes documentation in terms of recommendations and improvements of the plan.
- The lessons learned from the mock exercise are likely to be similar to those from real events. The only major difference is that exercises are controlled events, specifically designed to test procedures and they can be repeated again and again until sound/workable arrangements are in place.

6.4. REVIEW / UPDATING OF PLAN

The Disaster Preparedness and Response Plan should be reviewed and updated regularly, based on inputs as under:

- (a) Drills and Rehearsals
- (b) Recommendations from all Depts. in their Annual DM Report
- (c) Lessons learnt from Disasters in other Districts, States and countries
- (d) Directions from GSDMA, Ministry of Home Affairs, NDMA, Government etc...

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ANNEXURES

ANNEXURE -1

CONTROL ROOMS CONTACT NUMBERS FOR DISASTER INFORMATION

Sr No	Control Room	Telephone Numbers
1.	2.	3.
1.	State Control Room	1070
2.	Disaster Management Control Room	079-23256720

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ANNEXURE – 2

DISTRICT CRISIS GROUPS: MEMBER DETAILS OF GANDHINAGAR DISTRICT

Sr. No.	Member Details	Contact No.
1.	2.	3.
1.	District Collector – Shree Ravindra Khatale IAS	9978406209
2.	Inspector of Factories-Shri J.B.Bodat	9601298852
3.	District Emergency Officer- Shri A. D. Vanzara	9427306418
4.	Controller Of Explosives -Shri Sanjay Kumar	9830675417
5.	Superintendent of Police-Shri Raviteja IPS	9978405070
6.	District Health Officer Shri A.J. Vaishnav (I.C)	9687679256
7.	District Agriculture Officer - Shri J.S. Patel	9426597370
8.	R.T.O. Officer- D.B.Vankar	9913936440
9.	District Development Officer – Shri D.K.brhmbhat	9978406234
10.	Municipal Commissioner – Shree	9978400531
11.	Chief Fire Officer – Shree Rajesh Patel (I/C)	9714554586
12.	Chief Medical Officer (CMO)/ Civil Surgeon – Dr Kinjal Modi	9427309440
13.	Mamlatdar (Disaster Management) – Shree Nilesh Rathod	8141069678
14.	District Project Officer (GSDMA) – Maulik Pandya	7211124455
15.	District Information Officer – Parul Maniya	7574857845
16.	Gujarat Pollution Control Board – Sanjay Malsttar	9426931820

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Sr. No.	Member Details	Contact No.
1.	2.	3.
17.	Technical Expert – Mr. R.K. Sharma (IFFCO)	8905784649
18.	Technical Expert – Mr. Ganatra (Daddy Chemical)	9924078784
19.	Technical Expert – Mr. Sushilkumar (HPCL)	9594820637
20.	Chair Person of LCG –	

ANNEXURE -3

DEMOGRAPHIC INFORMATION

TOTAL AREA OF GANDHINAGAR DISTRICT (TALUKAWISE) AND POPULATION DISTRIBUTION

Sr. No.	Name of Taluka	Area (Km ²)	Villages	Population
1.	2.	3.	4.	5.
1.	Gandhinagar	671.32	80	560497
2.	Kalol	487.60	67	356127
3.	Dehgam	612.19	96	268562
4.	Mansa	368.89	51	206567

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ANNEXURE -4

RAIN FALL DATA OF GANDHINAGAR DISTRICT IN MM (1985 to 2018)

Sr. No.	Taluka	1985-2014	2015	2016	2017	2018
1.	2.	3.	4.	5.	6.	7.
1.	Gandhinagar	687	558	557	924	310
2.	Dehgam	761	669	812	1057	449
3.	Kalol	723	599	645	1738	359
4.	Mansa	774	739	744	1018	273

ANNEXURE – 5

NATURAL DISASTER HISTORY

LIST OF NATURAL CALAMITIES DETAILS OF PAST DISASTERS

❖ EARTHQUAKE

Year	Very dangerous incident	Number of Vulnerable villages	Number of dead person	Number of dead animal	Property sabotage	Financial loss (In lakh)
1.	2.	3.	4.	5.	6.	7.
2019 to 2024	0	0	0	0	0	0

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❖ FLOOD

Year	Migration of people	Number of dead person	Number of dead animal	Number of Sabotage property
1.	2.	3.	4.	5.
2014	0	0	0	12
2015	387	--	--	327
2016	--	--	--	--
2017	2400	--	--	696
2018 to 2024	--	--	--	--

Vulnerable Villages due to flood in Gandhinagar District are Isanpur mota, Magodi, Dabhoda, Vadodara, Galundan, Basan, Vankanerda, Sonarda, Raypur, Lodra, Shahpur.

❖ CYCLONE

Year	Migration of people	Number of dead person	Number of dead animal	Number of Sabotage property
1.	2.	3.	4.	5.
2014	--	--	--	--
2015	--	--	--	--
2016	--	--	--	--
2017	--	--	--	--
2018 to 2024	--	--	--	--

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ANNEXURE -6

HOSPITALS (GOVT PHCS/CHCS, PRIVATE AND CHARITABLE) IN THE GANDHINAGAR DISTRICT

Sr. No.	Name of CHCS
1.	2.
1.	CHC Adalaj
2.	CHC Charada
3.	CHC CHHALA
4.	CHC Dehgam
5.	CHC Mansa
6.	CHC Nardipur
7.	CHC Rakhiyal
8.	CHC Sadra
9.	Civil Hospital Ganghinagar
10.	GMCU-PHC Palaj
11.	GMCU-PHC Sec-2
12.	GMCU-PHC Sec-24
13.	GMCU-PHC Sec-29

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ANNEXURE -7

PRIMARY HEALTH CENTRES IN GANDHINAGAR DISTRICT

Sr. No.	Primary Health Centre	Contact No.
1.	2.	3.
1.	Primary Health Centre, Bilodara	253413
2.	Primary Health Centre, Dabhoda	255900
3.	Primary Health Centre, Pundhara	285256
4.	Primary Health Centre, Adalaj	271226
5.	Primary Health Centre, Bahiyal	262065
6.	Primary Health Centre, Dev-Muvada	263735
7.	Primary Health Centre, Hajipur	285768
8.	Primary Health Centre, Itadara	274095
9.	Primary Health Centre, Kadadara	269095
10.	Primary Health Centre, Kadjodara	265254
11.	Primary Health Centre, Mahudi	284421
12.	Primary Health Centre, Mokhasan	269007
13.	Primary Health Centre, Rancharada	260142
14.	Primary Health Centre, Rupal	275342
15.	Primary Health Centre, Saij	221094
16.	Primary Health Centre, Sughad	276079
17.	Primary Health Centre, Unava	275158

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Sr. No.	Primary Health Centre	Contact No.
1.	2.	3.
18.	Primary Health Centre, Uvarsad	271366
19.	Primary Health Centre, Vadodara	249561
20.	Primary Health Centre, Varsoda	285351
21.	Primary Health Centre, Pansar	288562
22.	Primary Health Centre, Adaraj	270284
23.	Primary Health Centre, Sanoda	230575

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ANNEXURE –8

TALUKA HEALTH OFFICE INFORMATION

No.	Taluka Name	Name & Contact No.	Email Id	Population Census
1.	2.	3.	4.	5.
1.	Gandhinagar	Shree Dr.Vijay Chuhdhary 9998633953	thogngr.health.gandhinagar@gmail.com	13.91 Lakh
2.	Kalol	Shree Dr.R.K.Patel 9909942217	thokalol.health.gandhinagar@gmail.com	
3.	Dahegam	Shree Dr.Mitesh Satyaki 8849412381	thodahegam.health.gandhinagar@gmail.com	
4.	Mansa	Shree Dr.Pravinkumar Patil 9909942234	thomansa.health.gandhinagar@gmail.com	

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AVAILABLE EMERGENCY HEALTH FACILITY SERVICE IN GANDHINAGAR

Services	Numbers
1.	2.
Taluka	04
Health Sub Center	173
Primary Health Center	23
Composite Health Care System	13
Sub District Hospital	01
District Civil Hospital	01
Medical College	01
Private Hospital	306
Private Laboratory	25
Postmortem Unit	03

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NEXURE – 9

OTHER HOSPITALS LIST

Sr. No.	Hospitals	Contact No.
1.	2.	3.
1.	Civil Hospital, Gandhinagar	23221931/32/13
2.	Namo'stuTe Hospitals, Gandhinagar	079-42686791
3.	Kanoria Hospital, Bhat	079-23969298
4.	Shashvat Hospital, Gandhinagar	079-23243108
5.	PSM Hospital, Kalol	9638052525 / 8866213131
6.	Pagarav Hospital & I.C.U.	8980809753/54
7.	Rugved Hospital, Kalol	6353331200 / 7947425244
8.	Mishika Multispeciality Hospital, Dehgam	9316750451
9.	Divine Multispeciality Hospital	7861812966/67
10.	Aashka Multispeciality Hospital	9879752777
11.	Hi – Tech Hospital	079-42680036

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ANNEXURE –10

MEDICAL FACILITIES AVAILABLE IN HEALTH CENTERS

Sr. No.	Institute Name	No. of Bed				
		Available Services			Extra Possibilities	Total
		A.C.	Simple	Total		
1.	2.	3.	4.	5.	6.	7.
1.	Primary Health Center	--	150	150	150	1050
2.	Composite Health Center	--	600	600	265	1070
3.	Civil Hospital	14	551	565	50	615
4.	District Health Center	--	300	300	100	400
5.	Hospitals by NGO	100	3000	3100	900	4000
6.	Private Hospital	300	4000	4300	1000	8000

ANNEXURE –11

LIST OF THE MAH INDUSTRIES OF GANDHINAGAR DISTRICT HANDLING HAZARDOUS CHEMICALS

Sr. No.	Name of the Factory	Category	Hazardous Chemical	Quantity (MT)
1.	2.	3.	4.	5.
1.	Amul Insecticides Pvt. Ltd.	MAH	Phorate	10 MT
2.	Anmol Chloro Chem	MAH	Chlorine	40.5 MT
3.	Bhagwati Industries	MAH	Chlorine	18 MT
4.	Balaji Formalin Pvt. Ltd.	MAH	Methanol	490 MT
			Formaldehyde	1145 MT
5.	Indian Farmers Fertiliser Co.Op. Ltd.	MAH	Ammonia	25000 KL

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Sr. No.	Name of the Factory	Category	Hazardous Chemical	Quantity (MT)
1.	2.	3.	4.	5.
6.	kemplast industries	MAH	Chlorine	138 MT
7.	HPCL LPG Bottling plant	MAH	LPG	650 MT
8.	Mahalaxmi Industries	MAH	Chlorine	18 MT
9.	Mutual Chemicals	MAH	Chlorine	13.5 MT
10.	Sahajand Chem Industries	MAH	Chlorine	10.8 MT
11.	Saibaba Surfactant Pvt. Ltd.	MAH	Ethylene Oxide	10 MT
12.	Sanginita Chemical	MAH	Chlorine	36 MT
13.	Shree Vallabh Chemical	MAH	Ethylene Oxide	7.5 MT
14.	Pinnacle Chlorochem Pvt. Ltd.	MAH	Chlorine	20 MT
15.	Trend India	MAH	Oleum	60 MT
16.	Deedy Chemicals Pvt. Ltd.	MAH	Chlorine	47.7 MT
			Acetic Acid	30 MT
			Thionyl Chloride	17 MT
			Sulphur	50 MT
			Sulphur Mono Chloride	5 MT
17.	Shaligram Laminates	MAH	Formaldehyde	20 MT
			Methanol	10 MT
			Phenol	20 MT
			Caustic Soda Flakes	200 KG
			Hcl	70 Kg
18.	Tirupati Foam Ltd.	MAH	Toluene di-isocyanate	790
19.	Olympic Décor LLP	MAH	Formaldehyde	50 MT
			Methanol	18 MT
			Phenol	65 MT
	Multi Scaff (India) Pvt. Ltd.	MAH	Formaldehyde	200 MT

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Sr. No.	Name of the Factory	Category	Hazardous Chemical	Quantity (MT)
1.	2.	3.	4.	5.
20.			Methanol	80 MT
21.	Real Metal Chem Pvt. Ltd.	MAH	Chlorine	67.5 MT
22.	Velsond Resins Pvt. Ltd.	MAH	Formaldehyde	30 MT
			Methanol	40 MT
			Phenol	30 MT
23.	Ambition Mica Ltd.	MAH	Formaldehyde	20 MT
			Methanol	30 MT
			Phenol	70 MT
24.	Kevin Polymers Pvt. Ltd.	MAH	Formaldehyde	38 MT
25.	Brosis Lam Pvt. Ltd.	MAH	Formaldehyde	20 MT
			Phenol	20 MT
			Methanol	20 MT
26.	Red Mica Pvt. Ltd.	MAH	Formaldehyde	45 MT
			Phenol	40 MT
			Methanol	15 MT
			Malamine	30 MT
27.	Noble Laminates Pvt. Ltd.	MAH	Formaldehyde	35 MT
			Methanol	25 MT
			Phenol	20 MT
28.	Pestimade Gujarat	MAH	Phorate	20 MT
			Methyl parathion	
			Parathion	
			Ethion	
29.	Salasar Laminates Ltd.	MAH	Formaldehyde	30 MT
			Methanol	30 MT
			Phenol	13 MT
			Hcl	50 Kg

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ANNEXURE –12

INDUSTRIES DISTANCE FROM GANDHINAGAR AND AHMEDABAD

Sr. No.	Name of the Factory	Distance from Gandhinagar (km)	Distance from Ahmedabad (km)
1.	2.	3.	4.
1.	Amul Insecticides Pvt. Ltd.	17.2	31
2.	Anmol Chloro Chem	25	43
3.	Bhagwati Industries	24	42
4.	Balaji Formalin Pvt. Ltd.	27	24
5.	Indian Farmers Fertiliser Co.Op. Ltd.	17	28
6.	kemplast industries	26.8	3
7.	HPCL LPG Bottling plant	20	34
8.	Mahalaxmi Industries	25	43
9.	Mutual Chemicals	25	43
10.	Sahajand Chem Industries	25	43
11.	Saibaba Surfactant Pvt. Ltd.	26	23
12.	Sanginita Chemical	24	42
13.	Shree Vallabh Chemical	30	40
14.	Pinnacle Chlorochem Pvt. Ltd.	25	43
15.	Trend India	21	3.1
16.	Deedy Chemicals Pvt. Ltd.	26	43.5

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Sr. No.	Name of the Factory	Distance from Gandhinagar (km)	Distance from Ahmedabad (km)
1.	2.	3.	4.
17.	Shaligram Laminates	24	43
18.	Tirupati Foam Ltd.	17	31
19.	Olympic Décor LLP	26	20
20.	Multi Scaff (India) Pvt. Ltd.	29	39
21.	Real Metal Chem Pvt. Ltd.	29	39
22.	Velsond Resins Pvt. Ltd.	33	46
23.	Ambition Mica Ltd.	29	26
24.	Kevin Polymers Pvt. Ltd.	25	36
25.	Brosis Lam Pvt. Ltd.	25	36
26.	Red Mica Pvt. Ltd.	25	36
27.	Noble Laminates Pvt. Ltd.	24	45
28.	Pestimade Gujarat	24.3	32.5
29.	Salasar Laminates Ltd.	29	39

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ANNEXURE – 13

VILLAGES LIST NEAR INDUSTRIES

Sr. No.	Name of the Factory	Name of village within 3 Km	Name of village within 5 Km	Occupier of Unit	Site main & Incident Controller
1.	2.	3.	4.	5.	6.
1.	Amul Insecticides Pvt. Ltd., Kalol	Borishana, Madhpura	Borishana, Madhpura Sherisa Vakhariya Ghanchiwad Pratap pura	Mr. Sureshbhai r. Patel 9429631695	Mr. Sureshbhai r. Patel 9429631695
2.	Anmol Chloro Chem, Chhatral	Dhanot, Indrad Ankhol Achrasan	Budasan Indrad Dhanot Chhatral Lunasan Vansol Karan Nagar	Mr. Mukesh Gupta 98240 77287	Mr. Mukesh Gupta 98240 77287 Mr. Gaurav Mittal 93271 04157
3.	Bhagwati Industries, Chhatral	Chhatral Dhanot	Chhatral Lunasan Dhanot Indrad	Monikaben Kalpeshbhai Patel	Mr. Jigneshbhai G. Joshi 98254 11035 Mr. Bhupendrabhai Parmar 73839 56475
4.	IFFCO Ltd.	Shertha	Shertha Tintoda Bhojan Rathod Borishana Shantigram	Mr. K J PATEL 9426725510	Mr. K J PATEL 9426725510 Mr. R.K.Sharma 8905784649
5.	kemplast industries	Indrad Dhanot Chhatral	Indrad Dhanot Chhatral	Mr. RAJIV RAMBHAI PATEL	Mr. RAJIV RAMBHAI PATEL

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Sr. No.	Name of the Factory	Name of village within 3 Km	Name of village within 5 Km	Occupier of Unit	Site main & Incident Controller
1.	2.	3.	4.	5.	6.
			Rajpur Jhulasan	9825020389	9825020389
6.	HPCL LPG Bottling plant	Sardhav Sonipur Adraj Moti	Sardhav Rupal Sonipur Adraj Moti Jalund	Mr. shushil kumar 9594820637	Mr. shushil kumar 9594820637
7.	Mahalaxmi Industries, Chhatral	Indrad Dhanot Chhatral	Indrad Dhanot Chhatral Rajpur Jhulasan	Mr. Pratikbhai Patel 97378 11109	Mr. Pratikbhai Patel 97378 11109 Mr. Sureshbhai Patel 92278 76860
8.	Mutual Chemicals	Indrad Dhanot Chhatral	Indrad Dhanot Chhatral Rajpur Jhulasan	Mr. Vipul Shah 98250 60442	Mr. Vipul Shah 98250 60442
9.	Sahajand Chem Industries, Chhatral	Dhanot Chhatral	Indrad Dhanot Chhatral Lunasan Isand	Mr. Bhagawatlal K. Jain	Mr. Kesharm Solanki 90990 65054 Mr. Babulal Meena 98985 71123
10.	Saibaba Surfactant Pvt. Ltd.	Vadsar Moti-Bhoyan Karoli	Santej Khatraj Rakanpur Dantali	Mr. Ganpatbhai K. Patel 99251 95834	Mr. Ganpatbhai K. Patel 99251 95834 Mr. Bhavin K. Patel 9951 95912

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Sr. No.	Name of the Factory	Name of village within 3 Km	Name of village within 5 Km	Occupier of Unit	Site main & Incident Controller
1.	2.	3.	4.	5.	6.
11.	Sanginita Chemical, Gandhinagar taluka	Dhanot Chhatral	Indrad Dhanot Chhatral Lunasan Isand	Mr. Dineshsigh Chavda 98240 65065	Mr. Dineshsigh Chavda 98240 65065
12.	Shree Vallabh Chemical	Sapa Nava-bavalpura	Salkki Nadol Paliya Mosamapur	Mr. Rajendar Mohanlal Shah 99251 39501	Mr. Rajendar Mohanlal Shah 99251 39501 Mr. Manan Patel 99251 39507
13.	Balaji Formalin Pvt. Ltd.	Vadsar Moti-Bhoyan Karoli	Santej Khatraj Rakanpur Dantali	Mr. Mukesh Gupta 98240 77287	Mr. Mukesh Gupta 98240 77287 Mr. Gaurav Mittal 9327104157
14.	Deedy Chemicals Pvt. Ltd.	Dhanot Chhatral	Indrad Dhanot Chhatral Lunasan Isand	Mr. Hemal Seth 98240 44994	Mr. Hemal Seth 98240 44994 Mr. Ganatra 99240 78784
15.	Pinnacle Chlorochem Pvt. Ltd.	Bileshwarpura Chhatral	Indrad Bileshwarpura Chhatral Lunasan Isand	Mr. Dilipkumar Gulecha 8128686123	Mr. Dilipkumar Gulecha 8128686123 Mr. Rahul Gulecha 8128686122
16.	Shaligram Laminates	Bileshwarpura Chhatral	Indrad Bileshwarpura Chhatral	Mr. Raxit Sureshbhai Patel	Mr. Raxit Sureshbhai Patel 98250 07202

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Sr. No.	Name of the Factory	Name of village within 3 Km	Name of village within 5 Km	Occupier of Unit	Site main & Incident Controller
1.	2.	3.	4.	5.	6.
			Lunasan Isand	98250 07202	Mr. Ahokbhai Upadhyay 94264 64116
17.	Multi Scaff (India) Pvt. Ltd.	Dhanot Chhatral	Indrad Dhanot Chhatral Lunasan Isand	Mr. Shitalprasad Jain 9484539309	Mr. Shitalprasad Jain 9484539309
18.	Trend India	Borishana, Madhpura	Borishana, Madhpura Sherisa Vakhariya Ghanchiwad Pratap pura	Mr. Alpeshbhai Patel 9824414339	Mr. Alpeshbhai Patel 9824414339 Mr. Rakeshbhai darji 9825071473
19.	Velsond Resins Pvt. Ltd.	Chiskari Nava-bavalpura	Salkki Nadol Paliya Mosamapur	Mr. Govindbhai Patel 9558816935	Mr. Govindbhai Patel 9558816935 Mr. Kishorbhai Patel 9033031259
20.	Olympic Décor LLP	Vadsar Moti-Bhoyan Karoli	Santej Khatraj Rakanpur Dantali	Mr. Bharatbhai Patel 7940017900	Mr. Bharatbhai Patel 7940017900
21.	Tirupati Foam Ltd.	Vadsar Moti-Bhoyan Karoli	Santej Khatraj Rakanpur Dantali	Mr. Satishbhai Mehta 9825263645	Mr. Satishbhai Mehta 9825263645

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Sr. No.	Name of the Factory	Name of village within 3 Km	Name of village within 5 Km	Occupier of Unit	Site main & Incident Controller
1.	2.	3.	4.	5.	6.
22.	Real Metal Chem Pvt.Ltd	Dhanot Chhatral	Indrad Dhanot Chhatral Lunasan Isand	Mr ANIL JAIN 9825454426	Mr Anil Jain 9825454426
23.	Ambition Mica Ltd.	Zak Vehlal	Kadodara Huka Pardhol Raipur	Mr. Govindbhai Patel 9558816935	Mr. Govindbhai Patel 9558816935 Mr. Bhaveshbhai Patel 9724679897
24.	Kevin Polymers Pvt. Ltd.	Zak Vehlal	Kadodara Rakhial Pardhol	Mr Shah Piyushkumar 9898283892	Mr Shah Piyushkumar 9898283892
25.	Brosis Lam Pvt. Ltd.	Vasana-Rathod Nava-bavalpura	Salkki Vasana-Rathod Paliya Mosamapur	Mr Patel Harshit 9974640645	Mr Patel Harshit 9974640645
26.	Red Mica Pvt. Ltd.	Lavad Nava-bavalpura	Salkki Nadol Paliya Mosamapur	Mr. Jainam H Agrawal 9328444900	Mr. Jainam H Agrawal 9328444900
27.	Noble Laminates Pvt. Ltd.	Sadara chhala	abod katharpuraa sukhad	Mr. Rasikbbhai Virjibhai Patel 9979841422	Mr. Rasikbbhai Virjibhai Patel 9979841422
28.	Pestimade Gujarat	Dhanot Chhatral	Indrad Dhanot	Mr. Prerak Patel	Mr. Prerak Patel

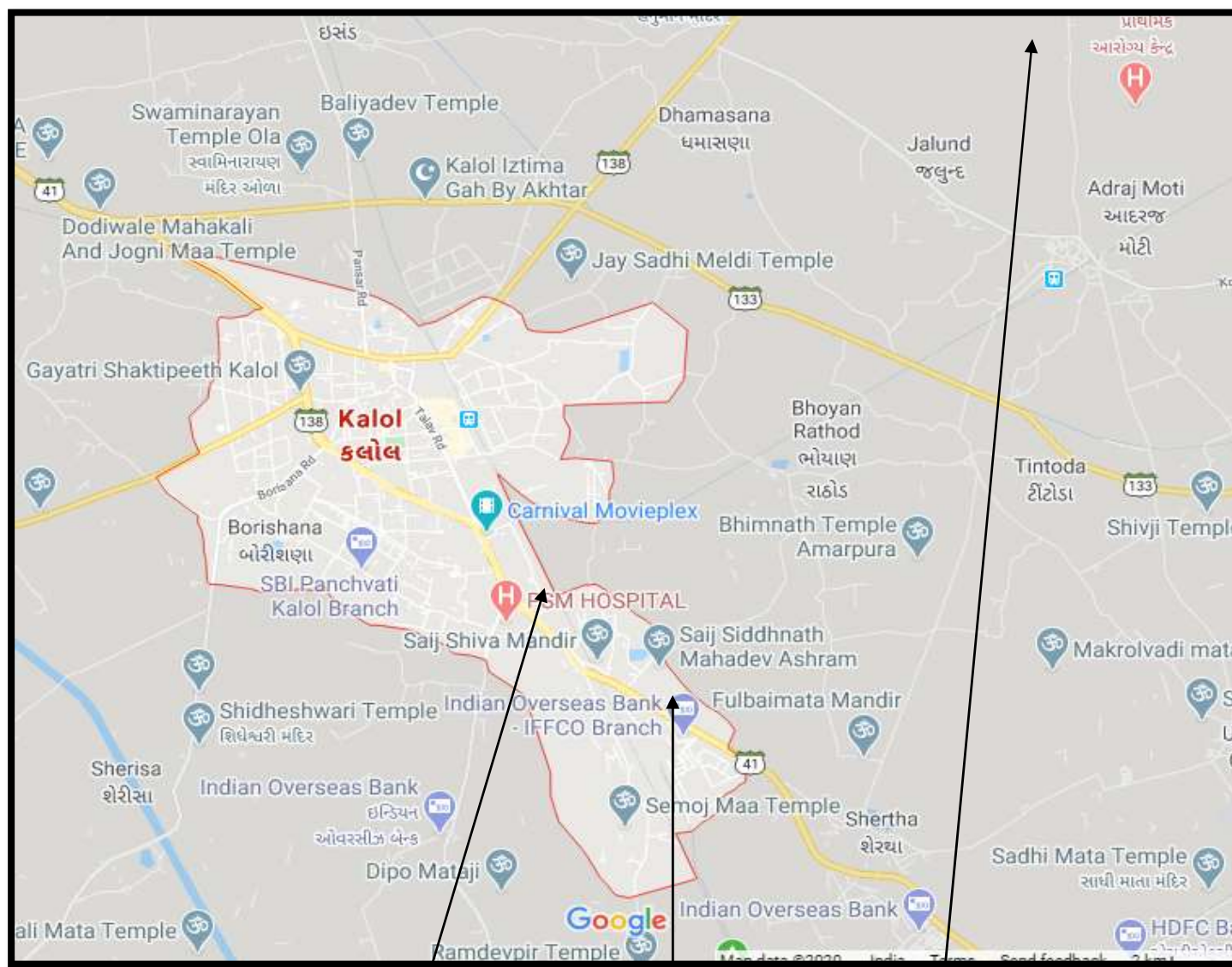
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Sr. No.	Name of the Factory	Name of village within 3 Km	Name of village within 5 Km	Occupier of Unit	Site main & Incident Controller
1.	2.	3.	4.	5.	6.
			Chhatral Lunasan Isand	99099942308	99099942308Mr. Manish Barot 7777977327
29.	Salasar Laminates Ltd.	Dhanot Chhatral	Indrad Dhanot Chhatral Lunasan Isand	Mr. Vijaykumar Agrawal 9327025713	Mr. Vijaykumar Agrawal 9327025713 Mr. Amarnath Tripathi 9374216885

District Crisis Group Plan for Gandhinagar District 2026

LOCATION OF INDUSTRIES ON MAP (TALUKAWISE)

❖ Industries in Kalol Taluka



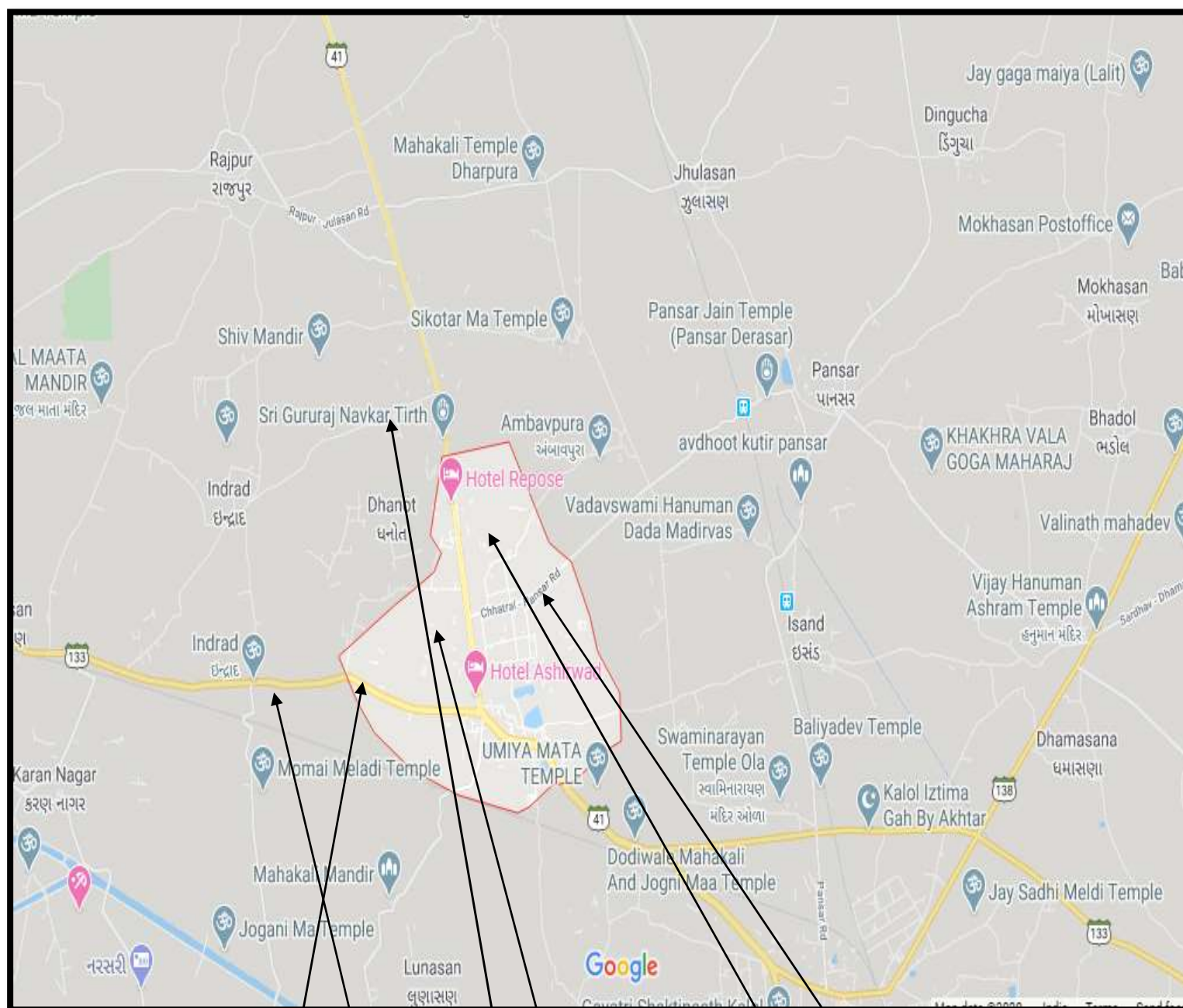
Amul Insecticides Pvt. Ltd.

IFFCO Ltd.

HPCL Bottling Plant

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❖ Location of Industries in Chhatral



Anmol Chloro Chem

Umiya Agro Industries

Bhagwati Industries

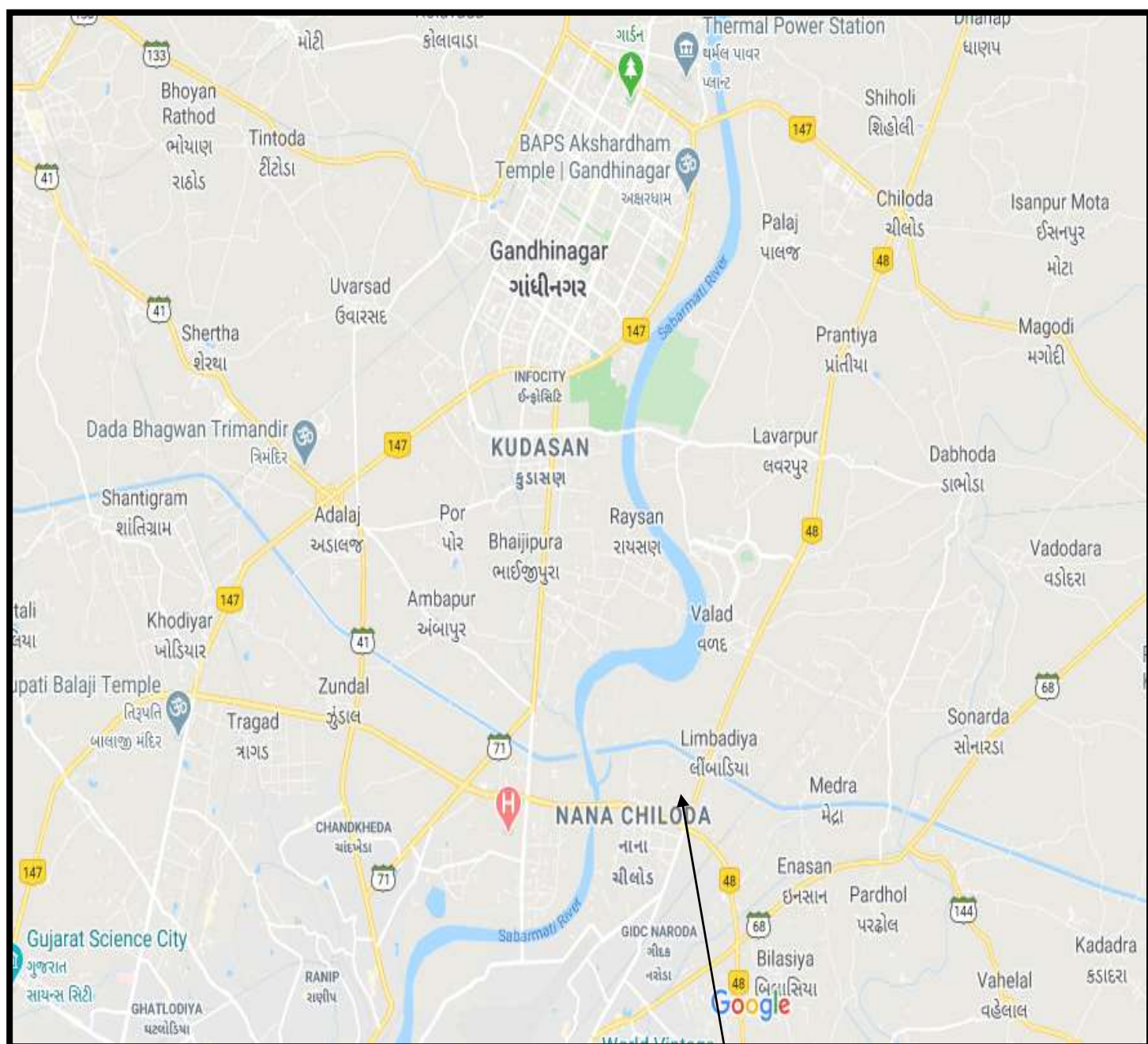
Mahalaxmi Industries

**Gujarat Pesticides Pvt.
Ltd.**

**Sahajanand Chem
Industries**

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❖ Location of industry on Gandhinagar - Ahmedabad National Highway



Vimal Crop Care Pvt. Ltd.

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ANNEXURE –14

EVACUATION INFORMATION-TRANSPORT

GSRTC

Sr. No.	Taluka name	Phone No.
1.	2.	3.
1.	Gandhinagar GSRTC	Shree Hardik Raval (Dapo Maneger) 6359918291 / 079-23222842
2.	Dehgam – GSRTC	Su.Shree Rina Darji (Dapo Maneger) 6359918282 / 02716-232337
3.	Mansa – GSRTC	Shree Mayur Trivedi (Dapo Maneger) 6359918517 / 02763-270016
4.	Kalol – GSRTC	Su.Shree Sonal Barot(Dapo Maeger) 6359918613 / 02764-223113

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ANNEXURE –15

ANTIDOTES

SR. NO.	TOXIC CHEMICALS HANDLED IN DISTRICT (ESP. IN MAH UNITS)	ANTIDOTES REQUIRED
1.	2.	3.
1	Ammonia	0.4 % Benzocain For Eyes
2	Chlorine	Derrifyline Dexona, Cp Malate, Milk Of Meghnesiya
3	Hydrogen Chloride	Milk Of Meghnesiya
4	Hydrogen Fluoride	Inj Cal Gluconate
5	Oleum (Sulphur Trioxide)	Milk Of Meghnesiya
6	Acrilonitrile / Sodium / Potassium Cyanide	Cyanide Antidot Kit
		Oxygen Adminitration Facility
		Cyanides Antidote Kit
7	Phorate	Atropine
8	Methyl parathion	Atropine
9	Nephtha	Nitrites
10	LPG	No specific antidote
11	Fenvalerate	No Specific antidote

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First Aid Measures

1. CHLORINE: -

If 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. . WARNING: To avoid possible chemical burns, the rescuer should avoid breathing any exhaled air from the victim.

If on Skin: - Avoid breathing vapours. In case of contact, immediately flush affected areas with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse. Discard contaminated shoes.

If in Eye: - 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.

If Ingestion: - Ingestion is not considered a potential route of exposure.

2. CARBON DISULFIDE:-

If Inhalation: - Move to fresh air. Do not use mouth-to-mouth methods 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. Immediate attention is required. If not breathing, give artificial respiration.

If on skin: - wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

If in Eye: - Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

If Ingestion: - Do not induce vomiting. Call a physician or Poison Control Centre immediately.

3. SULPHURIC ACID: -

If Inhalation: - Move victim to fresh air. Give artificial respiration only if breathing has stopped. Do not use mouth-to-mouth method if victim ingested or inhaled the substance, induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Give Cardiopulmonary Resuscitation (CPR) if there is no pulse and no breathing. Obtain medical attention immediately.

If on skin: - Immediately flush skin with running water for a minimum of 20 minutes. Start flushing while removing contaminated clothing. If irritation persists, repeat flushing. Obtain medical attention immediately. Do not transport victim unless the recommended flushing period is completed or flushing can be continued during transport.

If in Eye: - Immediately flush eyes with running water for a minimum of 20 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention immediately. Do not transport victim until the recommended flushing period is completed unless flushing can be continued during transport.

If Ingestion: - Do not induce vomiting. If victim is alert and not convulsing, rinse mouth and give ½ to 1 glass of water to dilute material. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and

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administer more water. Immediately contact local poison control centre. Vomiting may need to be induced but should be directed by a physician or a poison control centre. Immediately transport victim to an emergency facility.

4. HYDROCHLORIC ACID: -

If Inhalation: - May be fatal if inhaled. May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. Causes chemical burns to the respiratory tract. Causes corrosive action on the mucous membranes.

If on skin: - Contact with liquid is corrosive and causes severe burns and ulceration. The severity of injury depends on the concentration of the solution and the duration of exposure.

If in Eye: - May cause irreversible eye injury. Vapour or mist may cause irritation and severe burns. Contact with liquid is corrosive to the eyes and causes severe burns.

If Ingestion: - Causes severe digestive tract burns with abdominal pain, vomiting and possible death. May cause corrosion and permanent tissue destruction of the esophagus and digestive tract.

5. AMMONIA: -

If Inhalation: - Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

If on skin: - Remove contaminated clothing. Drench affected area with water for at least 15 minutes. In case of frostbite, spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance.

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If in Eye: - Immediately flush eyes thoroughly with water for at least 15 minutes.

If Ingestion: - Ingestion is not considered a potential route of exposure.

6. PHORATE: -

If Inhalation: - Remove victim to fresh air. If breathing has ceased, clear the victim's airway and start mouth-to-mouth artificial respiration. If breathing is difficult, give oxygen. Contact a physician immediately. Be sure the contact areas are clean to prevent contamination of the rescuer.

If on skin: - Immediately flush all affected areas with large amounts of clear water for at least 15 minutes. Remove contaminated clothing. Do not attempt to neutralize with chemical agents. Wash clothing before reuse. If skin irritation develops, contact a physician immediately.

If in eyes: - Immediately flush the eyes with copious amounts of clear, cool running water for a minimum of 15 minutes. Hold the eyelids apart during the flushing to ensure rinsing of the entire surface of the eyes and lids with water. Contact a physician immediately. If there will be a delay in getting medical attention, rinse the eyes for at least another 15 minutes.

If Ingestion: - Immediately dilute the swallowed product by giving large quantities of water. Induce vomiting by giving Syrup of Ipecac according to directions on the bottle or by sticking a finger down the throat. Never give anything by mouth to an unconscious or convulsing person. Contact a physician immediately. Be sure the mouth is clean or wear a rubber glove to prevent contamination of the rescuer.

7. MONOCROTOPHOS: -

If Inhalation: - Supply fresh air. If required, provide artificial respiration. Keep patient warm. Consult doctor if symptoms persist. In case of unconsciousness, place patient stably in side position for transportation.

If on skin: - Generally the product does not irritate the skin.

If in eyes: - Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

If Ingestion: - Immediately call a doctor.

8. METHYL PARATHION: -

If Inhalation: - Immediately remove victim to fresh air. If breathing has stopped, begin artificial respiration immediately. Transport to a clinic or hospital immediately.

If on skin: - Immediately flush skin with running water for at least 15 minutes, while removing contaminated clothing and shoes. Obtain medical attention immediately. Thoroughly clean contaminated clothing before re-use.

If in eyes: - Immediately flush eyes with running water for at least 30 minutes. Get medical attention immediately.

If Ingestion: - If ingested, induce vomiting immediately, only as directed by medical personnel. Be aware that the product contains petroleum distillates which can cause

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aspiration. Never give anything by mouth if victim is unconscious or convulsing. Transport to a clinic or hospital immediately.

9. NAPHTHA: -

If Inhalation: - If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention immediately.

If on skin: - In case of contact, immediately flush skin with plenty of water. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use. Contaminated leather, particularly footwear, must be discarded. Note that contaminated clothing may be a fire hazard. Seek medical advice if symptoms persist or develop.

If in eyes: - Remove contact lenses. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

If Ingestion: - Do not induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention immediately.

10. LPG (Liquefied Petroleum Gas): -

If Inhalation: - Remove to fresh air. Give oxygen, artificial respiration, or CPR if needed. Seek medical attention.

If on skin: - If freeze burn occurs, gently bathe affected area in warm water (38 – 43) °C. Do not rub. Get medical attention.

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If in eyes: - Immediately flush with large amounts of lukewarm water for 15 minutes, lifting upper and lower lids at intervals. Seek medical attention if irritation persists.

If Ingestion: - Usually no effect by this route.

11. ETHYLENE OXIDE: -

If 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.

If on skin: - 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 colouring and sensation has 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.

If in eyes: - 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.

If Ingestion: - Not expected to be a primary route of exposure. . Give water to drink if victim is completely conscious/alert. Do not induce vomiting. Call a physician. . Never give anything by mouth to an unconscious person.

12. Fenvalerate: -

If Inhalation: - If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

If on skin: - 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.

If in 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.

If Ingestion: - If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

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ANNEXURE –16

DISTRICT- CONTACT NUMBERS

Sr. No.	EOCS / CONTROL ROOMS	CONTACT NUMBERS
1.	2.	3.
1.	Collector Office, Gandhinaagr	23256720 / 23259030
2.	District Disaster Management	1077/079(232)56720 /23256920
3.	State Control Room	9978405304/23251900 /23251902
4.	District Police Superintendent Office	9978405968 /23210914 / 23210108
5.	District Panchayat Office, Health	23256945
6.	District Panchayat Office, Gandhinaagr	23256978
7.	Civil Hospital	23221921/32/13
8.	Municipal Corporations Gandhinagar (GMC)	18001081818 (toll free)
9.	Search & Rescue	1070
10.	Fire Bridged, Gandhianagr	6358218289/2322274 / 23222100
11.	G.S.E.B. Control Room	23212616 / 23244721
12.	Water Supply	Toll free:- 1916
13.	Irrigation Control Room	23248735 / 23248736
14.	Public Health & Sanitation	23256941
15.	Mamlatdar Office,Gandhinagar	23249074
16.	Mamlatdar Office, Kalol	027 64220414
17.	Mamlatdar Office,Mansa	027 63270662
18.	Mamlatdar Office, Dehgam	02716232002 / 232002
19.	N.D.R.F	
20.	B.S.F.	079 23200911
21.	Army Camp	23201507 / 23201502
22.	Gujarat Police	07929758004
23.	C.R.P.F.	0792970506 / 9429607908
24.	Gujarat Gas Company	23264555/721116422

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ANNEXURE –17

SHELTERS LIST

SR.NO.	SCHOOLS AND COLLEGES LIST	TYPE
1.	2.	3.
1.	Ahmedabad Public School	Public
2.	Shree Swaminarayan Public School	Public
3.	Swaminarayan Dham International School	International
4.	Swaminarayan Cambridge International School	International
5.	A. A. Patel Commerce College	Private
6.	Bholabhai Patel College of Computer Studies	Private
7.	Bholabhai Patel College of Business Administration	Private
8.	Chaudhari Technical Institute	Private
9.	Dhirubhai Ambani Institute of Information & Communication Technology	Private
10.	Gandhinagar Institute of Technology	Government
11.	Government Polytechnic	Government
12.	Government Engineering College	Government
13.	Institute for Plasma Research	Government
14.	Institute of Hotel Management, Catering Technology & Applied Nutrition	Government
15.	K. B. Institute of Pharmaceutical Education & Research	Private
16.	LDRP Institute of Technology and Research	Private
17.	National Institute of Co-operative Management	Government
18.	National Institute of Fashion Technology	Government
19.	S. K. Patel Institute of Management & Computer Studies	Private
20.	Samarpan Arts & Commerce College	Private
21.	Shardben Shantibhai Patel College of Education	Private
22.	Shree Swaminarayan Institute of Technology	Private
23.	Shri PHG Science College	Private
24.	Technical Examinations Board	Government
25.	Uma Arts & Nathiba Commerce Mahila College	Private
26.	Vishwakarma Government Engineering College	Government

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ANNEXURE –18

NGO LIST

SR. NO.	NAME OF NGO	ADDRESS
1.	2.	3.
1.	Gujarat State Rural Development Council	Block-No.-60/3, Old M.L.A.Quarters, Sector-17, Gandhinagar-Pin-382017 Gujarat State
2.	Adarsh Mahila Seva Sangh	Plot No. 374/1, Sector No.22, Shreyas Society, Gh-5 Corner, Gandhinagar
3.	Maruti Education Trust	Plot No. 374/1, Sector No. 22, Shreyas Society, Gandhinagar
4.	Volunteers Of Charity	374/A, Sector: 23, Gandhinagar Pincode: 382023.
5.	Shree Gurudev Khadi Seva Sangh	S-9, Apna Bazar, Sector 6(B), Gandhinagar, Gujarat-382006
6.	Gram Seva Mandir	Opposite Geb Village: Nardipur Taluk: Kalol Dist: Gandhinagar Pincode No: 382735
7.	Helping Hand Foundation	Sector 4-D, Plot No-961/2, "ga" Road, Gandhinagar
8.	Unnati Seva Trust	First Floor Balaji Complex Near Narnarayan Hospital

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SR. NO.	NAME OF NGO	ADDRESS
1.	2.	3.
		Post- Mansa-382845 Dist- Gandhinagar
9.	Jivandeep Seva Santhan	At& Post Chhala Taluk & District:- Gandhinagar Gujarat Pin 382321
10.	Om Foundation	Nava Thambhliya, post -kadjodra, Taluk -Dehgam, District -Gandhinagar Gujarat
11.	New Gujarat Seva Samiti	Plot no. 334, Sector -8, Gandhinagar, Gujarat
12.	Dhrashtee Foundation	Post Vasana Chaudhary, Taluka Dehgam, District Gandhinagar, Pin - 382321
13.	Khb Association	Post - Dasela, Ta & District Gandhinagar
14.	Siesta Research And Development Association	Block no. 131/2, "GH" type, sector-21. Gandhinagar Gujarat-382021
15.	Blue Veterinary Diagnosis And Research Foundation	C 193, Gopalnagar District Gandhinagar Kalol 382721 Gujarat
16.	Village Education Development Trust	Plot no. 1043/2, First floor, Sector no. 13 C, Gandhinagar 382016 Gujarat
17.	Sankalp Seva Trust	C/23, Gopalnagar B/H Panchvati Area Kalol

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SR. NO.	NAME OF NGO	ADDRESS
1.	2.	3.
		District - Gandhinagar Pin- 382721 (North Gujarat)
18.	Sarvajanik Vikas Parsiad	1st floor-21/A, Mayur.Co. Opposite ho.Society, B/H Ralway St (East), Kalol, Gandhinagar, Pin-382721(N.G)
19.	Shree Maruti Gram Vikas Trust Gandhinagar	Maruti motors 73/A/2, Sector-16 Near Vidhya library Gandhinagar Pin Code -382016 Phone: 9925154068
20.	Mercy Cheritable Trust	Mercy Charitable Trust M-6, Suman Tower, SEC-11 Gandhinagar - 382011
21.	Akhil Bhartiya Jankalyan Parisad	10, Second floor, Near Inquiry Office, SEC-13/B, Gandhinagar: 382013
22.	Sandipani Charitable Trust	Plot no. 1384/1 Sector-2 Gandhinagar Pin-382002
23.	Smuti Vikas Trust	Plot no - 1384/1 Sector-2/B Gandhinagar Pin-382002
24.	Manav Utthan Seva Charitable Trust Kalol	171/A, Plot Vistar, East Of Railway Station, Kalol (N.G.)Pin :- 382721, Dist : Gandhinagar, Gujarat

ANNEXURE –19

MATERIAL SAFETY DATA SHEET

1.0 SULPHURIC ACID

Section 1 – Chemical Product and Company Identification

MSDS Name: Sulphuric acid 90-98%

Synonyms: Hydrogen sulphate; Oil of vitriol; Vitriol brown oil; Mattling acid; Battery acid; Sulphuric acid; Electrolyte acid; Dihydrogen sulphate; Spirit of sulphur; Chamber acid.

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7664-93-9	Sulphuric acid	90-98	231-639-5

Section 3 - Hazards Identification

Appearance: Clear colourless to yellow liquid

Danger! Causes eye and skin burns. Causes digestive and respiratory tract burns. May be fatal if mist inhaled. Strong inorganic acid mists containing sulphuric acid may cause cancer. Concentrated sulphuric acid reacts violently with water and many other substances under certain conditions. May cause lung damage. Hygroscopic (absorbs moisture from the air). Corrosive to metal.

Target organs: Lungs, teeth, eyes, skin.

Potential Health Effects

Eye: Causes severe eye burns. May cause irreversible eye injury. May cause blindness. May cause permanent corneal opacification. The severity of injury depends on the concentration of the solution and the duration of exposure.

Skin: Causes skin burns. The severity of injury depends on the concentration of the solution and the duration of exposure.

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Ingestion: May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns.

Inhalation: May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Because its vapor pressure is negligible, it exists in the air only as a mist or spray. Exposure may impair lung function and cause mucostasis (reduced mucous clearance).

Chronic: Prolonged or repeated skin contact may cause dermatitis. Prolonged or repeated inhalation may cause nosebleeds, nasal congestion, erosion of the teeth, perforation of the nasal septum, chest pain and bronchitis. Prolonged or repeated eye contact may cause conjunctivitis. Effects may be delayed. Workers chronically exposed to sulfuric acid mists may show various lesions of the skin, tracheobronchitis, stomatitis, conjunctivitis, or gastritis. Occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to humans.

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: If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. 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: Monitor arterial blood gases, chest x-ray, and pulmonary function tests if respiratory tract irritation or respiratory depression is evident. Treat dermal

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irritation or burns with standard topical therapy. Effects may be delayed. Do NOT use sodium bicarbonate in an attempt to neutralize the acid.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Substance is non-combustible. Contact with water can cause violent liberation of heat and splattering of the material. Contact with metals may evolve flammable hydrogen gas. Runoff from fire control or dilution water may cause pollution. Approach fire from upwind to avoid hazardous vapours and toxic decomposition products. Strong dehydrating agent, which may cause ignition of finely divided materials on contact. Oxides of sulphur may be produced in fire.

Extinguishing Media: Use extinguishing media most appropriate for the surrounding fire. Do not get water inside containers. If water is used, care should be taken, since it can generate heat and cause spattering if applied directly to sulphuric acid.

Flash Point: Not applicable.

Auto ignition Temperature: Not available.

Explosion Limits, Lower: Not available.

Upper: Not available.

NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 2; Special Hazard: -W-

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Carefully scoop up and place into appropriate disposal container. Provide ventilation. Do not get water inside containers. Cover with dry earth, dry sand, or other non-combustible material followed with plastic sheet to minimize spreading and contact with water.

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Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not allow water to get into the container because of violent reaction. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Discard contaminated shoes. Use only with adequate ventilation. Do not breathe spray or mist. Do not use with metal spatula or other metal items. Inform laundry personnel of contaminant's hazards.

Storage: Do not store near combustible materials. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store near alkaline substances. Store protected from moisture. Ideally, sulphuric acid should be stored in isolation from all other chemicals in an approved acid or corrosives safety cabinet.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Use a corrosion-resistant ventilation system.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Sulphuric acid	0.2 mg/m ³ TWA (thoracic fraction)	1 mg/m ³ TWA 15 mg/m ³ IDLH	1 mg/m ³ TWA

OSHA Vacated PELs: Sulphuric acid: 1 mg/m³ TWA

Personal protective Equipment

Eyes: Wear chemical splash goggles and face shield.

Skin: Wear neoprene gloves, apron, and/or clothing. Viton gloves are recommended.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

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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: Oily – clear colourless to yellow

Odour: odourless

pH: 0.3 (1N solution)

Vapour Pressure: < 0.001 mm Hg @ 20 deg C

Vapour Density: 3.38 (air=1)

Evaporation Rate: Slower than ether.

Viscosity: 21 mPas @ 25 C

Boiling Point: 290 - 338 deg C

Freezing/Melting Point: 10 deg C

Decomposition Temperature: 340 deg C

Solubility: Soluble with much heat

Specific Gravity/Density: 1.84

Molecular Formula: H_2SO_4

Molecular Weight: 98.07

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Section 10 - Stability and Reactivity

Chemical Stability: Sulfuric acid reacts vigorously, violently or explosively with many organic and inorganic chemicals and with water.

Conditions to Avoid: Excess heat, exposure to moist air or water, Note: Use great caution in mixing with water due to heat evolution that causes explosive spattering. Always add the acid to water, never the reverse.

Incompatibilities with Other Materials: Metals, oxidizing agents, reducing agents, bases, acrylonitrile, chlorates, finely powdered metals, nitrates, perchlorates, permanganates, epichlorohydrin, aniline, carbides, fulminates, picrates, organic materials, and flammable liquids.

Hazardous Decomposition Products: Oxides of sulphur.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:

CAS# 7664-93-9: WS5600000

LD50/LC50:

CAS# 7664-93-9:

Draize test, rabbit, eye: 250 ug Severe;

Inhalation, mouse: LC50 = 320 mg/m³/2H;

Inhalation, mouse: LC50 = 320 mg/m³;

Inhalation, rat: LC50 = 510 mg/m³/2H;

Inhalation, rat: LC50 = 510 mg/m³;

Oral, rat: LD50 = 2140 mg/kg;

Carcinogenicity:

CAS# 7664-93-9:

ACGIH: A2 - Suspected Human Carcinogen (contained in strong inorganic acid mists)

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California: carcinogen, initial date 3/14/03 (listed as Strong inorganic acid mists containing sulfuric acid).

NTP: Known carcinogen (listed as Strong inorganic acid mists containing s).

IARC: Group 1 carcinogen

Epidemiology: Workers exposed to industrial sulphuric acid mist showed a statistical increase in laryngeal cancer. This suggests a possible relationship between carcinogenesis and inhalation of sulphuric acid mist.

Teratogenicity: Sulphuric acid was not teratogenic in mice and rabbits, but was slightly embryotoxic in rabbits (a minor, rare skeletal variation). The animals were exposed to 5 and 20 mg/m³ for 7 hr/day throughout pregnancy. Slight maternal toxicity was present at the highest dose in both species.

Reproductive Effects: No Information found

Mutagenicity: There are no mutagenicity studies specifically of sulphuric acid. However, there are established effects of reduced pH in mutagenicity testing, as would be caused by sulphuric acid. These effects are an artifact of low pH and are not necessarily due to biological effects of sulphuric acid itself.

Neurotoxicity: No information found

Section 12 - Ecological Information

Ecotoxicity: Fish: Bluegill/Sunfish: 49 mg/L; 48Hr; TLm (tap water @ 20C)

Fish: Bluegill/Sunfish: 24.5 ppm; 48Hr; TLm (fresh water)

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.

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2.0 NAPHTHA

Section 1 – Chemical Product and Company Identification

MSDS Name: Naphtha

Synonyms: Light Naphtha, Japan Open Spec Bonded Naphtha, SNG Naphtha, Light Cat Naphtha, Sweet Virgin Naphtha (SVN), Debutanized Naphtha, Atmospheric Naphtha (DAN), HCU Light Naphtha, Light CR Gasoline, Full Range Cracked Naphtha, Full Range Hydro cracked Naphtha, Full Range Reformed Naphtha, Light Chemical Treated Naphtha, Light Cracked Naphtha, Light Hydro cracked Naphtha, Light Hydro treated Naphtha

Section 2 - Composition, Information on Ingredients

Chemical Name	CAS#	Percent
Naphtha, low boiling point naphtha	8030-30-6	100%
N-Hexane	110-54-3	25-35%
Xylene	1330-20-7	25-35%
Toluene	108-88-3	15-20%
Cyclohexane	110-82-7	15-20%
Pentane	109-66-0	15-20%
Heptane	142-82-5	12.5-15%
Ethylbenzene	100-41-4	5-7%
Benzene	71-43-2	3-5%
,2,4-Trimethylbenzene	95-63-6	2-3%
Sulfur	7704-34-9	0-1.5%

Section 3 - Hazards Identification

Emergency Overview

Regulatory Status: This material is considered hazardous by the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200).

Signal Word: DANGER

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Hazard Summary: Extremely flammable. Irritating to eyes and respiratory system. Affects central nervous system. Harmful or fatal if swallowed. Aspiration Hazard.

Potential Health Effects

Eyes: High vapour concentration or contact may cause irritation and discomfort.

Skin: Brief contact may cause slight irritation. Skin irritation leading to dermatitis may occur upon prolonged or repeated contact. Can be absorbed through skin.

Ingestion: Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death.

Inhalation: Vapours or mists from this material can irritate the nose, throat, and lungs, and can cause signs and symptoms of central nervous system depression, depending on the concentration and duration of exposure. Inhalation of high concentrations may cause central nervous system depression such as dizziness, drowsiness, headache, and similar narcotic symptoms, but no long-term effects.

Chronic Exposure: Long-term exposure may cause effects to specific organs, such as to the liver, kidneys, blood, nervous system, and skin. Contains benzene, which can cause blood disease, including anemia and leukemia.

Target Organs: Skin, Central nervous system, Liver, Kidney, Blood

Section 4 - First Aid Measures

General advice: Remove from exposure, lie down. In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). When symptoms persist or in all cases of doubt, seek medical advice. Never give anything by mouth to an unconscious person. Take off all contaminated clothing immediately and thoroughly wash material from skin.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention immediately.

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Skin contact: In case of contact, immediately flush skin with plenty of water. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use. Contaminated leather, particularly footwear, must be discarded. Note that contaminated clothing may be a fire hazard. Seek medical advice if symptoms persist or develop.

Eye contact: Remove contact lenses. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Ingestion: If swallowed Do not induce vomiting. Never give anything by mouth to an unconscious person. Seek medical attention immediately.

Notes to physician: Symptoms: Dizziness, Discomfort, Headache, Nausea, Kidney disorders, Liver disorders.

Section 5 - Fire Fighting Measures

Form: Liquid

Flash point -typical: -21.7 °C (-7.1 °F)

Auto Ignition temperature: 225 °C (437 °F)

Lower explosive limit: 1.2 %(V)

Upper explosive limit: 6.9 % (V)

Suitable extinguishing media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Does not use a solid water stream as it may scatter and spread fire.

Specific hazards during fire fighting: SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO₂, water spray, fire fighting foam, or Halon. LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Special protective equipment for fire-fighters: Fire fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear. Fire fighters' protective clothing will provide limited protection.

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Further information: Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam. Exposure to decomposition products may be a hazard to health. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use water spray to cool unopened containers. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

Section 6 - Accidental Release Measures

Personal precautions: Evacuate personnel to safe areas. Ventilate the area. Remove all sources of ignition. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

Environmental precautions: Should not be released into the environment. Avoid subsoil penetration. If the product contaminates rivers and lakes or drains, inform respective authorities.

Methods for cleaning up: Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations.

Section 7 - Handling and Storage

Handling: Keep away from fire, sparks and heated surfaces. No smoking near areas where material is stored or handled. The product should only be stored and handled in areas with intrinsically safe electrical classification.

Advice on protection against fire and explosion: Hydrocarbon liquids including this product can act as a non-conductive flammable liquid (or static accumulators), and may form ignitable vapour-air mixtures in storage tanks or other containers. Precautions to prevent static-initiated fire or explosion during transfer, storage or handling, include but are not limited to these examples: (1) Ground and bond containers during product transfers. Grounding and bonding may not be adequate protection to prevent ignition or explosion of hydrocarbon liquids and vapours that are static accumulators. (2) Special slow load procedures for "switch loading" must be followed to avoid the static ignition

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hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such as gasoline or naphtha). (3) Storage tank level floats must be effectively bonded. For more information on precautions to prevent static-initiated fire or explosion, see NFPA 77, Recommended Practice on Static Electricity (2007), and API Recommended Practice 2003, Protection against Ignitions Arising out of Static, Lightning, and Stray Currents (2008).

Dust explosion class: Not applicable

Requirements for storage areas and containers: Keep away from flame, sparks, excessive temperatures and open flame. Use approved containers. Keep containers closed and clearly labelled. Empty or partially full product containers or vessels may contain explosive vapours. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Should be stored in a well-ventilated area. The storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks in Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

Advice on common storage: Keep away from food, drink and animal feed. Incompatible with oxidizing agents. Incompatible with acids.

Other data: No decomposition if stored and applied as directed.

Section 8 - Exposure Controls, Personal Protection

Engineering measures: Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use only intrinsically safe electrical equipment approved for use in classified areas.

Eye protection: Safety glasses or goggles are recommended where there is a possibility of splashing or spraying. Ensure that eyewash stations and safety showers are close to the workstation location.

Hand protection: Gloves constructed of nitrile or neoprene is recommended. Consult manufacturer specifications for further information.

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Skin and body protection: If needed to prevent skin contact, chemical protective clothing such as of DuPont TyChem®, Saranex or equivalent recommended based on degree of exposure. The resistance of specific material may vary from product to product as well as with degree of exposure.

Respiratory protection: A NIOSH/ MSHA-approved air-purifying respirator with organic vapour cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odour or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Work / Hygiene practices: Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapours which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

Section 9 - Physical and Chemical Properties

Form: Liquid

Appearance: Colourless to light yellow

Odour: Characteristic hydrocarbon-like

Flash point - typical: -21.7 °C (-7.1 °F)

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Auto Ignition temperature: 225 °C (437 °F)

Thermal decomposition: Heating can release hazardous gases, No decomposition if stored and applied as directed.

Lower explosive limit: 1.2 % (V)

Upper explosive limit: 6.9 % (V)

pH: Not applicable

Specific gravity: 0.77 (H₂O=1)

Boiling point: 26.7 - 148.9 °C (80.1 - 300.0 °F)

Vapour Pressure: 758 - 896 hPa at 20 °C (68 °F)

Vapour Density (Air = 1): 3.5

Water solubility: Negligible

Viscosity, kinematic: Not determined

Percent Volatiles: 100 %

Work / Hygiene practices: Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapours which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

Section 10 - Stability and Reactivity

Conditions to avoid: Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources.

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Materials to avoid: Strong acids and strong bases. Oxidizing agents.

Hazardous decomposition products: Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

Thermal decomposition: Heating can release hazardous gases. No decomposition if stored and applied as directed.

Hazardous reactions: Vapours may form explosive mixture with air. Hazardous polymerization does not occur. Note: Stable under recommended storage conditions.

Section 11 - Toxicological Information

Carcinogenicity

NTP: Benzene (CAS-No.: 71-43-2)

IARC: Ethylbenzene (CAS-No.: 100-41-4) Benzene (CAS-No.: 71-43-2)

OSHA: Benzene (CAS-No.: 71-43-2)

CA Prop 65: WARNING! This product contains a chemical known to the State of California to cause cancer. Ethylbenzene (CAS-No.: 100-41-4) Benzene (CAS-No.: 71-43-2): WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Toluene (CAS-No.: 108-88-3) Benzene (CAS-No.: 71-43-2)

Skin irritation: Repeated or prolonged contact with the preparation may cause removal of natural fat from the skin resulting in desiccation of the skin. The product may be absorbed through the skin.

Eye irritation: The liquid splashed in the eyes may cause irritation and reversible damage. Strong lachrymation can make it difficult to escape

Further information: This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-

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forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH. Acute toxicity of benzene results primarily from depression of the central nervous system (CNS). Inhalation of concentrations over 50 ppm can produce headache, lassitude, weariness, dizziness, drowsiness, or excitation. Exposure to very high levels can result in unconsciousness and death. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.

Section 12 - Ecological Information

Additional ecological information: Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Section 13 - Disposal Considerations

Disposal: Dispose of container and unused contents in accordance with federal, state and local requirements.

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3.0 CHLORINE

Section 1 – Chemical Product and Company 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)

Material Name: **Chlorine**

Chemical Formula: **Cl₂**

Section 2 - Composition, Information on Ingredients

Chemical Name	CAS#	Percent
Chlorine	7782-50-5	100

Section 3 - Hazards Identification

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

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, vapour, 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

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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 Centre 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 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

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Symptoms: Delayed respiratory tract burns, skin burns, eye burns, kidney damage, tooth erosion, respiratory system effects

Section 5 - Fire Fighting Measures

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 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 Fire-fighters: 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).

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If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Centre 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 vapours 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).

Section 8 - Exposure Controls, Personal Protection

Component Exposure Limits

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 TWA 1 ppm STEL; 3 mg/m³ STEL

NIOSH: 0.5 ppm Ceiling (15 min); 1.45 mg/m³ Ceiling (15 min)

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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 face shield. 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.

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Any supplied-air respirator with a full face piece 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.

Section 9 - Physical and Chemical Properties

Physical State: Gas

Appearance: Not available

Colour: yellow or green

Physical Form: gas

Odour: distinct odour, irritating odour

Odour 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

LEL: Not available

UEL: Not available

Vapour Pressure: 5168 mmHg @ 21 °C

Vapour Density (air = 1): 2.49

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Density: 3.214 g/L @ 0 °C

Specific Gravity (water=1): 1.5649 @ -35 °C (liquid)

Water Solubility: 1.46 % @ 0 °C

Auto Ignition: Not available

Viscosity: 0.01327 cP @ 20 °C

Molecular Weight: 70.906

Molecular Formula: Cl₂

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.

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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:

Inhalation LC50 Rat 0.86 mg/L 1 h; Inhalation LC50 Rat 293 ppm 1 h

RTECS Acute Toxicity (selected) The components of this material have been reviewed, and RTECS publishes the following endpoints:

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

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:

Corrosive: inhalation, skin, eye.

Respiratory Sensitizer: No data available.

Dermal Sensitizer: No data available.

Carcinogenicity

Component Carcinogenicity: ACGIH: A4 - Not Classifiable as a Human Carcinogen

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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

565 mg/kg Oral Rat TDLO (male 8 week, prior to copulation 2 week, post 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

Section 12 - Ecological Information

Component Analysis - Aquatic Toxicity

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.

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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.

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4.0 LPG (Liquefied Petroleum Gas)

Section 1 – Chemical Product and Company Identification

Product Name: Liquefied Petroleum Gas

Chemical Formula: $C_3H_8 + C_4H_{10} + C_3H_6$

Trade name: Safety-gas

Colour Coding: Plascon Dark Admiralty Grey (SABS 1091 – G.12) body, with a Handigas decal affixed to the cylinder. All cylinders fitted with an internal eductor tube for liquid withdrawal shall be clearly marked with two Yellow (B.49) stripes painted diametrically opposite each other along the length of the cylinder.

Valve: Brass 5/8 inch BSP left hand female, either single or two-way outlet.

Company Identification: African Oxygen Limited 23 Webber Street Selby, Johannesburg South Africa.

Section 2 - Composition, Information on Ingredients

Chemical Name: Butane / Propane / Propylene

Chemical Family: Aliphatic Hydrocarbon

CAS NO.

BUTANE: 106-97-8: UN NO.1075

Propane: 74-98-6: UN No. 1978

Propylene: 115-07-01: UN No. 1077

UN No. 1075

ERG No. 115

Hazchem Warning: 2A Flammable gas

Section 3 - Hazards Identification

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Vaporized liquefied petroleum gas is highly flammable and can form explosive mixtures with air. The vaporized liquid does not support life. It can act as a simple asphyxiant by diluting the concentration of oxygen in the air below the levels necessary to support life. It can act as a simple asphyxiant.

Adverse Health effects: The liquefied petroleum gases are non-toxic. Prolonged inhalation of high concentrations has an anaesthetic effect

Chemical Hazards: Propane and butane (known as extensively in commercial and popular terms as LPGas or LPG) have an extremely wide range of domestic, industrial, commercial, agricultural and internal combustion engine uses. It is estimated that two gases, un-mixed and in mixtures, have several thousand industrial applications and many more in other fields. Their very broad application stems from their occurrences as hydrocarbons between natural gas and natural gasoline, and from their corresponding properties. As a result of their wide application, misuse could result in serious chemical hazards.

Biological Hazards: Contact with the liquid phase of liquefied petroleum gases with the skin can result in frostbite.

Vapour Inhalation: As the vaporized liquid act as a simple asphyxiant death may result from errors in judgement, confusion, or loss of consciousness which prevents self-rescue. At low oxygen concentrations, unconsciousness and death may occur in seconds without warning.

Eye Contact: The liquid can cause severe burn-like injuries.

Skin contact: Contact with the liquid phase can cause severe burn-like injuries.

Ingestion: No known effect

Section 4 - First Aid Measures

Prompt medical attention is mandatory in all cases of overexposure to vaporized liquefied petroleum gas. Rescue personnel should be equipped with self-contained breathing apparatus. In the case of frostbite from contact with the liquid phase, place the frost bitten part in warm water, about 40 -42 °C. If warm water is not available. Or is impractical to

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use, wrap the affected part gently in blankets. Encourage the patient to exercise the affected part whilst it is being warmed. Do not remove clothing whilst frosted. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be removed to an uncontaminated area, and given mouth-to mouth resuscitation and supplemental oxygen.

Eye contact: Immediately flush with large quantities of tepid water, or with sterile saline solution. Seek medical attention

Skin Contact: See above for handling of frostbite

Ingestion: No known effect

Precautionary Statements

P210: Keep away from heat/ sparks/open flames/ hot surface. No Smoking

P377: leaking gas fire: Do not extinguish, unless leak can be stopped safely.

P381: Eliminate all ignition sources if safe to do so.

P403: Store in a well-ventilated place.

Hazard Statements

H220: Extremely flammable gas

Section 5 - Fire Fighting Measures

Extinguish media: Do not extinguish fire unless the leakage can be stopped. Do not use water jet. Use dry chemical, CO₂ or foam.

Specific Hazards: The rupturing of cylinders or bulk containers due to excessive exposure to fire could result in a BLEVE (Boiling Liquid expanding Vapour Explosion), with disastrous effects. As the flammability limits in the air for the main constituents of liquefied petroleum gas vary between approximately 2 and 11% by vol, extreme care must be taken when handling leaks.

Emergency actions: If possible shut off the source of spillage. Evacuate area. Post notices “No Naked lights – No Smoking”. Prevent liquid or vapour from entering sewers,

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basements and work pits. Keep cylinders or bulk vessels cool by spraying with water if exposed to fire. If tanker has overturned, do not attempt to right or move it.

Protective Clothing: Self contained breathing apparatus. Safety gloves and shoes, or boots, should be worn when handling containers.

Environmental precautions: Vaporized liquefied petroleum gas is heavier than air and could form pockets of oxygen-deficient atmosphere in low lying areas.

Section 6 - Accidental Release Measures

Personal Precautions: Do not enter any area where liquefied petroleum gas has been spilled unless tests have shown that it is safe to do so.

Environmental Precautions: The danger of widespread formation of explosive LPG/Air mixtures should be taken into account. Accidental ignition could result in massive explosion.

Small spills: Do not extinguish the fire unless the leakage can be stopped immediately. Once the fire has been extinguished and all spills have been stopped, ventilate the area.

Large spills: Stop the source if it can be done without risk. Contain the leaking liquid, with sand or earth, or disperse with special water/fog spray nozzle. Allow to evaporate. Restrict access to the area until completion of the clean-up procedure. Ventilate the area using forced-draught if necessary. All electrical equipment must be flameproof.

Section 7 - Handling and Storage

Cylinders containing liquefied petroleum gas should only be handled and stored in the vertical position. Cylinders should never be rolled. Do not allow cylinders to slide or come into contact with sharp edges and they should be handled carefully. Ensure that cylinders are stored away from oxidants. Comply with local legislation.

Section 8 - Exposure Controls, Personal Protection

Occupational Exposure Hazards: As vaporised LPG is a simple asphyxiant, avoid any areas where spillage has taken place.

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Engineering control measures: Engineering control measures are preferred to reduce exposure to Oxygen depleted atmospheres. General methods include forced-draught ventilation, separate from other exhaust ventilation, separate from other exhaust ventilation systems. Ensure that all electrical equipment is flameproof.

Personal Protection: Self-contained breathing apparatus should always be worn when entering area where oxygen depletion may have occurred. Safety goggles, gloves and shoes, or boots, should be worn when handling containers. Skin. Wear loose-fitting overalls, preferably without pockets.

Section 9 - Physical and Chemical Properties

Specific Volume @ 20°C & 101,325 kPa: 471ml/g

Auto ignition temperature: 450°C

Relative density (Air=1) @101,325kPa: +-1,75

Flammability in air: 2,2-9.5%

Colour – Liquid: Clear

Taste: None

Odour: Ethyl-Mercaptan

Specification: SANS 1174

Section 10 - Stability and Reactivity

Conditions to avoid: The dilution of the oxygen concentration in the atmosphere to levels which cannot support life. The formation of explosive gas/air mixtures.

Incompatible Materials: Any common, commercially available metal may be used with commercial (or higher) grades of liquefied petroleum gases because they are non-corrosive, though installations must be designed to withstand the pressure involved and must comply with all state local regulations.

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Hazardous Decomposition Products: The constituents of liquefied petroleum gas are relatively stable. However, on combustion, toxic compositions, typically carbon monoxide, may be formed, depending on conditions.

Section 11 - Toxicological Information

Acute Toxicity: TLV 1000 VPM

Skin & eye contact: No known effect

Carcinogenicity: Severe cold burns can result in carcinoma

(For Further information see Section 3. Adverse Health Effects)

Section 12 - Ecological Information

Vaporized liquefied petroleum gas is heavier than air, and can cause pockets of oxygen-depleted atmosphere in low-lying areas. It does not pose a hazard to the ecology, unless the gas/air is ignited.

Section 13 - Disposal Considerations

Disposal Methods: Disposal of Propane, as with other flammable gases, should be undertaken only by personnel familiar with the gas and the procedures for disposal. Contact the supplier for instructions. In general, should it become necessary to dispose of Propane, the best procedure, as for other flammable gases, is to burn them in suitable burning unit available in the plant. This should be done in accordance with appropriate regulations.

Disposal of packaging: The disposal of cylinders must only be handled by the gas supplier.

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5.0 AMMONIA

Section 1 – Chemical Product and Company Identification

Product Name: Ammonia

Chemical Formula: NH_3

Trade name: Ammonia

Colour coding: Silver body with a Red (A.11) circle below the valve, and a yellow band immediately below the red circle

Valve: CGA240-3/8 inch – 18 NGT right hand female

Company Identification: African Oxygen Limited 23 Webber Street Johannesburg, 2001
Tel. No: (011) 490-0400 Fax No: (011) 490-0506

Emergency Number: 0860111185 or (011) 873 4382 (24 hours)

Section 2 - Composition, Information on Ingredients

Chemical Name: Ammonia

Chemical family: Corrosive, caustic, reactive gas

Synonyms: Anhydrous ammonia, R717

CAS No. 7664-41-7

UN No. 1005

ERG No. 125

Hazchem: Warning Corrosive toxic gas

Section 3 - Hazards Identification

Main Hazards: Irritating or corrosive to exposed tissues. Inhalation of vapours may result in pulmonary oedema and chemical pneumonitis. Contact with liquid product may cause frostbite or freeze burns, in exposed tissues. All cylinders are portable gas containers and must be regarded as pressure vessels at all times.

Adverse Health Effects: Inhalation of high concentrations produces violent coughing due to the local action on the respiratory tract. If rapid escape is not possible, severe lung irritation, pulmonary oedema and death can result. Lower concentrations cause eye irritation, laryngitis and bronchitis.

Biological Hazards: Because of its alkaline properties, long-term exposure to flora can cause damage. Aquatic fauna can also be affected should the pH of their environment change due to long-term exposure to high concentrations of ammonia.

Vapour Inhalation: Ammonia acts principally on the upper respiratory tract, where it exerts an alkaline, caustic action. It produces respiratory reflexes such as coughing and arrest of respiration. It affects the conjunctiva and cornea immediately. Inhalation causes acute inflammation of the respiratory organs, coughing, oedema of the lungs, chronic bronchial catarrh and secretion of saliva and retention of urine.

Eye Contact: Exposure to high gas concentrations may cause temporary blindness and severe eye damage. Direct contact of the eyes with liquid anhydrous ammonia will produce serious eye burns.

Skin Contact: Liquid anhydrous ammonia produces skin burns on contact.

Ingestion: Swallowing of the liquid results in severe corrosive action of the mouth, throat, and stomach.

Section 4 - First Aid Measures

Prompt medical attention is mandatory in all cases of overexposure. Rescue personnel should be equipped with self-contained breathing apparatus. Any conscious person who has inhaled ammonia causing irritation should be assisted to an uncontaminated area and inhale fresh air. A person overcome by ammonia should immediately be carried to an uncontaminated area. If breathing has ceased, artificial respiration must be started immediately, preferably by trained personnel. If breathing is weak or has been restored by artificial respiration, oxygen may be administered. Summon a physician immediately for anyone who has been burned or overcome by ammonia. Until a physician arrives, and after having accomplished a thorough removal of ammonia as possible, keep the patient warm and quiet, and take such specific action as may be indicated.

Eye Contact: Persons with potential exposure to ammonia should not wear contact lenses. Call a physician at once. Immediately begin irrigation of the eyes with copious amounts of clean water while holding the eyelids apart. Continue irrigation for 15 minutes. Repeat this procedure every 10 minutes for an hour, each time irrigating for a period of 5 minutes. If readily available, a 5% boric acid solution may be used instead of water, but irrigation must not be delayed while such a solution is sought or prepared. Prompt and thorough irrigation is of primary importance. Any standard anaesthetic solution for ophthalmic use ordered by the physician may be instilled for control of severe pain, but only after the 15 minute period of irrigation has been completed. Continuous cold boric acid compresses should be used for cases of severe injury, in addition to irrigation. No oils or ointments should be instilled until after the eye has been examined by a qualified physician, and then only as prescribed by him. Ulcers of the cornea should be treated by an ophthalmologist.

Skin Contact: If skin contact is extensive and emergency showers available, the victim should get under the emergency shower immediately. Contaminated clothing and shoes should be removed under the shower. In other cases, the affected areas should be washed thoroughly with large amounts of running water for at least 15 minutes. Do not apply salves or ointments or cover burns with dressing; however, protect the injured area with a clean cloth prior to medical care. Do not attempt to neutralise the ammonia. Subsequent medical treatment is otherwise the same as for thermal burns.

Inhalation: The conscious person who has inhaled a concentration of ammonia which causes irritation effects should go to an uncontaminated area and inhale fresh air or oxygen. Eye, nose and throat irritation should be treated as described below for more

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serious exposures. However, if the exposure has been to minor concentrations for a limited time, usually no treatment will be required. A worker overcome by ammonia must be carried to an uncontaminated atmosphere and, if breathing is laboured or has ceased, given artificial respiration (back-pressure, arm lift, or mouth-to-mouth resuscitation) immediately, preferably by trained personnel. When breathing has been restored, 100% oxygen is administered, but not for more than 1 hour of continuous treatment at one time. Oxygen therapy may be interrupted after 1 hour, and reinstituted as the clinical condition indicates. Observe for laryngeal spasm and perform tracheotomy if indicated. In case of severe exposure, the patient should breathe 100% oxygen under positive exhalation pressure (4cm) for one-half hour periods every hour. Treatment may be continued in this way until symptoms subside or other clinical indications for interruption appear.

Contact with nose & throat: Irrigate the nose and mouth continuously for 15 minutes. If the patient can swallow, encourage him to drink large quantities of 0,5% citric acid solution or lemonade. Never give anything by mouth to an unconscious person.

Ingestion: If liquid anhydrous ammonia has been swallowed, call a physician immediately. If the patient is conscious and able, he should drink large amounts of water to dilute the chemical. Do not induce vomiting if the patient is in shock, extreme pain or is unconscious. If vomiting begins, place the patient face down with head lower than hips; this prevents vomit from entering the lungs and causing further injury.

Section 5 - Fire Fighting Measures

Extinguishing media: Fog-water spray (In the absence of fog equipment, a fine spray of water may be used.) Use media suitable for surrounding fire. Although ammonia does not represent a serious flammability hazard, mixtures of air and ammonia containing from 15% to 28% ammonia vapour by volume will ignite when sparked, or exposed to temperatures exceeding 651°C.

Specific Hazards: High levels of ammonia can produce corrosive effects on tissues and can cause laryngeal and bronchial spasm and oedema so as to obstruct breathing.

Emergency Actions: Rescue personnel should be equipped with self-contained breathing apparatus. If possible, stop the flow of gas. Since ammonia is soluble in water, it is the best extinguishing media - not only in extinguishing the fire, but also absorbing the escaped ammonia gas. Evacuate the area. All cylinders should be removed from the

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vicinity of the fire. Cylinders that cannot be removed should be cooled with water from a safe distance. Cylinders which have been exposed to excessive heat should be clearly identified and returned to the supplier.

Protective Clothing: Self-contained breathing apparatus. Safety gloves, Goggles and shoes, or boots, should be worn when handling cylinders.

Environmental precautions: As the gas is lighter than air, ensure that it is not trapped in confined spaces. Knock down pockets of gas with fog water spray, and ventilate the area using forced-draft if necessary. Prevent from entering sewers and drains.

Section 6 - Accidental Release Measures

Personal Precautions: Personnel working with anhydrous ammonia should be thoroughly familiar with safety precautions for handling a gas corrosive to human tissue as well as measures for handling emergencies. A gas mask must be worn when breaking and making connections, or pressuring a system. Self-contained breathing apparatus should be available both up and down wind.

Environmental Precautions: Because of its high alkalinity and solubility in water, ammonia can alter the pH balances of surface water, soil and plants. Should they be exposed to high concentrations for any length of time, these changes in pH could be detrimental to both flora and fauna.

Small spills: Only personnel trained for, and designated to handle emergencies, should attempt to stop a leak. Respiratory equipment of a type suitable for ammonia must be worn. All persons not so equipped must leave the affected area until the leak has been stopped. If ammonia vapour is released, the irritating effect of the vapour will typically force personnel to leave the area before they have been exposed to dangerous concentrations. Knock down small amounts of ammonia using a fog-water spray. Prevent from entering sewers or drains. Ventilate the area using forced-draught ventilation if necessary.

Large spills: Evacuate all unprotected personnel to upwind areas. Disperse leaks with water spray or fog to lower concentration of ammonia gas. Neutralise contaminated area with a dilute acid, and deluge with plenty of water. Rotate a leaking cylinder to allow gas

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instead of liquid to escape. Keep area isolated until all gas has been dispersed. Evaporation is very rapid causing ice to form on leaking cylinders.

Section 7 - Handling and Storage

Always store full cylinders in upright position. Avoid dragging, rolling or sliding cylinders. Use trolleys for handling. Cylinders should be stored in a well ventilated area on a hard dry surface. Ventilation inlets should be at ceiling and floor level. Cylinders must be used on a "first in - first out" basis. Keep cylinders away from sources of heat. Keep away from children

Section 8 - Exposure Controls, Personal Protection

Occupational Exposure Hazards: Inhalation of high concentrations produces violent coughing due to local action on the respiratory tract. If rapid escape is not possible, severe lung irritation, pulmonary oedema and death can result. Lower concentrations cause eye irritation, laryngitis and bronchitis. Exposure to high gas concentrations may cause temporary blindness and severe eye damage. Direct contact of the eyes with liquid anhydrous ammonia will produce serious eye burns. Liquid anhydrous ammonia produces skin burns on contact.

TLV 25ppm

STEL 35ppm

Engineering control measures: Engineering control measures are preferred to reduce exposures. General methods include mechanical ventilation, process or personal enclosure, and control of process conditions. Administrative controls and personal protective equipment may also be required. Use a suitable flameproof ventilation system separate from other exhaust ventilation systems. Exhaust direct to outside and supply sufficient replacement air to make up for air removed by exhaust system.

Personal protection: Eyes - Chemical goggles, Hands - Rubber gloves, Skin - rubber or plastic apron.

Section 9 - Physical and Chemical Properties

PHYSICAL DATA

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Chemical Symbol: NH_3

Molecular Weight: 17.031

Specific Volume @ 20°C & 101,325 kPa: 1405.6 ml/g

Boiling point @ 101,325 kPa: -33.4°C

Relative density (Air = 1) @ 101,325 kPa: 0.599

Flammability levels in air: 16 - 25% (by vol.)

Auto ignition temperature: 651°C

Colour: None

Taste: Alkaline

Odour: Pungent

Section 10 - Stability and Reactivity

Conditions to avoid: Heating of cylinders, as the increase in pressure bears a direct relationship to increase in temperature. When the gas is exposed to temperatures in the range 449°C at 101,325kPa, dissociation will occur, with the release of nitrogen and hydrogen. The hydrogen could then form explosive gas/air mixtures. Never use cylinders as rollers or supports, or for any other purpose than the storage of ammonia.

Incompatible Materials: Most common metals are not affected by dry ammonia. However, when combined with water vapour, ammonia will attack copper, zinc, or alloys containing copper as a major alloying element. Therefore, these materials should not be used in contact with ammonia.

Hazardous Decomposition Products: See above, Conditions to Avoid

Section 11 - Toxicological Information

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Acute Toxicity: Ammonia is not a systemic poison

Skin & eye contact: Severe irritant

Chronic Toxicity: Chronic irritation to the eyes, nose, and upper respiratory tract may result from repeated exposure to the vapours.

Carcinogenicity: No known effect.

Mutagenicity: Genetic mutations observed in bacterial and mammalian test systems.

Reproductive Hazards: No known effect

National Legislation: None

(For further information see Section 3. Adverse Health Effects)

Section 12 - Ecological Information

Ammonia gas can cause damage to the ecology due to its high alkalinity and affinity for water. pH changes can occur in the immediate environs of a spill which could affect both flora and fauna.

Section 13 - Disposal Considerations

Disposal Methods: Ammonia may be disposed of by discharge into water of sufficient volume to absorb it. Disposal of the resultant ammonium hydroxide, including and subsequent neutralisation products, must be done in an environmentally safe manner that, for example, will not be harmful to aquatic life. Large amounts should only be handled by the gas supplier.

6.0 PHORATE

Section 1 – Chemical Product and Company Identification

Product Name: **Phorate 10% cg**

Chemical Classification: **Toxic**

Synonyms: **O, O-Diethyl ethylthiomethyl phosphorodithioate, O, O-Diethyl-S-(Ethylthio) methyl phosphorodithioate, Thimet**

Formula: **C₇H₁₇O₂PS₃**

Section 2 - Composition, Information on Ingredients

Composition: Phorate

Content %: 10%

Section 3 - Hazards Identification

Effects of Exposure / Symptoms: Phorate has a very high acute toxicity to humans, fish and wildlife. It is a cholinesterase inhibitor. Symptoms include headache, tightness of chest, nausea or vomiting, abdominal cramps, diarrhoea, convulsions. Absorption through the skin may have the same effects.

Section 4 - First Aid Measures

Inhalation: Remove the person to fresh air area and atropine powder or tablet may be given.

Skin: Remove the contaminated clothes and wash the affected area with plenty of water and soap. The affected area may be decontaminated with 5-10% soln. of ammonia or 2-5% soln. of chloramines.

Eyes: Flush eyes with water for at least 15 mins.

Ingestion: Induce vomiting. Give half a glass of a 2% Na₂CO₃ soln. with 2-3 tablespoonful's triturated activated charcoal to drink.

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Section 5 - Fire Fighting Measures

Flammability: No

Flash Point °C in OC: 160°C

Boiling: 118-120°C

Melting point: -42.8°C

Section 6 - Accidental Release Measures

Fire Extinguishing Media: Keep containers cool by spraying water, if exposed to heat or flame.

Unusual Hazards: Shock can shatter containers, releasing the contents. When heated to decomposition, toxic fumes of sulphur oxides, phosphorus oxides, and nitrogen oxides are emitted.

Section 7 - Handling and Storage

Phorate and its formulations are used as insecticide-nematicide. Certain oxidation products of phorate are found to be more toxic than phorate itself. Phorate has some potential to reach through soil and contaminate ground water. Phorate is highly toxic to both cold and warm water fish.

Antidotes/Dosage: Atropine sulphate (powder or tablet); 0.15% to 1% atropine sulphate for instilling in the eyes; Atropine sulphate for injection; 2-PAM, TMB-4, Toxogonin.

Section 8 - Exposure Controls, Personal Protection

Inhalation: Remove the person to fresh air area and atropine powder or tablet may be given.

Skin: Remove the contaminated clothes and wash the affected area with plenty of water and soap. The affected area may be decontaminated with 5-10% soln. of ammonia or 2-5% soln. of chloramine.

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Eyes: Flush eyes with water for at least 15 min.

Ingestion: Induce vomiting. Give half a glass of a 2% Na_2CO_3 soln. with 2-3 tablespoonful's triturated activated charcoal to drink.

Section 9 - Physical and Chemical Properties

Auto ignition Temperature $^{\circ}\text{C}$: Explosion

Sensitivity to impact: Stable Explosion

Hazardous Combustion Products: When heated to decomposition it emits SO_x

Hazardous Polymerization: Will not occur

Combustible Liquid: Yes

Hazardous Polymerization: Will not occur

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature

Incompatibility with other material: Alkalai

Reactivity: Hydrolysed in presence of water and alkali

Section 11 - Toxicological Information

LD50 (oral-rat) mg/kg: 3.7 mg/kg

STEL: 0.2 mg/m^3 , skin

LC50 (rat) mg/kg: 0.011 mg/litre for 1

Permissible: 0.05 mg/m^3 , skin

TLV (ACGIH) : 0.05 mg/m^3 , skin

Section 12 - Disposal Considerations

Disposal: Improper disposal of this product is a violation of Federal law. For disposal as a waste, this product may be hazardous waste.

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7.0 MONOCROTOPHOS

Section 1 – Chemical Product and Company Identification

Product Name: Monocrotophos 36% SL

Chemical Name: Dimethyl (E)-1-methyl-2-(methylcarbamoyl) vinyl phosphate (IUPAC)

Brand Name: Monocrop

Users: Insecticide

Molecular Formula: C₂₂H₁₉Cl₂NO₃

Manufacturer: Crop Life Science Ltd.

Address: Plot No. 5165, 5166, 5151, G.I.D.C., Ankleshwar-393002 Gujarat, India

Section 2 - Composition, Information on Ingredients

Chemical Name: Monocrotophos

CAS: 6923-22-4

Percent or Content (W/W): 36.00 % w/w

Section 3 - Hazards Identification

Risk Phrases: Harmful by installation and if swallowed. Irritating to eyes

Skin Harmful: Danger of serious damage to health by prolonged exposure if swallowed.

Environmental Hazard: Very toxic to aquatic organisms, may cause long-term adverse effects in the Aquatic environment.

Primary route of Exposure: Vapours inhalation. Skin and eyes contact.

Inhalation: Cough, Headache, Drowsiness and Dizziness.

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Skin contact: Redness, pain.

Eye contact: Blurred vision may cause eye irritation.

Ingestion: Abdominal pain, nausea.

Section 4 - First Aid Measures

In case poisoning symptoms appear, call physician immediately. Meanwhile, remove the patient immediately to open air. Remove the clothing and wash contaminated body parts. Induce vomiting by putting fingers inside throat or give one tablet spoon salt with lukewarm water. Continue this process till the vomit is cleared. Gastric lavage with 5 % sodium bicarbonate may be given. Use artificial respiration, if needed be, with oxygen under pressure.

Section 5 - Fire Fighting Measures

Prevention: Keep away from sources of ignition. No smoking.

Extinguishing media

- Suitable: Small fire. Dry chemical

Large fire: Water Fog. Water sprays Foam.

- Not to be used: Do not use a heavy water stream

Surrounding fires: Use water spray or fog for cooling exposed containers.

Special exposure Hazards: When exposed to heat, may decompose liberating Hazardous gases, Carbon monoxide, Carbon dioxide, Halogens, Nitrogen oxides.

Protection against Fire: Do not enter fire area without proper protective Equipment, including respiratory protection.

Special procedures: Exercise caution when fighting any chemical fire. Avoid (reject) fire – fighting water to enter Environment.

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Section 6 - Accidental Release Measures

Personal precautions: No smoking. Keep public away from danger area. Spill should be handled by trained cleaning personnel properly equipped with respiratory and eye protection.

Environment Precautions: Prevent entry to sewers and public waters. Notify Authorities if liquid enters sewers or public waters.

After spillage and / or leakage: Clean up any spills as soon as possible, using an Absorbent material to collect it. Use suitable disposal Containers.

Section 7 - Handling and Storage

General: Keep away from sources from sources of ignition. No smoking. Do not breathe vapours

Precautions in handling and storage: Both local exhaust and good general room ventilation must be provided not to control exposure but also to prevent formation of Flammable mixtures.

Technical protective Measure: Use grubbed electrical / mechanical equipment.

Storage: Store in dry, cool, well – ventilated area. Protection from Freezing.

Handling: Ensure prompt removal from eyes, skin and clothing. Wash Hands and other exposed areas with mild soap and water before Eat, drink or smoke and when leaving work.

Section 8 - Exposure Controls, Personal Protection

Personal protection

Respiratory protection: When exposure through inhalation may occur from use, Approved respiratory protection equipment is recommended.

Hand protection: Wear suitable gloves resistant to chemical penetration

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Skin protection: If skin contact or contamination of clothing is likely, Protective Clothing should be wear.

Eye protection: Chemical goggles or face shield with safety glasses.

Ingestion: When using, do not eat, drink or smoke.

Industrial hygiene: Provide local exhaust or general room ventilation to minimize Dust and/ or vapour concentrations. Emergency eye wash Fountains and safety showers should be available in the Immediate vicinity of any potential exposure.

Section 9 - Physical and Chemical Properties

Physical State: Liquid.

Colour: Reddish brown

Odour: Characteristic

Density (g/cm³), 20°C: 1.02 at 25°C

Solubility in water: Soluble in water

Section 10 - Stability and Reactivity

Chemical stability: Stable under normal conditions of use. No dangerous action known under normal conditions.

Hazardous polymerization: None

Conditions to avoid: Extreme heat and fire

Incompatible materials: None known

Section 11 - Toxicological Information

Acute Toxicity: Monocrotophos is a direct acting cholinesterase inhibitor capable of penetration through the skin. The dose which kills half of the test animals, the LD50, is

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17-18 mg/kg for male rats and 20 mg/kg for female rats. The LD50 for dermal exposure is 126 mg/kg for male rats, 112 mg/kg for female rats, and 354 mg/kg for rabbits. The concentration in air at which half of the test animals die, the LC50, is 0.8 mg/l air.

Monocrotophos is not irritating to skin and eyes. Symptoms of Monocrotophos poisoning are similar to those of other organophosphate compounds. Its cholinesterase inhibiting activity causes nervous system effects. Cases of human poisoning are characterized by muscular weakness, blurred vision, profuse perspiration, confusion, vomiting, pain, and small pupils. There is a risk of death due to respiratory failure.

Chronic Toxicity: No Information Available.

Reproductive Effects: Rats who received doses of 2 mg/kg/day Monocrotophos produced fetuses with lower than average length and weight. This dose is much higher than expected from normal application of this pesticide.

Teratogenic Effects: No Teratogenic effects were found at 2 mg Monocrotophos/kg/day in rats, the highest dose tested.

Mutagenic Effects: Studies show that Monocrotophos may be weakly mutagenic.

Carcinogenic Effects: Monocrotophos is not carcinogenic in rats at 0.45 mg/kg/day, the highest dose tested. No significant carcinogenic lesions were observed when rats were exposed to Monocrotophos aerosol at concentrations from 97-308 mg/m³ for one hour.

Organ Toxicity: Monocrotophos affects the central nervous system by inhibiting cholinesterase, an enzyme essential for normal nerve impulse transmission.

Section 12 – Ecological Information

Effects on Birds: Monocrotophos is highly toxic to birds. The LD50 is 0.76 mg/kg for California quail, 0.94 mg/kg for bobwhite quail, 1.58 mg/kg for Canada goose, 3.3 mg/kg for European starling and 4.76 mg/kg for mallard ducks.

Effects on Aquatic Organisms: Monocrotophos is moderately toxic to fish. The LC50 (48hrs) is 7 mg/l for rainbow trout and 23 mg/l for bluegill sunfish. Monocrotophos causes reproductive damage to crustaceans exposed for long periods of time.

Effects on Other Animals (Non-target species): Monocrotophos is highly toxic to bees. It may also kill non-target birds which eat insects poisoned with Monocrotophos.

Section 13 - Disposal Considerations

Do not wash away into sewer. Sweep spilled substance into sealable containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder and then remove to safe place. Personal protection: complete protective clothing including self-contained breathing apparatus.

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8.0 METHYL PARATHION 4 EC

Section 1 – Chemical Product and Company Identification

Product identifier : METHYL PARATHION 4 EC

Product Code(s) : None reported.

Product Use : Insecticide

Chemical Family : Mixture

Supplier's name and address: CHEMINOVA Inc.

PO Box 110566

One Park Drive

Research Triangle Park, NC, USA

27709

Section 2 - Composition, Information on Ingredients

Ingredients	CAS	% weight	ACGIH TLV		OSHA PEL	
			TWA	STEL	PEL	STEL
Parathion methyl	298-00-0	30.00-60.00	0.2 mg/m ³	N. A.	N. A.	N. A.
Heavy aromatic solvent naphtha	64742-94-	30.00-60.00	N. A.	N. A.	N. A.	N. A.
Xylene	1330-20-7	7.00-13.00	100 ppm	150 ppm	100 ppm; 435 mg/m ³	N. A.
Valeric Acid	109-52-4	0.50-1.50	N. A.	N. A.	N. A.	N. A.

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Amber liquid. Rancid odour. DANGER! Flammable liquid and vapour. Dangerous exothermic decomposition may occur at temperatures greater than 212°F / 100° C. May be fatal if inhaled or swallowed. Can enter the lungs and cause damage. Harmful if absorbed through the skin. Contains material which can cause nervous system damage.

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Contains material which may be a teratogen. May cause long-term adverse effects in the environment. This material is toxic to birds, insects and aquatic invertebrates.

POTENTIAL HEALTH EFFECTS

Target organs : Eyes, skin, respiratory system, digestive system, central nervous system.

Signs and symptoms of short-term (acute) exposure

Inhalation May be fatal if inhaled. This material can cause organophosphorous poisoning.

Symptoms of poisoning may include headache, nausea, vomiting, blurred vision, tightness in chest, drooling and frothing of mouth and nose, convulsions, coma and death.

Skin: May cause mild irritation. Readily absorbed through the skin. Causes symptoms similar to those listed for inhalation.

Eyes: May cause mild eye irritation. Readily absorbed through eye surfaces. Causes symptoms similar to those listed for inhalation.

Ingestion: May be fatal if ingested. Causes symptoms similar to those listed for inhalation.

Material is an aspiration hazard. Aspiration into the lungs during swallowing or subsequent vomiting may cause chemical pneumonitis, which can be fatal.

Effects of long-term (chronic) exposure : Prolonged or repeated overexposure may cause behavioural changes. Prolonged or repeated skin exposure may cause redness, a burning sensation, drying and cracking of the skin (dermatitis). Prolonged or repeated overexposure could cause adverse liver effects.

Conditions aggravated by overexposure: Pre-existing skin, eye, respiratory and central nervous system disorders.

Carcinogenic status: See TOXICOLOGICAL INFORMATION, Section 11.

Additional health hazards: Potential teratogen. See TOXICOLOGICAL INFORMATION, Section 11.

Potential environmental effects: This material is highly toxic to fish and wildlife. See ECOLOGICAL INFORMATION, Section 12.

Cholinesterase inhibitor. May cause central nervous system depression. May cause damage to the peripheral nervous system. See Toxicological Information, Section 11.

Section 4 - First Aid Measures

Inhalation: Immediately remove person to fresh air. If breathing has stopped, give artificial respiration. Obtain medical attention immediately.

Skin contact: Immediately flush skin with running water for at least 15 minutes, while removing contaminated clothing. Obtain medical attention immediately. Wash contaminated clothing before reuse.

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Eye contact: Immediately flush eyes thoroughly with running water for at least 20 to 30 minutes. Obtain medical attention immediately.

Ingestion: Do NOT induce vomiting. Never give anything by mouth to an unconscious person. If vomiting occurs spontaneously, keep victim's head lowered (forward) to reduce the risk of aspiration. Obtain medical attention immediately.

Notes for physician: This product contains a cholinesterase inhibitor affecting the central and peripheral nervous systems and producing respiratory depression. Decontamination procedures such as whole body washing, gastric lavage and administration of activated charcoal are often required. If symptoms are present, administer atropine sulphate in large doses. Two to four mg intravenously or intramuscularly as soon as possible. Repeat at 5 to 10 minute intervals until signs of atropinization appear. Maintain full atropinization until all organophosphate is metabolised. Obidoxime chloride (Toxogonin), alternatively pralidoxime chloride (2-PAM), may be administered as an adjunct to, but not a substitute for atropine, which is a symptomatic and often life-saving antidote. Treatment with oxime should be maintained as long as atropine sulphate is administered. At first sign of pulmonary edema, the patient should be given supplemental oxygen and treated symptomatically. Continued absorption may occur and relapse may occur after initial improvement. Very close supervision of the patient is indicated for at least 48 hours, depending on the severity of poisoning.

Section 5 - Fire Fighting Measures

Fire hazards/conditions of flammability: Flammable liquid and vapour. This material may burn when exposed to extreme heat, flame and other ignition sources. Material may decompose rapidly when exposed to heat and flame. Heat of decomposition may cause closed containers to build up pressure and explode.

Flammability classification (OSHA 29 CFR 1910.1200): OSHA Combustible Liquid II

Flash point : 122°F / 50°C

Flash point Method : Pensky Martens Closed Cup

Auto-ignition temperature : 830°F / 443°C (based on ingredients)

Lower flammable limit (% by vol.) : 0.7 (based on ingredients)

Upper flammable limit (% by vol.): 7.0 (based on ingredients)

Explosion data: Sensitivity to mechanical impact / static discharge : Not expected to be sensitive to mechanical impact or static discharge.

Suitable extinguishing media : Carbon dioxide or dry chemical for small fires. For large fires, use water spray or foam.

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Special fire-fighting procedures/equipment: Fire-fighters should wear proper protective equipment and self-contained breathing apparatus with full face piece operated in positive pressure mode. Move containers from fire area if safe to do so. Water spray may be useful in cooling equipment exposed to heat and flame. Avoid spreading burning liquid with water spray used for cooling purposes.

Hazardous combustion products: Carbon oxides; nitrogen oxides (NO_x); Oxides of phosphorus; sulfur oxides; irritating fumes and smoke.

Section 6 - Accidental Release Measures

Personal precautions: Restrict access to area until completion of clean-up. Ensure clean-up is conducted by trained personnel only. All persons dealing with clean-up should wear the appropriate protective equipment including self-contained breathing apparatus. Refer to Section 8, Exposure Controls And Personal Protection, for additional information on acceptable personal protective equipment.

Environmental precautions: Ensure spilled product does not enter drains, sewers, waterways, or confined spaces. If necessary, dike well ahead of the spill to prevent runoff into drains, sewers, or any natural waterway or drinking supply.

Spill response/cleanup: Remove all sources of ignition. Ventilate area of release. Stop the spill at source if it is safe to do so. Contain and absorb spilled material with inert, non-combustible absorbent material, such as sand. Sweep up and shovel into suitable containers for disposal. For a water spill, confine the spill immediately with booms. Notify the appropriate authorities as required.

Prohibited materials : None known.

Special spill response procedures: In case of a transportation accident, in the United States contact CHEMTREC at 1-800-424-9300 or International at 1-703-527-3887. If a spill/release in excess of the EPA reportable quantity is made into the environment, immediately notify the national response center in the United States (phone: 1-800-424-8002). US CERCLA Reportable quantity (RQ): Methyl parathion (100 lbs / 45.4 kg); Xylene (100 lbs / 45.4 kg); This product may also contain trace amounts of: Naphthalene (100 lbs / 45.4 kg)

Section 7 - Handling and Storage

Safe Handling procedures: This material is a toxic liquid. Wear chemically resistant protective equipment during handling. Use only in well-ventilated areas. Avoid contact with eyes, skin and clothing. Do not breathe fumes or mists. Keep away from children and all unprotected persons. Do not use near sources of heat, flame or direct sunlight. Do

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not heat above 131°F / 55°C, and avoid local heating above this temperature. Keep away from incompatibles. Use caution when opening cap. Keep containers tightly closed when not in use. Wash thoroughly after handling.

Storage requirements: Store in a cool, dry, well ventilated area. Keep away from excessive heat, open flames, sparks and other possible sources of ignition. Avoid storage above 77°F / 25°C for prolonged period of time. Keep away from incompatibles. Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. Inspect periodically for damage or leaks. No smoking in the area

Incompatible materials: Strong alkalis; Strong oxidizing agents.

Special packaging materials: Always keep in containers made of the same materials as the supply container.

Section 8 - Exposure Controls, Personal Protection

Ventilation and engineering measures: Provide sufficient ventilation to keep vapour concentration below the given TLV and/or PEL.

Respiratory protection: Respiratory protection is required. Wear a pesticide respirator jointly approved by the MSHA and NIOSH. Advice should be sought from respiratory protection specialists. Skin protection: Impervious gloves must be worn when using this product. Advice should be sought from glove suppliers.

Eye / face protection: Chemical splash goggles must be worn when handling this material.

Other protective equipment: Wear impervious chemical apron and protective clothing (water-proof pants, coat, hat and boots) to prevent skin contact. An eyewash station and safety shower should be made available in the immediate working area.

General hygiene considerations: Avoid breathing vapour or mist. Avoid contact with skin, eyes and clothing. Do not eat, drink, smoke or use cosmetics while working with this product. Always wash hands, face and arms with soap and water before smoking, eating or drinking. After work, take off all protective equipment, work clothes and shoes, and wash with soap and water. Respirator should be cleaned and filter replaced according to manufacturer's instructions. Wear only clean, uncontaminated clothes when leaving place of work. Persons working with this product for a longer period should have frequent blood tests for cholinesterase levels. If the cholinesterase levels fall below a critical point, no further exposure should be allowed until it has been determined, by means of blood tests that cholinesterase levels have returned to normal.

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Section 9 - Physical and Chemical Properties

Physical state: Liquid

Appearance: Amber liquid.

Odour: Rancid odour.

Odour threshold: N/Av

pH: N/Av

Boiling point : >228°F / >109°C

Specific gravity: 1.06 g/ml

Melting/Freezing point : <63F/<17C

Coefficient of water/oil distribution: 3300 (Methyl parathion)

Solubility in Water: 55-60 mg/L @ 20C (Methyl parathion); <0.1% @ 20C (Aromatic solvent naphtha)

Section 10 - Stability and Reactivity

Stability and reactivity: Stable if handled below 131°F / 55°C and stored below 77°F / 25°C. At higher temperatures decomposition will take place and lower the quality of the product. The released heat from decomposition can raise the temperature further and accelerate decomposition. May corrode iron, steel, tin plate and copper. May be hydrolyzed in water by heating and adjusting the pH (alkaline).

Hazardous polymerization: May decompose rapidly when heated to temperatures above 212°F / 100°C, significantly increasing the risk of inducing explosions. The decomposition is to a considerable extent dependant on time as well as temperature due to exothermic and autocatalytic reactions. The reactions involve rearrangements and polymerisation.

Conditions to avoid: Keep this product away from heat, sparks, flame, and other sources of ignition (e.g. pilot lights, electric motors, static electricity).

Materials to Avoid and Incompatibility: Avoid contact with incompatible materials. See Section 7 (Handling and Storage) for further details.

Hazardous decomposition products: None known refer to hazardous combustion products in Section 5.

Section 11 - Toxicological Information

Toxicological data : LD50 Oral (rat): 13 mg/kg LD50 Dermal (rat): 662 mg/kg LC50 Inhalation (rat): 0.119 mg/L/4 hrs

Carcinogenic status: No components are listed as carcinogens by ACGIH, IARC, OSHA or NTP.

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Reproductive effects: Not expected to have other reproductive effects.

Teratogenicity : This product contains Xylene. Xylene may cause fetotoxic effects at doses which are not maternally toxic, based on animal data.

Mutagenicity : Not classifiable as a mutagen.

Epidemiology: Not available.

Sensitization to material : Not expected to be a skin or respiratory sensitizer.

Synergistic materials: Not available.

Irritancy: Irritating to eyes and skin.

Other important hazards : See Section 3 for additional information.

Section 12 – Ecological Information

Environmental effects: The ecological characteristics of this product have not been fully investigated. The product should not be allowed to enter drains or water courses, or be deposited where it can affect ground or surface waters. Do not discharge product unmonitored into the environment. This material is highly toxic to fish and wildlife.

Important environmental characteristics: This product is a pesticide. The active ingredient is: Methyl parathion the active ingredient is readily biodegradable. The active ingredient undergoes rapid degradation in the environment and, without problems, in sewage treatment plants. No adverse effects are found at concentrations up to 100 g/L in waste water treatment plants. Degradation occurs both aerobically and an aerobically, and biologically as well as a biologically

Eco-toxicological: The active ingredient is: Methyl parathion

The toxicity of the active ingredient to wildlife species is measured to be:

Fish - 96-Hr LC50 (95% CI), Rainbow trout (*Salmo gairdneri*) = 3.70 mg/L.

Invertebrates - 48-Hr EC50, Daphnids (*Daphnia magna*) = 7.3 µg/L.

Birds - LD50, Mallard = 10.0 mg/kg.

Bees - 24-Hr LD50, worker honey-bees (*Apis mellifera*), acute oral = 0.013 µg/bee.

24-Hr LD50, worker honey-bees (*Apis mellifera*), topical = 0.04 µg/bee

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Section 13 - Disposal Considerations

Handling for Disposal: Handle waste according to recommendations in Section 7.

Methods of Disposal: Do not contaminate water, foodstuffs, feed or seed by storage or disposal. For disposable containers, triple rinse (or equivalent) containers and add rinse material to disposal tank. Follow any additional local, state or federal requirements for cleaning containers prior to disposal. Make the empty, rinsed container unsuitable for further use by puncturing. Dispose in accordance with all applicable federal, state, provincial and local regulations. Contact your local, state, provincial or federal environmental agency for specific rules.

RCRA: If this product, as supplied, becomes a waste in the United States, it may meet the criteria of a hazardous waste as defined under RCRA, Title 40 CFR 261. It is the responsibility of the waste generator to determine the proper waste identification and disposal method. For disposal of unused or waste material, check with local, state and federal environmental agencies.

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9.0 ETHYLENE OXIDE

Section 1 – Chemical Product and Company Identification

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

Use of the substance/mixture: Industrial use. Use as directed.

Details of supplier:

Praxair, Inc.

10 Riverview Drive

Danbury, CT 06810-6268 - USA

Section 2 - Composition, Information on Ingredients

Ingredients	CAS	% weight	ACGIH TLV		OSHA PEL	
			TWA	STEL	PEL	STEL
Parathion methyl	298-00-0	30.00-60.00	0.2 mg/m ³	N. A.	N. A.	N. A.
Heavy aromatic solvent naphtha	64742-94-	30.00-60.00	N. A.	N. A.	N. A.	N. A.
Xylene	1330-20-7	7.00-13.00	100 ppm	150 ppm	100 ppm; 435 mg/m ³	N. A.
Valeric Acid	109-52-4	0.50-1.50	N. A.	N. A.	N. A.	N. A.

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Amber liquid. Rancid odour. DANGER! Flammable liquid and vapour. Dangerous exothermic decomposition may occur at temperatures greater than 212°F / 100° C. May be fatal if inhaled or swallowed. Can enter the lungs and cause damage. Harmful if absorbed through the skin. Contains material which can cause nervous system damage.

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Contains material which may be a teratogen. May cause long-term adverse effects in the environment. This material is toxic to birds, insects and aquatic invertebrates.

POTENTIAL HEALTH EFFECTS

Target organs : Eyes, skin, respiratory system, digestive system, central nervous system.

Signs and symptoms of short-term (acute) exposure

Inhalation May be fatal if inhaled. This material can cause organophosphorous poisoning.

Symptoms of poisoning may include headache, nausea, vomiting, blurred vision, tightness in chest, drooling and frothing of mouth and nose, convulsions, coma and death.

Skin: May cause mild irritation. Readily absorbed through the skin. Causes symptoms similar to those listed for inhalation.

Eyes: May cause mild eye irritation. Readily absorbed through eye surfaces. Causes symptoms similar to those listed for inhalation.

Ingestion: May be fatal if ingested. Causes symptoms similar to those listed for inhalation.

Material is an aspiration hazard. Aspiration into the lungs during swallowing or subsequent vomiting may cause chemical pneumonitis, which can be fatal.

Effects of long-term (chronic) exposure : Prolonged or repeated overexposure may cause behavioural changes. Prolonged or repeated skin exposure may cause redness, a burning sensation, drying and cracking of the skin (dermatitis). Prolonged or repeated overexposure could cause adverse liver effects.

Conditions aggravated by overexposure: Pre-existing skin, eye, respiratory and central nervous system disorders.

Carcinogenic status: See TOXICOLOGICAL INFORMATION, Section 11.

Additional health hazards: Potential teratogen. See TOXICOLOGICAL INFORMATION, Section 11.

Potential environmental effects: This material is highly toxic to fish and wildlife. See ECOLOGICAL INFORMATION, Section 12.

Cholinesterase inhibitor. May cause central nervous system depression. May cause damage to the peripheral nervous system. See Toxicological Information, Section 11.

Section 4 - First Aid Measures

Inhalation: Immediately remove person to fresh air. If breathing has stopped, give artificial respiration. Obtain medical attention immediately.

Skin contact: Immediately flush skin with running water for at least 15 minutes, while removing contaminated clothing. Obtain medical attention immediately. Wash contaminated clothing before reuse.

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Eye contact: Immediately flush eyes thoroughly with running water for at least 20 to 30 minutes. Obtain medical attention immediately.

Ingestion: Do NOT induce vomiting. Never give anything by mouth to an unconscious person. If vomiting occurs spontaneously, keep victim's head lowered (forward) to reduce the risk of aspiration. Obtain medical attention immediately.

Notes for physician: This product contains a cholinesterase inhibitor affecting the central and peripheral nervous systems and producing respiratory depression. Decontamination procedures such as whole body washing, gastric lavage and administration of activated charcoal are often required. If symptoms are present, administer atropine sulphate in large doses. Two to four mg intravenously or intramuscularly as soon as possible. Repeat at 5 to 10 minute intervals until signs of atropinization appear. Maintain full atropinization until all organophosphate is metabolised. Obidoxime chloride (Toxogonin), alternatively pralidoxime chloride (2-PAM), may be administered as an adjunct to, but not a substitute for atropine, which is a symptomatic and often life-saving antidote. Treatment with oxime should be maintained as long as atropine sulphate is administered. At first sign of pulmonary edema, the patient should be given supplemental oxygen and treated symptomatically. Continued absorption may occur and relapse may occur after initial improvement. Very close supervision of the patient is indicated for at least 48 hours, depending on the severity of poisoning.

Section 5 - Fire Fighting Measures

Fire hazards/conditions of flammability: Flammable liquid and vapour. This material may burn when exposed to extreme heat, flame and other ignition sources. Material may decompose rapidly when exposed to heat and flame. Heat of decomposition may cause closed containers to build up pressure and explode.

Flammability classification (OSHA 29 CFR 1910.1200): OSHA Combustible Liquid II

Flash point : 122°F / 50°C

Flash point Method : Pensky Martens Closed Cup

Auto-ignition temperature : 830°F / 443°C (based on ingredients)

Lower flammable limit (% by vol.) : 0.7 (based on ingredients)

Upper flammable limit (% by vol.): 7.0 (based on ingredients)

Explosion data: Sensitivity to mechanical impact / static discharge : Not expected to be sensitive to mechanical impact or static discharge.

Suitable extinguishing media : Carbon dioxide or dry chemical for small fires. For large fires, use water spray or foam.

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Special fire-fighting procedures/equipment: Fire-fighters should wear proper protective equipment and self-contained breathing apparatus with full face piece operated in positive pressure mode. Move containers from fire area if safe to do so. Water spray may be useful in cooling equipment exposed to heat and flame. Avoid spreading burning liquid with water spray used for cooling purposes.

Hazardous combustion products: Carbon oxides; nitrogen oxides (NO_x); Oxides of phosphorus; sulfur oxides; irritating fumes and smoke.

Section 6 - Accidental Release Measures

Personal precautions: Restrict access to area until completion of clean-up. Ensure clean-up is conducted by trained personnel only. All persons dealing with clean-up should wear the appropriate protective equipment including self-contained breathing apparatus. Refer to Section 8, Exposure Controls And Personal Protection, for additional information on acceptable personal protective equipment.

Environmental precautions: Ensure spilled product does not enter drains, sewers, waterways, or confined spaces. If necessary, dike well ahead of the spill to prevent runoff into drains, sewers, or any natural waterway or drinking supply.

Spill response/cleanup: Remove all sources of ignition. Ventilate area of release. Stop the spill at source if it is safe to do so. Contain and absorb spilled material with inert, non-combustible absorbent material, such as sand. Sweep up and shovel into suitable containers for disposal. For a water spill, confine the spill immediately with booms. Notify the appropriate authorities as required.

Prohibited materials : None known.

Special spill response procedures: In case of a transportation accident, in the United States contact CHEMTREC at 1-800-424-9300 or International at 1-703-527-3887. If a spill/release in excess of the EPA reportable quantity is made into the environment, immediately notify the national response center in the United States (phone: 1-800-424-8002). US CERCLA Reportable quantity (RQ): Methyl parathion (100 lbs / 45.4 kg); Xylene (100 lbs / 45.4 kg); This product may also contain trace amounts of: Naphthalene (100 lbs / 45.4 kg)

Section 7 - Handling and Storage

Safe Handling procedures: This material is a toxic liquid. Wear chemically resistant protective equipment during handling. Use only in well-ventilated areas. Avoid contact with eyes, skin and clothing. Do not breathe fumes or mists. Keep away from children and all unprotected persons. Do not use near sources of heat, flame or direct sunlight. Do

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not heat above 131°F / 55°C, and avoid local heating above this temperature. Keep away from incompatibles. Use caution when opening cap. Keep containers tightly closed when not in use. Wash thoroughly after handling.

Storage requirements: Store in a cool, dry, well ventilated area. Keep away from excessive heat, open flames, sparks and other possible sources of ignition. Avoid storage above 77°F / 25°C for prolonged period of time. Keep away from incompatibles. Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. Inspect periodically for damage or leaks. No smoking in the area

Incompatible materials: Strong alkalis; Strong oxidizing agents.

Special packaging materials: Always keep in containers made of the same materials as the supply container.

Section 8 - Exposure Controls, Personal Protection

Ventilation and engineering measures: Provide sufficient ventilation to keep vapour concentration below the given TLV and/or PEL.

Respiratory protection: Respiratory protection is required. Wear a pesticide respirator jointly approved by the MSHA and NIOSH. Advice should be sought from respiratory protection specialists. Skin protection: Impervious gloves must be worn when using this product. Advice should be sought from glove suppliers.

Eye / face protection: Chemical splash goggles must be worn when handling this material.

Other protective equipment: Wear impervious chemical apron and protective clothing (water-proof pants, coat, hat and boots) to prevent skin contact. An eyewash station and safety shower should be made available in the immediate working area.

General hygiene considerations: Avoid breathing vapour or mist. Avoid contact with skin, eyes and clothing. Do not eat, drink, smoke or use cosmetics while working with this product. Always wash hands, face and arms with soap and water before smoking, eating or drinking. After work, take off all protective equipment, work clothes and shoes, and wash with soap and water. Respirator should be cleaned and filter replaced according to manufacturer's instructions. Wear only clean, uncontaminated clothes when leaving place of work. Persons working with this product for a longer period should have frequent blood tests for cholinesterase levels. If the cholinesterase levels fall below a critical point, no further exposure should be allowed until it has been determined, by means of blood tests that cholinesterase levels have returned to normal.

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Section 9 - Physical and Chemical Properties

Physical state: Liquid

Appearance: Amber liquid.

Odour: Rancid odour.

Odour threshold: N/Av

pH: N/Av

Boiling point : >228°F / >109°C

Specific gravity: 1.06 g/ml

Melting/Freezing point : <63F/<17C

Coefficient of water/oil distribution: 3300 (Methyl parathion)

Solubility in Water: 55-60 mg/L @ 20C (Methyl parathion); <0.1% @ 20C (Aromatic solvent naphtha)

Section 10 - Stability and Reactivity

Stability and reactivity: Stable if handled below 131°F / 55°C and stored below 77°F / 25°C. At higher temperatures decomposition will take place and lower the quality of the product. The released heat from decomposition can raise the temperature further and accelerate decomposition. May corrode iron, steel, tin plate and copper. May be hydrolyzed in water by heating and adjusting the pH (alkaline).

Hazardous polymerization: May decompose rapidly when heated to temperatures above 212°F / 100°C, significantly increasing the risk of inducing explosions. The decomposition is to a considerable extent dependant on time as well as temperature due to exothermic and autocatalytic reactions. The reactions involve rearrangements and polymerisation.

Conditions to avoid: Keep this product away from heat, sparks, flame, and other sources of ignition (e.g. pilot lights, electric motors, static electricity).

Materials to Avoid and Incompatibility: Avoid contact with incompatible materials. See Section 7 (Handling and Storage) for further details.

Hazardous decomposition products: None known refer to hazardous combustion products in Section 5.

Section 11 - Toxicological Information

Toxicological data : LD50 Oral (rat): 13 mg/kg LD50 Dermal (rat): 662 mg/kg LC50 Inhalation (rat): 0.119 mg/L/4 hrs

Carcinogenic status: No components are listed as carcinogens by ACGIH, IARC, OSHA or NTP.

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Reproductive effects: Not expected to have other reproductive effects.

Teratogenicity : This product contains Xylene. Xylene may cause fetotoxic effects at doses which are not maternally toxic, based on animal data.

Mutagenicity : Not classifiable as a mutagen.

Epidemiology: Not available.

Sensitization to material : Not expected to be a skin or respiratory sensitizer.

Synergistic materials: Not available.

Irritancy: Irritating to eyes and skin.

Other important hazards : See Section 3 for additional information.

Section 12 – Ecological Information

Environmental effects: The ecological characteristics of this product have not been fully investigated. The product should not be allowed to enter drains or water courses, or be deposited where it can affect ground or surface waters. Do not discharge product unmonitored into the environment. This material is highly toxic to fish and wildlife.

Important environmental characteristics: This product is a pesticide. The active ingredient is: Methyl parathion the active ingredient is readily biodegradable. The active ingredient undergoes rapid degradation in the environment and, without problems, in sewage treatment plants. No adverse effects are found at concentrations up to 100 g/L in waste water treatment plants. Degradation occurs both aerobically and an aerobically, and biologically as well as a biologically

Eco-toxicological: The active ingredient is: Methyl parathion

The toxicity of the active ingredient to wildlife species is measured to be:

Fish - 96-Hr LC50 (95% CI), Rainbow trout (*Salmo gairdneri*) = 3.70 mg/L.

Invertebrates - 48-Hr EC50, Daphnids (*Daphnia magna*) = 7.3 µg/L.

Birds - LD50, Mallard = 10.0 mg/kg.

Bees - 24-Hr LD50, worker honey-bees (*Apis mellifera*), acute oral = 0.013 µg/bee.

24-Hr LD50, worker honey-bees (*Apis mellifera*), topical = 0.04 µg/bee

Section 13 - Disposal Considerations

Handling for Disposal: Handle waste according to recommendations in Section 7.

Methods of Disposal: Do not contaminate water, foodstuffs, feed or seed by storage or disposal. For disposable containers, triple rinse (or equivalent) containers and add rinse material to disposal tank. Follow any additional local, state or federal requirements for cleaning containers prior to disposal. Make the empty, rinsed container unsuitable for further use by puncturing. Dispose in accordance with all applicable federal, state,

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provincial and local regulations. Contact your local, state, provincial or federal environmental agency for specific rules.

RCRA: If this product, as supplied, becomes a waste in the United States, it may meet the criteria of a hazardous waste as defined under RCRA, Title 40 CFR 261. It is the responsibility of the waste generator to determine the proper waste identification and disposal method. For disposal of unused or waste material, check with local, state and federal environmental agencies.

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10.0 FENVERLATE

Section 1 – Chemical Product and Company Identification

Product Name: Fenvalerate Technical

CAS No: 51630-58-1

Use: Insecticide

Company Info: M/s HPM Chemicals & Fertilizers Ltd 209-210, Anupam Bhawan, Commercial Complex Azadpur, Delhi-110033

Section 2 - Composition, Information on Ingredients

Composition	Concentration
Ethion a.i.	96.00% min.
Other associates impurities	4.00% max

Section 3 - Hazards Identification

Emergency Overview:

Major Health Hazards: The onset of symptoms varies depending upon such factors as the route of absorption and quantity involved. In patients with occupational poisoning, skin symptoms usually develop within 4-6 hours after exposure, with systemic symptoms occurring as late as 48 hours after exposure. Paraesthesia of the facial skin can develop approximately 30 minutes after exposure and does not usually last beyond 24 hours when exposure is terminated. Following ingestion, the initial symptoms involve the gastrointestinal tract, developing 10-60 minutes after exposure. Patients suffering from acute oral poisoning usually develop prominent digestive symptoms such as epigastric pain, nausea and vomiting. Severely poisoned patients may have frequent convulsive attacks, coma, or pulmonary oedema. The prognosis is good if treated, with usually full recovery even in severely poisoned patients. (The hospitalisation period is usually longer than 4 weeks).

Potential Health Effects

ROUTES OF EXPOSURE: Skin contact and absorption and vapor/mist inhalation. Fenvalerate is synthetic pyrethroid, which following ingestion, inhalation or skin contact can be absorbed into the bloodstream causing effects such as transient skin sensations (tingling, burning, and numbness). Keep under observation and treat symptomatically. If indicated, lavage with cuffed tube.

Section 4 - First Aid Measures

General Information: You should call doctor if you feel that you may have been poisoned, burned or irritated by this product. Have this MSDS with you when you call.

INHALATION:

Acute exposure: May cause mucous membrane irritation. Fenvalerate produce central nervous system stimulation in animals with symptoms of nausea, vomiting, gastroenteritis with diarrhoea, hypersensitivity, in coordination, tremors, muscular paralysis, convulsion, coma, and death due to respiratory failure.

Chronic exposure: Prolonged or repeated exposure may cause irritation of the mucous membrane.

First aid: Remove from exposure area to fresh air immediately. If breathing has stopped, perform artificial respiration. Keep person warm and at rest. Treat symptomatically and supportively: Get medical attention immediately.

SKIN CONTACT:

Acute exposure: May cause irritation. Exposure to fenvalerate may cause severe irritation.

Chronic exposure: Prolonged or repeated exposure may cause irritation.

First aid: Remove contaminated clothing and shoes immediately. Wash affected area with soap or mild detergent and large amounts of water until no evidence of chemical remains (approximately 15-20 minutes). Get medical attention immediately.

EYE CONTACT:

Acute exposure: May cause irritation. Contact with fenvalerate may cause severe irritation with substantial but temporary eye injury.

Chronic exposure: Prolonged or repeated exposure may cause irritation or conjunctivitis.

First aid: Wash eyes immediately with large amounts of water or normal saline, occasionally lifting upper and lower lids, until no evidence of chemical remains (approximately 15-20 minutes). Get medical attention immediately.

INGESTION:

Acute exposure: In laboratory animals, Fenvalerate material has produced central nervous system stimulation with symptoms of nervousness, anxiety, salivation, tremors and convulsions. . Rats given high doses suffered nerve damage. A low dose of fenvalerate mixed with DMSO was lethal in rats; the DMSO may be responsible for increase absorption from the gut resulting in an increase in the toxicity. A more moderate dose of the technical grade of fenvalerate suspended in water was lethal in rats.

Chronic exposure: Rats fed 1000 ppm in the diet for 2 years exhibited signs of decreased body weight with some increase of organ/body weight ratios. Chronic ingestion of a cumulative dose of 1138 mg/kg for 26 weeks produced in dogs adverse effects on the reproductive system of females.

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First aid: Remove by gastric lavage and catharsis. Maintain blood pressure and airway. Give oxygen if respiration is depressed. Do not perform gastric lavage if victim is unconscious. Get medical attention immediately. Administration of lavage or oxygen should be performed by qualified medical personnel.

ANTIDOTE: No specific antidote. Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

Suitable Extinguishing Media :

Dry chemical, CO₂, Water spray, standard foam. For larger fire, use water spray, fog or standard foam.

Exposure Hazards : During a fire, irritating and possibly toxic gases like carbon dioxide; carbon monoxide; nitrogen oxides; sulphur dioxide; hydrogen chloride; may be generated by thermal decomposition or combustion

Fire-Fighting : Use dry chemical, foam or CO₂ extinguishing media. Wear full protective clothing and self- contained breathing apparatus. Evacuate non essential personnel from the area to prevent human exposure to fire, smoke, fumes or products of combustion. Prevent use of contaminated buildings, area, and equipment until decontaminated. Water runoff can cause environmental damage. If water is used to fight fire, dike and collect runoff.

Section 6 - Accidental Release Measures

Personal Preparation : Avoid contact with skin, eyes and clothing.

Environmental Precautions : Prevent contamination of soil, drains and surface water.

Method of cleaning : Absorb the material in the sand, soil, diatomaceous earth or suitable absorbent. Place in suitable material and remove to safe place or dispose of in an incinerator approved for chemicals.

Section 7 - Handling and Storage

Handling : Use appropriate (impervious) clothing, gloves and closed foot ware to prevent the repeated contact with skin. Use flash proof and dust resistant goggles to prevent the contact with eyes.

Storage : Keep the product in original container tightly closed and correctly labeled. Store in suitable, cool, dry, well ventilated place under lock and key; away from the reach of the children, animals, food and animal feeding stuffs. Store away from the incompatible substances and source of ignition.

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Section 8 - Exposure Controls, Personal Protection

Technical protective measures : None

Exposure controls limits : Not Established

Respiratory protection : Wear suitable mask

Hand protection : Wear impervious gloves

Eye protection : Wear flash proof and dust resistant goggles.

Skin protection : Wear impervious clothing and closed foot ware.

Section 9 - Physical and Chemical Properties

Physical Description & colour : Yellow brown viscous liquid.

Odour : Mild chemical odour.

Molecular Weight : 419.9

Molecular Formula : C₂₅H₂₂ClNO₃

Boiling Point : Decomposes on distillation.

Freezing/Melting Point : 39.5-53.7 °C (pure)

Volatiles : No data.

Vapour Pressure : 1.92 x 10⁻² mPa (20°C)

Vapour Density : No data.

Specific Gravity : 1.175 (25 °C)

Water Solubility : In water <10µg/l (25°C).

pH : Not Available

Flash Point : 230°C

Section 10 - Stability and Reactivity

Thermal Stability : Stable to heat.

Conditions to avoid : Direct source of heat/open flames.

Material to avoid : Alkaline material

Hazardous Decomposition Products: During a fire, irritating and possibly toxic gases like carbon dioxide; carbon monoxide; nitrogen oxides; sulphur dioxide; hydrogen chloride; may be generated by thermal decomposition or combustion.

Section 11 - Toxicological Information

ACUTE TOXICITY:

Oral LD₅₀ (Rats) - 451 mg/Kg

Dermal LD₅₀ (Rats) - > 5000 mg/Kg, LD₅₀ for (Rabbits) 1000-3200 mg/Kg

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Inhalation LC50 (Rats) - > 101 mg/m³
Eye Irritation (Rabbits) - Slight irritant
Skin Irritation (Rabbits) - Slight irritant
Sensitization (guinea pig) - Non-sensitizer
ADI - 0.02 mg/kg/day (ppm) (WHO)
Toxicity class - WHO (a.i.) II

Section 12 – Ecological Information

Fenvalerate is extremely toxic to aquatic life, such as bluegill and lake trout while it is slightly toxic to bird species, such as mallards. Toxicity increases with higher water temperatures and acidity.

Birds: Acute oral LD50 domestic fowl: >1600 mg/kg, LD50 mallard ducks: 9932 mg/kg.

Dietary LC50 for quail: >10000 mg/kg, Dietary LC50 for mallard duck: 5500 mg/kg.

Fish: LC50 (96h) for rainbow trout 0.0036 mg/l.

Bees: Toxic to bees.

Contact LD50 0.23 µg/bee

Section 13 - Disposal Considerations

Pesticide Disposal: Wastes resulting from the use of this product may be disposed on site (by use according to the label) or at an approved waste disposal facility. Further information can be obtained from the EPA or the equivalent state and local agencies.

Container Disposal: Completely empty bag into application equipment. Check with EPA, State, and local authorities for the current regulations applicable to your area for disposal of waste containers.

||END OF THE REPORT||