

GUJARAT STATE DISASTER MANAGEMENT PLAN

VOLUME 2 HAZARD SPECIFIC ACTION PLANS

2016-17



GUJARAT STATE DISASTER MANAGEMENT AUTHORITY
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Chapter 1

Action Plan for Earthquake

1.1 Introduction

The Earthquake Vulnerability Atlas of India reveals that 19% of the total area in Gujarat is at a very high risk for earthquake, i.e. seismic zone V. Another 13% area of the State is at a high risk for earthquake, i.e. seismic zone IV. As such, Gujarat State has a long history of earthquakes and in the recent past, it witnessed a major earthquake (6.9 on Richter scale) which had caused widespread loss of human lives and property.

1.2 Declaration of Earthquake Disaster

The Gujarat State Disaster Management Act, 2003 provides for the State Government to declare any area where earthquake has occurred as disaster affected area on the recommendations of the State Relief Commissioner or the District Collector. The purpose of declaration of disaster is to organize effective response and mitigating the earthquake effects. Such a declaration provides wide powers and responsibilities to the State Relief Commissioner and the District Collectors in order to handle the incident effectively.

1.3 Institutional Mechanism of the State Government for Response

Gujarat has developed a well-organized administrative structure for earthquake response in the State. Particularly, in the aftermath of 2001

earthquake in the State, the management of earthquake has undergone a quantum change. The State government has undertaken long term capacity building initiatives to deal with future earthquakes. The focus of the government has now broadened to include earthquake risk reduction, mitigation and preparedness also, along with response & relief. New institutions are now being set up in the State to deal with disasters in general and earthquakes in particular.

The Revenue department is primarily responsible for emergency response and relief in the State, while the Gujarat State Disaster Management Authority (GSDMA) is designated as the nodal agency for formulation of policies, long term planning, coordination and monitoring body for mitigation, reduction and preparedness for disasters in the State.

The Institute of Seismological Research (ISR), under the Department of Science and Technology, is established to carry out seismological research and monitoring activities. In addition, a network of Seismological Observatories and Strong Motion Accelerographs has been established under the operational control of ISR for constant seismological monitoring and prediction. As a result of this network, it has been possible to locate even micro earthquakes of magnitude < 3 on Richter scale. These are useful to

scientists for statistical analysis and knowing the sites of ongoing seismicity.

The institutional mechanism established in the State for management of disasters is given in Chapter 3 of Vol. 1. The composition of the State Emergency Operation Centre (SEOC) along with its staff structure is placed at Annexure 11.

1.4 Trigger Mechanism

An earthquake of magnitude 5 or more is likely to cause deaths and injuries to human beings and damage to all kinds of property, both private and public. Unfortunately there is very little warning available before the earthquake. Therefore planning should cater for a quick response at all levels to reduce the effects of the earthquake to the minimum.

The Revenue Department of the State will be the nodal department for formulating, controlling, monitoring and directing measures for earthquake preparedness, organizing rescue, relief and rehabilitation. All other concerned departments should extend full cooperation in all matters pertaining to the management of the earthquake whenever it occurs.

The occurrence of an earthquake may be reported by the Indian Meteorological Department (IMD) / National Geophysical Research Institute (NGRI) / Institute of Seismological Research (ISR) to the Commissioner of Relief by the fastest means. The State Crisis Management Committee (SCMC) under the chairmanship of the Chief Secretary should be activated immediately on

the occurrence of any major earthquake.

Besides these, the SEOC also receives reports on the earthquake from district and taluka levels. On receipt of the information, the SEOC verifies the authenticity of the reports and will inform the real situation to concerned authorities. The State Government 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 affected area under Gujarat State Disaster Management Act, 2003, Section 32 (2) (a)).

1.5 Response Mechanism

1.5.1 Information and Reporting

The agencies which provide information to the SEOC about the occurrence of an earthquake in the State are:

- a. IMD, Ahmedabad / New Delhi
- b. ISR
- c. SSNNL
- d. NGRI
- e. DEOC

The SEOC should be activated for emergency response on the occurrence of any major earthquake. The SEOC should initiate following activities:

- a. State EOC should report the occurrence of a major earthquake to the following:
 - i. Commissioner of Relief
 - ii. Principal Secretary (Revenue)
 - iii. Chief Executive Officer, Gujarat State Disaster Management Authority
 - iv. Chief Secretary of the State

- v. Members of Crisis Management Committee
 - vi. Chief Minister
 - vii. Revenue & Disaster Management Minister
 - viii. National Disaster Management EOC at MHA, Gol
 - ix. Vice Chairman, National Disaster Management Authority (NDMA)
 - x. Secretary, MHA
- b. State EOC to alert state search and rescue machinery for emergency response as also fire brigade personnel.
 - c. State EOC to verify the authenticity of the information from authorized scientific agencies as well as district and Taluka control rooms.
 - d. State EOC to contact its regular and emergency staff to report immediately.
 - e. All Secretaries of the State Departments to be contacted to remain available in the EOC immediately.
 - f. State EOC to remain in constant touch with control rooms at national, district and taluka level.
 - g. Overall management of state EOC shall be taken over by the Commissioner of Relief.
 - h. Management of media (Press/TV Channels/Government Press Notes) to be carried out by the Secretary (Information & Broadcasting) with special emphasis on rumour control. He shall maintain constant liaison with Commissioner of Relief.

On receipt of information, COR to:

- i. Contact all member of Crisis Management Group to inform them about the venue and time of first meeting (chaired by Chief Secretary) to assess the situation and decide the course of action to be adopted by the State Government
- ii. Issue instructions to all departments to ensure that all state government employees to report for duty

- immediately in order to execute their responsibilities as mentioned in their departmental Earthquake Management Plan.
- iii. Instruct all line departments to ensure their duty officers to remain available round the clock in state EOC with full updated information of the activities of their departments.
- iv. Prepare and submit daily situation report to Government of India, Chief Secretary, Principal Secretary (Revenue), Chief Executive Officer, Gujarat State Disaster Management Authority etc.
- v. If necessary depute senior state level officers to worst affected talukas for effective implementation and supervision of Relief Operation.
- vi. Mobilize additional manpower from the departments to the affected district / talukas for supporting the Relief Operation. They should be provided Task Force Action Plans of the concerned talukas / district prepared earlier.

1.5.2 Restoration of Critical Services

- a. Establishment of Emergency Communication
- b. Restoration of Communication Links (Rail, Road & Air)
- c. Restoration of power and electricity
- d. Supply of safe drinking water
- e. Restoration of essential lifeline infrastructure

1.5.3 Search, Rescue and Medical Assistance

- a. Identification of areas where SAR Teams to be deployed
- b. Coordination of SAR teams for their quick deployment in allotted areas
- c. Provision of quick transport of SAR teams to affected areas
- d. The department of Roads and Buildings to evolve a mechanism for clearing access

- routes and debris in order to facilitate search and rescue operations
- e. Mobilization of specialized equipment and machinery to affected areas
- f. Cordoning of affected areas with control of entry and exit
- g. Traffic Management by establishment of traffic points and check-posts
- h. The Home Department to evolve a mechanism for providing security of properties of government and public in the affected areas.
- i. Setting up of field hospitals in the affected areas and deployment of mobile hospitals
- j. Arrangements to be made for quick transportation of injured victims to the hospitals
- k. Secretary (Health) to evolve a mechanism for speedy treatment of casualties

1.5.4 Emergency Relief

- a. Establishment of Temporary shelters for evacuees
- b. Ensuring provision of essential services

- c. Arrangement for food, clothing, blanket/bedding, drinking water, sanitation and hygiene, lighting arrangements and essential medicines
- d. Deployment of mobile hospitals in affected areas for treatment of victims
- e. Providing counselling services to the earthquake victims and their relatives
- f. Arrangement for providing transport facility to send dead bodies of non-locals to their natives. The administration should also ensure Law and Order during shifting of the dead bodies
- g. Ensure establishment of communication link between the affected people and their relatives outside

1.5.5 Task & Responsibility Matrix for Emergency Response Phase

A Task and Responsibility Matrix for Emergency Response Phase (first 72 Hours of the incident) is given below:

Time Frame	S. No.	Task	Responsibility
0 + 15 Minutes	1	Report the occurrence of earthquake to COR, PS (RD), CEO - GSDMA, Heads of all line departments, Chief Secretary and Chief Minister's Office and National Disaster Management EOC at MHA, Gol	In-charge SEOC
0 + 30 Minutes	2	Verify the authenticity of the incident from agencies like IMD, ISR, DEOCs, TEOCs, Police and Fire Brigade control rooms and find magnitude of disaster and immediate impacts	In-charge SEOC
	3	In case of L-2 level event, take overall management of SEOC	COR/ DOR
	4	Deploy Emergency Rescue Vehicles to affected areas for establishing communication link	
	5	Activate ERCs for prompt mobilisation teams and resources to affected areas	

	6	Hold planning meeting of HODs (all line depts.) in SEOC	
	7	Instruct duty officers of line departments to report in SEOC and hold meeting for further plan of action/ instruction	
	8	Request for the services of NDRF and Armed forces, if required	
	9	If required, inform GAD to ensure that all State Govt. employees report for emergency duties within half an hour	
	10	Establish alternate communication link through Satellite Phones, HF/ VHF set, HAM Radio, VSAT, etc. in SEOC, DEOCs, TEOCs	
0 + 1 Hour	11	Mobilise Search & Rescue teams and equipment of Fire Emergency Services, Home Dept., R&B, etc. to affected areas	COR
	12	Deploy medical teams and paramedics to the affected areas	
	13	Deploy rapid assessment team to affected areas	
	14	Make arrangements for aerial survey of the affected areas	
	15	Contact BISAG, NRSC, ISRO and Ministry of Defence for aerial / satellite imageries of the affected areas	
	16	Instruct local administration to evacuate population at risk to safer sites	
	17	Instruct concerned authorities or agencies to shut down critical operations	
	18	Contact Chief Secretary for deciding on time and venue for holding Crisis Management Group (CMG) meeting at the earliest	
	19	Inform all CMG members to attend CMG meeting in designated venue to assess situation and review emergency measures	
	20	Enforce evacuation from unsafe structures to pre-decided safe evacuation sites	Home Dept., District Collector, Municipal Commissioners
	21	With help of local authorities, local agencies, volunteers, RWAs, ensure that people do not go back to unsafe structures unless instructed as safe	
	22	Provide security in affected areas and maintain law and order situation to prevent incidents of thefts and stampede	

	23	Establish alternate communication links through HF, VHF, HAM, Satellite Phones, etc.	Dept. of Science & Technology
	24	Issue alert for secondary shocks/ disseminate critical information by SMS through service providers	
	25	Restore essential services like power, water supply, telecommunication of critical infrastructure like hospitals, SEOC, Sachivalya, Raj Bhawan, Control Rooms, AIR, Doordarshan, relief camps and temporary shelters, etc. on priority basis	COR, GUVNL, GWSSB, DOT, Energy & Petrochemicals
	26	Restore essential services or arrange for alternative facilities like power, water supply and telecommunication to the affected area	
	27	Assess the conditions of road, rail and air communication link for quick mobilization of emergency responders and teams and resources to affected areas and take follow up actions	Port & Transport, R&B Dept., COR
	28	Establish media management / information cell for public information, guidance and rumour control	Information Dept.
	29	Instruct district information officers to establish information centre near affected areas to provide guidance to volunteers and aid agencies	
0 + 2 Hours	30	Delegate responsibilities for organizing rescue and relief operations as per outcomes of CMG and planning meet	Chief Secretary/ COR
	31	Depute senior State Level officers to the affected areas	
	32	Inform Secretaries of all depts. to provide necessary logistics support to emergency operation task forces	
	33	Activate Operations Section of IRS for Emergency Response Operation	COR
	34	If required, seek assistance from neighbouring states, Central Govt. or external agencies	
	35	Set up separate desks for each operation task force and NGO coordination desk in the SEOC for coordinating emergency operations	
	36	Contact private / public sector agencies in the State to assist in emergency rescue and relief operations	

0 + 3 Hours	37	Make suitable transport arrangement for mobilization of quick response teams to the affected areas	Port & Transport Dept., Civil Aviation Dept.
	38	Maintain constant touch with the control room of MHA, NDMA, ERCs, DEOCs and TEOCs	COR, SEOC
	39	Arrange for press / media release for rumour control and public information and guidance	COR, Information Dept.
	40	Make necessary arrangement for treatment of injured and mass casualty management	Health Dept.
	41	Restore & ensure serviceability of communication towers in affected area through respective service providers	Dept. of Science & Technology, DOT
0 + 6 Hours	42	Establish relief coordination centre at airport, railway station, etc. for arrival of Search & Rescue and Medical Teams coming for humanitarian aid	COR
	43	Arrange for a logistic plan and warehouse for receipt & management of relief material	
	44	Instruct to cordon affected areas and setting up of check posts to control entry and exit	Home Dept.
	45	Ensure mechanism to prevent human trafficking	
	46	Open access routes and manage traffic for mobilization of equipment, machinery and volunteers to the affected areas	Home Dept., Port & Transport Dept., R&B Dept.
	47	If required, establish temporary access routes & disseminate route maps to all EOCs, control rooms and information cells	
	48	Conduct aerial survey to understand scale of damage and impacts	COR/ Head, Quick Assessment Task Force
	49	Establish information centres at the arrival and departure points especially at the airports, railway stations and interstate bus terminus	Information Dept.
0 + 12 Hours	50	Hold review meetings with duty officers in every 12 hours	DOR
	51	Prepare rapid need assessment report for planning of relief operation and	

		mobilization of resources to the affected areas	
	52	Mobilize relief materials i.e. tents, food materials, water, essential medicines, blankets, etc. to the affected districts and talukas	DOR, District Collectors, Municipal Commissioners, Line Deptts
	53	Establish relief centres, temporary shelters and godowns near affected areas & ensure provision of basic facilities like food, water, medical aid, toilets, etc.	
	54	Provide food and other relief material to relief camps, community kitchens, etc.	Food & Civil Supply
	55	Provide water tankers to affected areas, relief camps, temporary shelters, community kitchens, etc.	Water Supply Dept
	56	Arrange to shift people from evacuated sites to temporary shelters	Port & Transport Dept.,
	57	Arrange road, rail and air transport at State / District headquarters for dispatch of relief materials to the affected areas	
	58	Set up field hospitals near the affected areas	Health Dept.
	59	Arrange to shift injured persons to field hospitals	
	60	Ensure medical aid to injured cattle	Animal Husbandry Dept.
	61	Provide security to relief camps, godowns, evacuated structures, medical camps, etc.	Home Dept.
0 + 24 Hours	62	Instruct to set up coordination centres at the Resident Commissioner's Office in New Delhi and other Metro Cities as well	COR
	63	Prepare and circulate the situation report	DOR, Dy. Collector (DM) at SEOC
	64	Coordinate with Operation Task Forces mobilized to the affected areas	
	65	Organise media briefing twice a day at pre-determined intervals	COR, Information Dept.
	66	Depute additional officers and supporting staff to affected areas from non-affected areas	COR, Revenue Dept.
	67	Identify and declare unsafe structures in earthquake affected areas	R & B Dept.
0 + 48 Hours	68	Ensure safety and security of personnel deputed in affected areas for emergency response operation	Home Dept.

- i. Special emphasis on Hygiene and sanitation aspects should be given in relief camp sites.
- ii. Separate area should be earmarked within the relief camp for storage of relief materials
- iii. Adequate manpower and transport facilities for the camp site
- iv. Arrangements to be made for trauma management
- v. Mobile medical units to be sent to remote areas with a view to provide medical assistance to the victims/injured
- vi. Information centre should be established by the administration

1.6.2 Interim Relief Measures

- a. Arrangements to be made for identification and maintenance of the records of disposal of dead bodies in the affected areas.
- b. Arrangements to be made to record the complaints of all persons reported missing. Follow up action in terms of verification of the report also needs to be made.
- c. Sub-divisional magistrates to be empowered to exempt the requirement of post-mortem in case of mass casualties. Revenue Dept. may depute additional SDMs to expedite disposal of the dead bodies.
- d. Unclaimed/unidentified dead bodies to be disposed of at the earliest after keeping their records.
- e. Additional manpower to be deployed in the affected areas for supplementing the efforts of the local administration.
- f. Separate Cell to be established at state/district/talukas level to coordinate with the NGOs and outside donor/aid agencies.

- g. Regular meetings of the different stakeholders/departments should be organized at state level for sharing of information, developing strategies for relief operations.
- h. Information & Broadcasting Dept. to coordinate with the media to play a positive role in disseminating appropriate information to public and the government in order to facilitate the speedy recovery.

1.6.3 Assessment of Damage / Loss and Relief Needs

- a. The COR to issue instructions to the district collectors for the need and loss assessment
- b. Adequate manpower, vehicles, stationery etc should be provided to supplement the efforts for need/loss assessment
- c. Identification and demolition of dangerous structures in the affected areas to minimize further loss of life and injuries
- d. Arrangements for debris removal and its appropriate disposal
- e. Arrangements for distribution of gratuitous relief and cash doles
- f. Arrangements to be made for survey of human loss and distribution of ex-gratia relief to the families of deceased persons
- g. Teams to be formed and dispatched to the affected areas for detailed assessment of houses and property assessment
- h. As reconstruction of houses will take a long period, arrangements to be made to provide interim shelters to the affected
- i. Identification of the site for interim shelter

- j. Allocation of areas to the affected families
- k. Providing essential services at the interim shelter sites such as water, power, drainage / sanitation, PDS shops, etc.
- l. Distribution of shelter materials to individual families

Chapter 2

Action Plan for Cyclone

2.1 Introduction

Gujarat comes in the region of tropical cyclone with the longest coast line of 1600 km in the country which makes it highly vulnerable to it and associated hazards. The associated hazards consist of floods, storm surges, etc. Most of the cyclones that have affected the State are generated in the Arabian Sea. They travel towards northeast direction and hit the coast particularly the southern region of Kutch and southern part of Saurashtra and the western part of Gujarat. The purpose of this action plan is to develop quick response at all levels to reduce the effects of cyclone with an effective coordinated way in the Gujarat State. This document envisages brief actions from the issuing of the warning till the immediate relief/actions.

2.2 Associated Authority

The Nodal Department for controlling, monitoring and directing measures for organizing rescue, relief and rehabilitation is the Revenue Department of the State. All other concerned Departments should extend full cooperation in all matters pertaining to the management of the Cyclone disaster whenever it occurs. The State Departments like Revenue, Home including Transport, Ports & Fisheries, R&B, Power, Finance, Information and Broadcasting etc. shall have a major role in emergency

response during occurrence of Cyclone.

2.3 Disaster Declaration

The Gujarat State Disaster Management Act, 2003 provides for the State Government to declare any area where Cyclone has hit as disaster affected area on the recommendations of the State Relief Commissioner or the District Collector. The purpose of declaration of disaster is to organize effective response and mitigating the Cyclone effects. Such a declaration provides wide powers and responsibilities to the State Relief Commissioner and the District Collectors in order to handle the incident effectively.

2.4 Four Stage Warning System for Tropical Cyclones

a. Pre-Cyclone Watch

It is issued when a depression forms over the Bay of Bengal irrespective of its distance from the coast and is likely to affect Indian coast in future. The pre-cyclone watch is issued by the name of Director General of Meteorology and is issued at least 72 hours in advance of the commencement of adverse weather. It is issued at least once a day.

b. Cyclone Alert

It is issued at least 48 hours before the commencement of the bad weather when the cyclone is located beyond 500 Km from the coast. It is issued every three hours.

c. Cyclone Warning

It is issued at least 24 hours before the commencement of the bad weather when the cyclone is located within 500 km from the coast. Information about time /place of landfall is indicated in the bulletin. Confidence in estimation increases as the cyclone comes closer to the coast

d. Post Landfall Outlook

It is issued 12 hours before the cyclone landfall, when the cyclone is located within 200 Km from the coast. More accurate and specific information about time /place of landfall and associated bad weather is indicated in the bulletin. In addition, the interior distraction likely to be affected due to the cyclone is warned in this bulletin.

2.5 Warning Dissemination Process

1. Cyclone/flood forecasting is generally the responsibility of the Indian Meteorological Department (IMD). IMD is the nodal agency for providing cyclone warning services. IMD's INSAT satellite based Cyclone Warning Dissemination System (CWDS) is one of the best currently in use in India to communicate cyclone warnings from IMD to community and important officials in areas likely to be affected directly and quickly. There are 19 CWDS stations in Gujarat.
2. After getting information from IMD, warning dissemination is a responsibility of State Government (COR). The COR under the Revenue Department is responsible for disseminating cyclone warnings to the public and Line Departments.

3. On receiving an initial warning, the office of the COR disseminates the warning to all Line Departments, District administration and DG Police. Warning messages are transmitted through wireless to all districts and talukas. District Collectors are provided with satellite phones and Ham radios to maintain effective communication, even if terrestrial and cell-phone communication fails.
4. The state EOC and control rooms of the other line departments at the State level as well as district level also get the warnings. The control rooms are activated on receiving the warnings.

2.6 Plan Activation

The cyclone response structure will be activated on the receipt of cyclone warning by the Indian Meteorological Department (IMD). The occurrence of a cyclone may be reported by the IMD to the Commissioner of Relief/GSDMA by the fastest means. The Commissioner of Relief (COR) will activate all the Departments for emergency response including the State EOC, District EOC and ERCs. He will issue instructions to include the following details:

- Specify exact resources (in terms of manpower, equipments and essential items from key dept. /stakeholders) required
- The type of assistance to be provided
- The time limit within which assistance is needed
- Details of other Task/Response Forces through which coordination should take place

The State EOC, ERCs and other control rooms at the state level as well as district control rooms should be activated with full strength. The state Government may publish a notification in the official gazette, declaring such area to be disaster-affected area under GSDMA Act (Section 32 (2) (a)).

Once the situation is totally controlled and normalcy is restored, the COR declares End of Emergency Response and issues instructions to withdraw the staff deployed in emergency duties.

2.7 Roles and Responsibility

Time Frame	Task	Activity	Responsibility
Time = 0 – 72 Hrs.	Warning Receipt and Dissemination	<ol style="list-style-type: none"> 1. Inform COR/ DOR, PS (Revenue), CEO (GSDMA), Crisis Management Group, Hon. CM, Hon. Minister (DM), NDMA, Ministers and Secretaries of all line depts. as per the warning of IMD 2. Inform & instruct relevant District Collectors to activate District Control Room at full strength 3. Alert state response teams for deployment 4. Remain in constant touch with control rooms at National & State Level. 5. Instruct and alert heads of departments of the key line departments to activate their departmental plan and SOPs for Cyclone response 	In-charge, SEOC
	Interdepartmental Coordination	<ol style="list-style-type: none"> 6. Instruct all State Government officers and employees in the State to report to their respective Head for emergency duties (Only if the warning is of a level 2 disaster or as per the decision taken in the meeting of the Crisis Management Group headed by Chief Secretary) 7. Alert the District Collectors of districts not likely to be affected to be prepared for providing the following to the districts likely to be affected: <ul style="list-style-type: none"> o Additional manpower o Additional resources <ul style="list-style-type: none"> - Machinery & Equipment - Relief material 	COR/ DOR

	Establishment of Lines of Communication	<p>8. Activate alternative communication equipments i.e. satellite phones, HF/VHF sets, Ham radio, VSAT in SEOC, DEOCs, TEOCs and ERCs</p> <p>9. Establish communication links with ERCs and Search & Rescue Teams in all Municipal Corporations and alert them to be in stage of readiness</p> <p>10. Establish communication links with villages likely to be affected as per the contact details available in SDRN</p>	COR/ DOR
Time = 0 – 48 Hrs	Review of situation and reporting	<p>11. Establish contact with IMD, CWC, ACWC, ISRO and the defense ministry of Gol for aerial / satellites imageries of the latest Cyclone threat</p> <p>12. Get the latest weather report from IMD/other international websites to know the exact location of Cyclone and the likely area where landfall will take place</p> <p>13. After reviewing the weather report and satellite images issue instructions and orders for emergency response to areas likely to be affected</p>	Revenue Dept./ COR
	Management of EOC, ERCs and Cyclone Response	<p>14. Take over full command of SEOC and ERCs</p> <p>15. Instruct line departments to depute representatives at the State and District EOCs</p> <p>16. Hold a meeting with leaders of task forces and entrust them their tasks</p> <p>17. Arrange emergency meeting with State Crisis Management Group to devise a plan of action</p> <p>18. Arrange dissemination of information through various means of communication such as Radio, TV, Cable Network, SMS about Cyclone Warning to districts/areas which are likely to be hit by Cyclonic Storm.</p> <p>19. Alert teams to remain in readiness- Evacuation, Emergency Medical Services, Search & Rescue, Fire &</p>	COR

		Emergency Services, NDRF, Police, Home Guards, SRPF, Army, Air Force	
		20. Impose restriction on all transport activities heading towards coastal areas that are likely to be affected by Cyclone	Port & Transport Dept.
		21. Impose restriction to or alert all vessels in high sea through display of signals on respective ports, AIR broadcasts, coastal weather bulletins, etc.	Gujarat Maritime Board/ Coastal Radio Station/ Port Authorities
	Cyclone Response to Coastal Areas (Likely to be Affected)	22. Based on the warning issued by IMD, pin point the districts and villages likely to be affected by cyclone and start the procedure for identifying safe places/shelters for evacuation in those villages	Revenue Dept., Transport Dept. and Dist. Collectors, Municipal Commissioner
		23. Prepare route maps for safe place and evacuation shelters	
		24. Village wise data of safe shelters for evacuation available on SDRN should be referred and the District Collectors/Village level officers should be contacted to know the status of the shelters with the capacity of the shelter and other available facilities at the site	
		25. Make transport arrangement for mobilization of all emergency response teams	
		26. Make logistic arrangements for response teams	
		27. Ensure arrangements are in place to evacuate fishermen and salt workers if needed	Commissioner of Fisheries
		28. Ensure safety of tourists visiting beaches along the coastline	Tourism Dept.
		29. Cordoning off coastal areas for restricting entries of rail or road traffic	Home Dept., Dist. Collectors,
	30. Ensure law and order is maintained in areas likely to be affected		
		31. Ensure that all critical activities (mainly industrial production) in areas likely to be affected are shutdown	Line Depts.

		<p>32. Ensure that the schools and colleges are closed in areas likely to be affected by Cyclone and associated hazards</p> <p>33. Ensure availability & serviceability of cyclone shelters issued in schools</p>	Education Dept.
		<p>34. Ensure dissemination of information to remote areas by local means</p> <p>35. Ensure that local helplines are opened and effectively managed for public information, guidance and rumor control</p> <p>36. Ensure that the information to public and media (AIR/ Doordarshan/ print/ FM) about the progress of Cyclone at periodic intervals is released</p>	Dist. Collector, Information Dept.
		<p>37. Activate Departmental Disaster Management Plan and Departmental SOPs for Management of casualties</p> <p>38. Ensure availability of QRT & essential medicines</p>	Health Dept.
		<p>39. Issue alert/ warning through SMS by establishing liaison with service providers</p> <p>40. Ensure safety & serviceability of critical communication towers through respective service providers</p> <p>41. Ensure establishment of alternate communication links like HF, VHF, HAM, Satellite Phones, etc.</p>	Dept. of Science & Technology
		42. Ensure availability of safe drinking water	Dept. of Water Supply
		43. Ensure safety of dams & dewatering in case of heavy rains	Irrigation Dept.
Time = 0 - 24 Hrs	Review of Situation and Reporting	<p>44. Establish contact with IMD, CWC, ACWC, ISRO and the defense ministry of Gol for aerial / satellites imageries of the latest Cyclone threat</p> <p>45. After reviewing the weather report and satellite images, issue instructions and orders for emergency response to areas likely to be affected areas</p> <p>46. Review and monitor – evacuation</p>	Revenue Dept./ COR Information Dept.

		<p>from to be affected areas; positioning of search & rescue teams, mobile communication units, quick medical response teams; dissemination of information to vulnerable areas; preparedness measures to be taken by various authorities</p> <p>47. Keep in touch with National, District and Taluka Control Rooms</p> <p>48. Release information at appropriate time to media and public regarding response measures organized by the Government</p>	
	Emergency Response Management	<p>49. If reports regarding striking of cyclone are confirmed by IMD and other sources, start the emergency response and relief operations</p> <p>50. Divert the emergency services to areas likely to be affected as per the warning issued by IMD</p> <p>51. Inform the public residing in areas likely to be affected to evacuate through various means such as SMS, AIR, FM Radio, Doordarshan, etc.</p> <p>52. Start evacuation from the likely affected areas through Police support, if necessary</p>	Revenue Dept., COR, Dist. Collector, Home Dept.
		<p>53. Disconnect power supply at the time of cyclone striking</p>	Dept. of Power
		<p>54. To account for the exact number of fishermen in the sea and fishermen that have already reached the shore</p>	GMB/Coast Guard
	Emergency Relief Management	<p>55. Ensure that the Relief Management work planned in the areas likely to be affected by the Cyclone are well organized</p> <p>56. Inform following agencies to be in a state of readiness for assisting in the Cyclone response measures (if required):</p> <ul style="list-style-type: none"> o Public sector agencies o Private sector agencies o NGOs, CBOs o Volunteer Organizations <p>57. Request for help (if needed) to MHA/National Disaster Management Authority</p>	COR/ Revenue Dept.

		58. Ensure that the arrangement for basic amenities (shown below) at evacuation/relief centres are made by the respective departments: <ul style="list-style-type: none"> o Drinking water o Food o Clothing o Sanitation and hygiene, o Lighting o Medicines and other Health Care 	COR, Food & Civil Supply Dept., Revenue Dept. & Dist. Collectors, Water Supply Dept., GEB, Health Dept.
		59. Make necessary arrangements for public information/guidance, public opinion and rumor control	Information Dept.
		60. Impose restrictions for transportation in threatened areas	Transport Dept. and Dist. Collector, Home Dept.
Time = 0 Hrs	Disaster Declaration	61. When Cyclone makes a landfall, Cyclone affected Dist. Collectors should send a communication to the State Govt. to declare the area as disaster affected, if necessary, (depending upon the nature and intensity of impact)	COR, Dist. Collector
	Preliminary Assessment, Deployment of Emergency Response Teams and Information Dissemination	62. Send teams to the affected areas to take stock of the effects of Cyclone and associated rain. 63. Send sector wise situation reports to: <ul style="list-style-type: none"> o State EOC/COR o GSDMA 	District Collector
		64. Deployment of following teams to Cyclone affected areas: <ul style="list-style-type: none"> o Emergency Communication Teams o Emergency Medical Services Teams o Search and Rescue Teams (With Equipment) o Preliminary damage Assessment Teams o Need Assessment Teams 	COR, Dist. Collector, Municipal Commissioner
		65. Establish communication link with affected districts by activating alternate communication equipments such as Satellite Phones, HF/VHF Sets, Ham Radio, V Set etc., in State/District EOCs and	COR, Dist. Collector, Information Dept.

		<p>Taluka Control Rooms</p> <p>66. Arrange dissemination of information about occurrence of Cyclone and areas that are affected by it to media & public.</p>	
Time = 0+ 24 Hrs	Mobilization and Deployment	<p>67. Remain in constant touch with IMD for updates on weather forecast for the coming hours and plan accordingly</p> <p>68. Immediate mobilization of following units/teams to areas affected by Cyclone and associated rains</p> <ul style="list-style-type: none"> o S & R Teams of Fire and Emergency Services o Quick Medical Response Teams o Quick Damage & Loss Assessment Teams o Quick Need Assessment Teams o Road Clearance Teams o Teams for disposal of dead bodies o Teams for disposal of carcasses o Teams for debris clearance (if any) o Teams for maintaining Law & Order in the affected areas o Arrange for S & R teams of Air Force (If required) 	COR, Dist. Collector, Municipal Commissioner, Key line Dept.
	Clearance of Access Roads to Reach at The Sites of Affected Areas	<p>69. To survey the access roads/routes leading to the affected areas and manage traffic for mobilization of equipments, machinery and volunteers.</p> <p>70. Identify alternate roads/routes for evacuation of affected people</p> <p>71. Undertake repairing/restoration of damaged roads leading to the affected areas.</p> <p>72. Identify and declare unsafe buildings/structures in Cyclone affected areas.</p> <p>73. Evacuate people from unsafe buildings/structures and shift them to relief camps/sites</p> <p>74. Divert/stop transport activities (Rail + Road) heading towards Cyclone affected areas</p>	R & B Dept. , Transport Dept., Railways, COR

	<p>Necessary Arrangements at Evacuation/ Relief Centres</p>	<p>75. To ensure that necessary arrangements at evacuation/relief centers is made with sufficient availability of:</p> <ul style="list-style-type: none"> a. Food, b. Water, c. Blankets/Clothing d. Medicines e. Lighting f. Sanitation and hygiene etc. <p>76. To ensure necessary security arrangements for the personnel (Emergency responders/relief teams) who are working at Relief Centers and involved in distribution of Relief Materials</p> <p>77. To ensure that law and order is maintained at evacuation/relief centers and in the affected areas as well</p> <p>78. Arrange for a logistic plan and warehouse for receipt and management of relief material</p>	<p>Revenue Dept., Civil Supply Dept., Collectors, Municipal Commissioner, Water Supply Dept., Health Dept., GEB, Power & Energy Dept., GWSSB & Local Authorities, Home Dept.</p>
	<p>Safety of Fishermen and Salt Workers</p>	<p>79. Take immediate actions for safety of fishermen, salt workers and visitors at cyclone affected coastal areas</p> <p>80. Ensure that all the fishermen and salt workers have returned from the sea or those who are in the sea are rescued and evacuated to safer places</p>	<p>COR/DOR, Port and Fisheries Dept., Tourism Dept., Industrial Dept.</p>
	<p>Immediate Health and Minimization of Disease Outbreak</p>	<p>81. To establish camp hospitals near the affected areas</p> <p>82. To make transportation arrangements to shift seriously injured persons to nearest-camp Hospitals, Taluka and District Hospitals, Regional and State Hospitals</p> <p>83. Ensure that the Hospitals are well prepared to deal with seriously injured persons</p> <p>84. Ensure that the required medical assistance/aid and medicines are provided to the affected people at site as well as at evacuation/relief centers in the affected area and necessary records are maintained</p> <p>85. Take sanitation and epidemic</p>	<p>COR/ DOR, Port & Transport Dept, Fisheries Dept., Tourism Dept., Industrial Dept.</p>

		<p>control measures for preventing any water borne disease</p> <p>86. Keep adequate stock of essential medicines, first-aid etc. at taluka/district hospitals</p> <p>87. Take steps to purify drinking water sources</p> <p>88. If required, take the help of doctors/paramedics from the list of doctors/paramedics available at the taluka/district level for immediate medical assistance</p>	
		<p>89. Assess need for fodder if required</p> <p>90. Keep ready teams for carcass disposal (if required)</p>	Animal Husbandry Dept.
	Information to Public and Media	<p>91. Establish Media/Press Centre for media management and information dissemination</p> <p>92. Ensure that the information to media/general public about the response of the State Government is released in an organized manner</p> <p>93. Organize media briefing twice a day at pre-determined intervals</p>	Information Dept., COR
	Other Important Work Related to Immediate Response	<p>94. Prepare quick need assessment report for planning of relief operation</p> <p>95. Additional assistance may be asked for emergency response/relief from GoI-NDMA (if needed)</p> <p>96. Prepare situation report and circulate it twice a day in the morning and evening to key Government functionaries</p> <p>97. Maintain constant touch with National, District and Taluka EOCs and other control rooms</p> <p>98. Remain in constant touch with IMD for updates on weather forecast for the coming days and plan accordingly</p> <p>99. Conduct aerial survey of affected areas for taking a stalk of the situation</p>	COR
		<p>100. Activate evacuation & relief centers according to needs/situation</p> <p>101. Maintain record of persons admitted at evacuation/relief centres</p>	Revenue Dept. Collector, COR

Time = 0 + 24 to 48 Hrs	Review of Situation and Reporting	102. Establish contact with IMD, CWC, ACWC, ISRO and the defense ministry of Gol for aerial / satellites imageries about further weather condition and plan accordingly	COR
	Restoration of Critical Infrastructure/ Essential Services	103. Ensure that the essential services/critical infrastructure of the affected areas have been restored or alternative arrangement is made for ensuring safety of people and smooth management of emergency response. 104. Ensure that key administrative and lifeline buildings are brought back to operation quickly. 105. Designate and deploy senior officers (as per the need) to worst affected area/s to oversee rescue/relief operation. 106. Ensure following primary necessities are restored <ul style="list-style-type: none"> o Power o Water o Telecommunication o Roads o Bridges 	COR, Line Depts., Dist. Collectors, Municipal Commissioner
	Disposal of Dead Bodies	107. Ensure following procedure is followed before disposal/handing over of dead bodies: <ul style="list-style-type: none"> a. Photographs of the dead bodies are taken, b. Identification of the dead bodies is done, c. Post Mortem where ever necessary and possible is carried out, d. Handing over dead bodies of persons known/identified to their relatives, e. Disposal of unclaimed and unidentified dead bodies. 	Revenue Dept., Dist. Collector, Municipal Commissioner, Home Dept., Health Dept., Local Authorities
		108. Ensure medical aid to injured cattle 109. Disposal of animal carcasses with the help of local bodies/health dept.	Animal Husbandry Dept.

	Public Information and Media Management	<p>110. Ensure that the information about progress of rescue and relief is provided to media/public in an organized manner at least twice a day</p> <p>111. Establish help lines for facilitating communication between the victims and their relatives residing outside the affected area/s</p> <p>112. Establish Information Centers at strategic locations for providing information about persons evacuated to the relief centres/hospitals</p>	COR, Information Dept., Dist. Collector, Municipal Commissioner
	Miscellaneous Rescue and Relief Works	<p>113. Assess the situation and take appropriate action to accelerate the Search & Rescue Operations</p> <p>114. Depute additional officers and supporting staff to Cyclone affected areas from non-affected areas (if required) to accelerate the rescue and relief operations</p>	COR, Districts Collector, Municipal Commissioner
		<p>115. Ensure that the relief assistance received from outside is centrally received, stored and sent for distribution to Cyclone affected areas according to their need and proper accounts are maintained about both receipt and distribution</p>	COR, Civil Supply Dept.
		<p>116. District Collector may oversee the functioning of relief centres and ensure adequate supply of relief materials</p>	Revenue Dept, Civil Supply Dept.,
Time = 0 + 48 to 96 Hrs	Continuous Rescue and Relief Works	<p>117. Remain in constant touch with IMD for updates on weather forecast for the coming days and plan accordingly</p> <p>118. Arrange for procurement of additional relief material required for relief operations (on the basis of need assessment)</p> <p>119. Mobilize additional relief material required for relief operations</p> <p>120. Maintain constant touch with State & Districts EOCs</p>	COR, Dist. Collectors, Civil Supply Dept.

		<p>121. Arrangement for transportation of injured from field hospital to base hospital</p> <p>122. Arrangement for transport of dead bodies to their native places</p> <p>123. Ensure maintenance of record, timely reporting and information management</p> <p>124. Ensure maintenance of record and information database</p>	<p>Revenue Dept., Health Dept. , Transport Dept., Line Deptts.</p>
<p>Time = 0 + 96 to 168 Hrs</p>	<p>Continuous Rescue and Relief Works</p>	<p>125. Remain in constant touch with IMD for updates on weather forecast for the coming days and plan accordingly</p> <p>126. Review the restoration of all the public and essential buildings/ structures in Cyclone affected areas</p> <p>127. Review and follow-up all necessary arrangements for emergency response & relief in the affected area/s</p>	<p>COR</p>
		<p>128. On receiving the message from IMD about degradation of Cyclone, inform the concern dist. Collector</p>	<p>COR, IMD</p>
		<p>129. Organize a quick rapid visual survey of the affected areas (through a technical team of engineers) to ascertain the safety of the structures decide on giving the go-ahead to people to move back to their respective houses</p>	<p>COR, Dist. Collectors, Municipal Commissioner, R & B Dept.</p>
		<p>130. After receiving the message of de-warning, ensure that people are moved back safely to their houses</p>	<p>COR, Collector, Police Dept.</p>
		<p>131. Ensure relief disbursement, allotment of funds and grants to line department and district collectors for organizing emergency response, relief and evacuation arrangements</p>	<p>Revenue Dept.</p>

2.8 Immediate Relief

2.8.1 Short-term Relief Measures

- a. Search, Rescue and Medical Assistance
- i. Identification of areas where SAR Teams are to be deployed
 - ii. Coordination of SAR teams for their quick deployment in allotted areas
 - iii. Provision of quick transport of SAR teams to affected areas
 - iv. The department of Roads and Buildings to evolve a mechanism for clearing access routes in order

- to facilitate search and rescue operations
- v. Mobilization of specialized equipment and machinery to affected areas
- vi. Cordoning of affected areas with control of entry and exit
- vii. Traffic Management by establishment of traffic points and check-posts
- viii. The Home Department to evolve a mechanism for providing security of properties of government and public in the affected areas

b. Emergency Relief

- i. Establishment of Temporary shelters for evacuees
- ii. Ensuring Arrangement for food, clothing, blanket/bedding, drinking water, sanitation and hygiene, lighting arrangements and essential medicines
- iii. Ensure deployment of mobile hospitals in affected areas for treatment of victims
- iv. Provide counselling services to the cyclone victims and their relatives
- v. Ensure establishment of communication link between the affected people and their relatives outside

c. The COR to ensure the following in the relief camps:

- i. Special emphasis on Hygiene and sanitation aspects should be given in relief camp sites
- ii. Separate area should be earmarked within the relief camp for storage of relief materials
- iii. Adequate manpower and transport facilities for the camp site.
- iv. Arrangements to be made for trauma management
- v. Mobile medical units to be sent to remote areas with a view to provide medical assistance to the victims/injured
- vi. Information centre should be established by the administration

2.8.2 Interim Relief Measures

- a. Arrangements to be made for quick identification and maintenance of the records of disposal of dead bodies in the affected areas (Home, Revenue, Health Dept., Local Authorities)
- b. Arrangements to be made to record the complaints of all persons reported missing. Follow up action in terms of verification of the report also needs to be made (Home Dept.)
- c. District Magistrates and Sub-Divisional Magistrates to be empowered to exempt the requirement of identification and post-mortem in case of mass casualties. Revenue Dept may depute additional sub-divisional magistrates to expedite disposal of the dead bodies (Revenue & Home Dept.)
- d. Unclaimed/unidentified dead bodies to be disposed off with the help of pre-identified voluntary agencies at the earliest after keeping their records (Home, Revenue, Health Dept. & Local Bodies)
- e. Additional manpower to be deployed in the affected areas for supplementing the efforts of the local administration (GAD)
- f. Separate Cell to be established at state/district/taluka level to coordinate with the NGOs and outside donor/aid agencies (Revenue Dept.)
- g. Regular meetings of the different stakeholders/departments should be organized at state level for sharing of information, developing strategies for relief operations. (Commissioner of Relief & Collectors at District Level)
- h. Information & Public Relation Dept to coordinate with the media to play a positive role in disseminating appropriate information to public

and the government in order to facilitate the speedy recovery

2.8.3 Assessment of Damage/Loss and Relief Needs

- a. The Commissioner of Relief to issue instructions to the District Collectors to provide 'the need assessment' report. The Commissioner of Relief should consolidate the same and to prepare "States Need Assessment Report"
- b. The Commissioner of Relief to issue instructions to the District Collectors to provide the damage and loss assessment report. The Commissioner of Relief to consolidate the same and to prepare "state's damage and loss assessment report" which will be useful in planning and implementing the relief operation after the disaster for the victims of the disaster
- c. Adequate manpower, vehicles, stationery etc should be provided to supplement the efforts for need/loss assessment. (Commissioner of Relief & Revenue Dept.)
- d. The relief need assessment report should be provided by the Collectors (Commissioner of Relief & Collectors)
- e. Identification and demolition of dangerous structures in the affected areas to minimize further loss of life and injuries (R & B Dept., Revenue Dept and Local Bodies)
- f. Arrangements for distribution of gratuitous relief and cash doles (Revenue Dept., Panchayat& Rural Housing Dept., UD&UHD Dept. and Collectors)
- g. Arrangements to be made for survey of human loss and distribution of ex-gratia relief to the families of deceased persons (Revenue Dept.)
- h. Teams to be formed and dispatched to the affected areas for detailed assessment of houses and property damage assessment (Revenue Dept and Local authorities)
- i. As reconstruction of houses will take a long period, arrangements to be made to provide interim shelters to the affected (Revenue Dept and Line Departments like Water Supply Dept., GEB, R & B Dept. etc)
 - i. Identification of the site for interim shelter
 - ii. Allocation of areas to affected families
 - iii. Providing appropriate shelters to the affected families
 - iv. Providing essential services as under in the interim shelter sites like water, transportation, power, road, drainage/ sanitation, school, PDS, health, protection, distribution of shelter materials to individual families, etc.

Chapter 3

Action Plan for Tsunami

3.1 Introduction

The purpose of a Tsunami Action Plan is to assist the delivery of the right people, to the right location with the right equipment to complete the tasks required during tsunami. By examining Gujarat State Tsunami Management Plan and by referring to the Gujarat State Disaster Management Act (2003), this plan will explain quick response at all levels to reduce the effects of tsunami waves with an effective coordinated way.

3.2 Associated Authority

The Nodal Department for controlling, monitoring and directing measures for organizing rescue, relief and rehabilitation is the Revenue Department of the State. All other concerned Departments should extend full cooperation in all matters pertaining to the management of the Tsunami disaster whenever it occurs. The state departments like Revenue, Home including Transport, Ports & Fisheries, R&B, Power, Finance, Information and Broadcasting etc. shall have a major role in emergency response during occurrence of Tsunami generating earthquake and Tsunami hitting the shore.

3.3 Disaster Declaration

The Gujarat State Disaster Management Act, 2003 (Section 32) provides for the State Government to declare any area where Tsunamis have occurred or likely to occur as disaster

affected area on the recommendations of the State Relief Commissioner or the District Collector. The purpose of declaration of disaster is to organize effective response in mitigating the Tsunami effects. Such a declaration provides wide powers and responsibilities to the State Relief Commissioner and the District Collectors in order to handle the incident effectively.

3.4 Early Warning

Public may be able to protect themselves from the Tsunami emergency if they are informed and educated before an emergency. Most of the time tsunami hazard is predictable so warning to public is important part of Action Plan.

Decision Support system is the set of rules to be followed for issue of tsunami bulletins. These rules are appropriately coded in the form of software that automatically generates bulletins by accessing the real-time data from the observing network as well as the model scenario database. The Action Plan is the set of routine activities to be followed by the staff at the tsunami warning centre for observation, evaluation, confirmation, and dissemination of bulletins.

The Early Warning Centre continuously monitors the seismic activity in the two tsunamigenic source regions of the Indian Ocean through the network of national and international seismic

stations. This network enables us to detect any tsunamigenic earthquakes within a time period of 10 minutes of occurrence. Tsunami bulletins are then generated based on pre-set decision support rules and disseminated to the concerned authorities for action, following the SOP.

The criteria given below is followed for generation of different types of advisory bulletin messages (Warning/Alert/Watch) for a particular region of the coast based on the earthquake parameters, available warning time (i.e. time taken by the tsunami wave to reach the particular coast) and expected run-up from pre-run model scenarios.

3.4.1 Warning / Alert / Watch

Based on earthquake parameters, region's proximity to the earthquake zone (Travel Times) and expected run-up from pre-run model scenarios, warnings to far source regions are issued only after confirmation of tsunami triggering based on real-time water-level observations and correction of scenarios. This will reduce possibility of false warnings.

The warning criteria are based on the premise that coastal areas falling within 60 minutes travel time from a tsunamigenic earthquake source need to be warned based solely on earthquake information, since enough time is not available for confirmation of water levels from BPRs and Tide Gauges. Those coastal areas falling outside the 60 minutes travel time from a tsunamigenic earthquake source are put under a watch status and upgraded to a warning only upon confirmation of water-level data, e.g. If

a tsunamigenic earthquake happens in the coast of the Northern Indonesia, parts of the Andaman & Nicobar Islands falling within 60 minutes travel time of a tsunami wave are put under 'Warning' status. Other areas are put under 'Watch' Status and upgraded to a 'Warning' only if the BPRs or tide gauges reveal significant change in water level. This implies that the possibility of false alarms is higher for areas close to the earthquake source; however for other regions since the warnings are issued only after confirmation of water-level data, the issue of false alarms doesn't arise. To reduce the rate of false alarms even in the near source regions, alerts are generated by analyzing the pre-run model scenarios, so that warnings are issued only to those coastal locations that are at risk.

Category of tsunami advisory bulletins, time-line for generation, content of the alert and dissemination contact information is detailed below.

3.4.2 Types of TWC Tsunami Bulletin Messages

a. Earthquake Information Bulletin (T+20 Min)

It contains information about origin time, latitude and longitude of the epicenter, name of geographical area, magnitude and depth of an earthquake. This message also contains preliminary evaluation of tsunami potential based on the magnitude. (e.g. earthquake occurring on land or earthquake with < M 6.5 or earthquake occurring > 100 Km depth or earthquake occurring in very shallow water column, etc. no tsunami is expected; for larger magnitude

earthquakes in the ocean, a qualitative statement on the tsunamigenic potential may be given). No immediate action is required. Bulletins provided to Ministry of Home Affairs (MHA).

**b. Tsunami Warning (T+30 Min)
(RED)**

It contains information about the earthquake and a tsunami evaluation message indicating that tsunami is expected (e.g. For earthquakes with > M 6.5 occurring in the Ocean within a depth of < 100 Km, a tsunami warning will be issued for those areas falling within 60 minutes travel time from the earthquake source and if expected run up is > 2 m). This is the highest level wherein immediate actions are required to move public to higher grounds. Message also contains information on the travel times and tsunami grade (based on run-up estimates) at various coastal locations from pre-run model outputs. Information provided to Ministry of Home Affairs (MHA) and public.

**c. Tsunami Alert (T+30 Min)
(ORANGE)**

It contains information about the earthquake and a tsunami evaluation message indicating that tsunami is expected (e.g. For earthquakes with > M 6.5 occurring in the Ocean within a depth of < 100 Km, a tsunami alert will be issued for those areas falling within 60 minutes travel time from the earthquake source and if expected run up is between 0.5 to 2 m as well as for those areas falling above 60 minutes travel time from the earthquake source and if expected run up is >2 m). This is the second highest level wherein immediate public evacuation is not required. Public should avoid beaches

since strong current are expected. Local officials should be prepared for evacuation if it is upgraded to warning status. Message also contains information on the travel times and tsunami grade (based on run-up estimates) at various coastal locations from pre-run model outputs. Information provided to Ministry of Home Affairs (MHA) and public.

**d. Tsunami Watch (T+30 Min)
(YELLOW)**

It contains information about the earthquake and a tsunami evaluation message indicating that tsunami is expected (e. g. For earthquakes with > M6.5 occurring in the Ocean within a depth of < 100 Km, a tsunami watch will be issued for those areas falling within 60 minutes travel time from the earthquake source and if expected run up is < 0.5 m and for those areas falling above 60 minutes travel time from the earthquake source and if expected run up is 0.5 to 2 m). This is the third highest level wherein immediate public evacuation is not required, Local officials should be prepared for evacuation if it is upgraded to warning status. Message also contains information on the travel times and tsunami grade (based on run-up estimates) at various coastal locations from Pre-run model outputs. Information provided to Ministry of Home Affairs (MHA).

e. Tsunami Cancellation (GREEN)

It will be issued if the tsunami warning was issued on the basis of erroneous data or if the warning center determines from subsequent information that only an insignificant wave has been generated. In addition, tsunami warning may be canceled on

a selective basis when a significant wave that has been generated clearly poses no threat to one or more of the areas the warning center warns, either because of intervening continents or islands which screen them or because the orientation of the generating area causes the tsunami to be directed away from these areas. To maintain credibility the warning center will use the terminology "non-destructive tsunami" in the cancellation message whenever applicable.

f. Tsunami All Clear (GREEN)

This bulletin indicates that the 'Tsunami Threat' is passed and no more dangerous waves are expected.

3.5 Plan Activation

The tsunami response structure will be activated on the occurrence of a major tsunami. The Commissioner of Relief (COR) will activate all the Departments for emergency response including the State EOC. He will issue instructions to include the following details:

- Specify exact resources required.
- The type of assistance to be provided

- The time limit within which assistance is needed
- The state, district or other contact persons/agencies for the provision of the assistance
- Other Task Forces with which coordination should take place

The state EOC and other control rooms at the state level as well as district control rooms should be activated with full strength. The State Government may publish a notification in the official gazette, declaring such area to be disaster-affected area under GSDMA Act (Section 32 (2) (a)).

Once the situation is totally controlled and normalcy is restored, the COR declares End of Emergency Response and issues instructions to withdraw the staff deployed in emergency duties.

3.6 Roles and Responsibility

Following are the key emergency response measures when occurrence of tsunami generating earthquake under the ocean is reported:

Time Frame	Task	Activity	Responsibility
0 to (-) 60 Minutes	Warning Receipt and Dissemination	1. Report the occurrence of Tsunami generating earthquake to following officials: - COR/DOR - Principal Secretary (Revenue) - Chief Executive Officer, GSDMA - Chief Secretary of the State - Members of Crisis Management Group - Hon. Chief Minister - Hon. Minister – Disaster Management - National Disaster Management	IMD, COR

		<p>Authority, Gol.</p> <ul style="list-style-type: none"> - All concerned District Collectors as well as Control Rooms of the district/s likely to be affected as per preliminary warning of IMD. - Ministers and Secretaries of all line departments <ol style="list-style-type: none"> 2. Instruct Collectors (of the districts likely to be affected) to activate District Control Room at full strength 3. Alert all response teams in the State for deployment 4. Remain in constant touch with control rooms at National & State Level 5. Instruct and alert all heads of departments of the key line departments to activate their departmental plan and SOPs for Tsunami response 	
	Interdepartment Coordination	<ol style="list-style-type: none"> 6. Instruct all State government officers and employees in the State to report to their respective Head for emergency duties (Only if the warning is of a level 2 disaster or as per the decision taken in the meeting of the Crisis Management Group headed by Chief Secretary) 7. Alert the District Collectors of districts not likely to be affected to be prepared for providing: <ul style="list-style-type: none"> o Additional manpower o Additional resources <ul style="list-style-type: none"> - Machinery & Equipment - Relief material to the districts likely to be affected 	COR, GAD
	Establishment of Lines of Communication	<ol style="list-style-type: none"> 8. Activate alternative communication equipments i.e. satellite phones, HF/VHF sets, Ham radio, VSAT in State EOC and ERCs, District and Taluka control rooms 9. Establish communication links with ERCs and Search & Rescue Teams in all Municipal Corporations and alert them to be in stage of readiness. 10. Establish communication links with villages likely to be affected as per the contact details available in SDRN. 	COR

0 to (-) 50 Minutes	Review of situation and reporting	<p>11. Establish contact with IMD, INCOIS, ISRO and the Defense Ministry of Govt for aerial / satellites imageries.</p> <p>12. After reviewing the satellite images issue instructions and orders for emergency response to areas likely to be affected.</p>	COR
	Management of EOC, ERCs and Tsunami Response	<p>13. Take over full command of State EOC and ERCs.</p> <p>14. Instruct line departments to depute representatives at the State and District EOCs.</p> <p>15. Hold a meeting with leaders of task forces and entrust them their tasks.</p> <p>16. Ensure that Tsunami information is disseminated to all who are at danger</p> <p>17. Arrange emergency meeting with State Crisis Management Group to devise a plan of action.</p>	COR
		<p>18. Arrange dissemination of information through various means of communication such as Radio, TV, Cable Network, SMS about Tsunami to districts/areas which are likely to be hit.</p>	COR
		<p>19. Impose restriction on all transport activities heading towards coastal areas that are likely to be affected by Tsunami.</p>	Secretary Transport
		<p>20. Mobilize following teams:</p> <ul style="list-style-type: none"> o Evacuation o Emergency Medical Services o Search and Rescue <p>21. Mobilize following emergency response forces:</p> <ul style="list-style-type: none"> o Fire & Emergency Services o NDRF o Village Disaster Management Teams o Police, Home Guards o State Reserve Police Force o Army (if required) o Air Force (if required) 	COR
Tsunami Response to Coastal Areas (Likely to be Affected)	<p>22. Based on the warning issued by IMD, pin point the districts and villages likely to be affected by Tsunami and start the procedure for identifying safe places/shelters for evacuation in those villages.</p>	COR, Transport Dept., Dist. Collector, Municipal Commissioner	

		<p>23. Village wise data of safe sheltering for evacuation available on SDRN should be referred and the District Collectors/Village level officers should be contacted to know the status of the shelters with the capacity of the shelter and other available facilities at the site.</p> <p>24. Make transport arrangement for mobilization of all emergency response teams.</p>	
		25. Ensure arrangements are in place to evacuate fishermen and salt workers if needed.	Ports & Fisheries Dept., GMB, Revenue Dept.,
		26. Ensure safety of tourists visiting beaches along the coastline.	Tourism Dept.
		27. Cordon off coastal areas for restricting entries of rail or road traffic. 28. Ensure law and order is maintained in areas likely to be affected.	Home Dept., Dist. Collector, Municipal Commissioner
		29. Ensure that all critical activities (mainly industrial production) in areas likely to be affected are shutdown.	Line Depts. (GEB, Industries etc.)
		30. Ensure dissemination of information to remote areas by local means. 31. Ensure that local help lines are opened and effectively managed for public information, guidance and rumor control. 32. Ensure that the information to public and media about the progress of Tsunami at periodic intervals is released.	Dist. Collector, Municipal Commissioner, Information Dept.
		33. Health Department to activate their Departmental Tsunami Disaster Management Plan and Departmental SOPs for Management of casualties	Health Dept.

0 to (-) 15 Minutes	Review of Situation and Reporting	<p>34. Review and monitor following activities:</p> <ul style="list-style-type: none"> ○ Evacuation of people from coastal areas likely to be affected ○ Positioning of Search and Rescue Teams ○ Positioning of mobile communication units ○ Positioning of quick medical response teams ○ Mobilization of restoration teams of respective departments ○ Requirement of armed forces in rescue and relief operations ○ Dissemination of information to the vulnerable areas ○ All preparedness measures to be taken by various authorities <p>35. Keep in touch with National, District and Taluka Control Rooms</p> <p>36. Release information at appropriate time to media and public regarding response measures organized by the Government</p>	COR, Information Dept.
	Emergency Relief Management	<p>37. Ensure that the Relief Management work planned in the areas likely to be affected by the Tsunami are well organized.</p>	COR
		<p>38. Ensure that the arrangement for basic amenities (shown below) at evacuation/relief centres are made by the respective departments:</p> <ul style="list-style-type: none"> ○ Drinking water ○ Food ○ Clothing ○ Sanitation and hygiene ○ Lighting ○ Medicines and Health Care 	COR, Civil Supply Dept., Revenue Dept. & Dist. Collector, Municipal Commissioner, Water Supply Dept., GEB, Health Dept.
		<p>39. Inform following agencies to be in a state of readiness for assisting in the Tsunami response measures (if required):</p> <ul style="list-style-type: none"> ○ Public sector agencies ○ Private sector agencies ○ NGOs ○ CBOs ○ Volunteer Organizations 	COR
		<p>40. Request for help (if needed) to MHA/National Disaster Management Authority</p>	COR

		41. Make necessary arrangements for public information/guidance, public opinion and rumour control.	Information Dept.
Time = 0 Hrs	Disaster Declaration	42. Record the reports in detail with time, source of reports etc. and declare the area as disaster affected, if necessary, (depending upon the nature and intensity of impact)	COR, Dist. Collector,
	Preliminary Assessment, Deployment of Emergency Response Teams and Dissemination of Information	43. Dist. Collector/s should send teams to the affected areas to take stalk of the effects of Tsunami.	Dist. Collector, Municipal Commissioner
		44. District Collector/s should send sector wise situation reports to: <ul style="list-style-type: none"> o State EOC/COR o GSDMA 	
		45. Deployment of following teams to Tsunami affected areas: <ul style="list-style-type: none"> o Emergency Communication Teams o Emergency Medical Services Teams o Search and Rescue Teams (With Equipment) o Preliminary damage Assessment Teams o Need Assessment Teams 	COR, Dist. Collector, Municipal Commissioner
	46. Establish communication link with affected districts by activating alternate communication equipments such as Satellite Phones, HF/VHF Sets, Ham Radio, V Set etc., in State/District EOCs and Taluka Control Rooms. 47. Arrange dissemination of information about occurrence of Tsunami and areas that are affected by it to Media & Public	COR, Dist. Collector, Municipal Commissioner, Information Dept.	
Time = 0 + 24 Hrs	Mobilization and Deployment	48. Immediate mobilization of following units/teams to areas affected by Tsunami <ul style="list-style-type: none"> o S & R Teams of Fire and Emergency Services o Quick Medical Response Teams o Quick Damage & Loss Assessment Teams o Quick Need Assessment Teams o Road Clearance Teams o Teams for disposal of dead bodies o Teams for disposal of 	COR, Municipal Commissioner, Concern line Dept.

		<ul style="list-style-type: none"> ○ carcasses ○ Teams for debris clearance (if any) ○ Teams for maintaining Law & Order in the affected areas ○ Arrange for S & R teams of Air Force (If required) 	
	Measures for quick and organized response	49. State EOC, ERCs, the Collectors of the affected District/s Should ensure that the following response activities are carried out immediately:	COR, Collector, Municipal Commissioner, Line Dept.
	a. Clearance of access roads to reach at the sites of affected areas	<p>50. To survey the access roads/routes leading to the affected areas and manage traffic for mobilization of equipments, machinery and volunteers.</p> <p>51. Identify alternate roads/routes for evacuation.</p> <p>52. Undertake repairing/restoration of damaged roads leading to the affected areas.</p> <p>53. Identify and declare unsafe buildings/structures in Tsunami affected areas.</p> <p>54. Evacuate people from unsafe buildings/ structures and shift them to relief camps/sites.</p>	R & B Dept. , Transport Dept., Dist. Collector, Municipal Commissioner, Railways, COR
	b. Necessary Arrangements at evacuation/relief centres	<p>55. To ensure that necessary arrangements at evacuation/relief centers is made with sufficient availability of:</p> <ul style="list-style-type: none"> a. Food, b. Water, c. Blankets/Clothing d. Medicines e. Lighting f. Sanitation and hygiene etc. <p>56. To ensure necessary security arrangements for the personals (Emergency responders/relief teams) who are working at Relief Centers and involved in distribution of Relief Materials.</p> <p>57. To ensure that law and order is maintained at evacuation/relief centers and in the affected areas as well.</p>	Revenue Dept., Civil Supply Dept., Collector, Municipal Commissioner, Water Supply Dept., Health Dept., GEB, Power & Energy Dept., GWSSB & Local Authorities, Home Dept.

	<p>c. Safety of fishermen and salt workers</p>	<p>58. Immediate actions to be taken for safety of fishermen, salt workers and visitors at Tsunami affected coastal areas.</p> <p>59. Ensure that all the fishermen and salt workers have returned from the sea or those who are in the sea are rescued and evacuated to safer places.</p>	<p>COR, Port and Fisheries Dept., Tourism Dept., Industrial Dept.</p>
	<p>d. Ensure immediate health and minimization of outbreak of disease</p>	<p>60. To establish camp hospitals near the affected areas.</p> <p>61. To make transportation arrangements to shift seriously injured persons to nearest-</p> <ul style="list-style-type: none"> a. Camp Hospitals, b. Taluka and District Hospitals, c. Regional and State Hospitals <p>62. Ensure that the Hospitals are well prepared to deal with seriously injured persons.</p> <p>63. To ensure that the required medical assistance/aid and medicines are provided to the affected people at site as well as at evacuation/relief centers in the affected area and necessary records are maintained.</p> <p>64. Take sanitation and epidemic control measures for preventing any water borne disease.</p> <p>65. Keep adequate stock of essential medicines, first-aid etc. at taluka/district hospitals</p> <p>66. Take steps to purify drinking water sources</p> <p>67. If required, take the help of doctors/paramedics from the list of doctors/paramedics available at the taluka/district level for immediate medical assistance.</p>	<p>Health Dept., Transport Dept.</p>
		<p>68. Assess need for fodder if required.</p> <p>69. Keep ready teams for carcass disposal (if required).</p>	<p>Animal Husbandry Dept.</p>
	<p>e. Information to public and media</p>	<p>70. Establish Media/Press Centre for media management and information dissemination</p> <p>71. Ensure that the information to media/general public about the response of the State Government is released in an organized manner.</p> <p>72. Organize media briefing twice a day at pre-determined intervals.</p>	<p>Information Dept., COR</p>

	f. Other important work related to immediate response	<p>73. Prepare quick need assessment report for planning of relief operation.</p> <p>74. Additional assistance may be asked for emergency response/relief from Gol-NDMA (If needed).</p> <p>75. Maintain constant touch with National, District and Taluka EOCs and other control rooms.</p> <p>76. Conduct Arial survey of affected areas for taking a stalk of the situation.</p>	COR
Time = 0 + 24 to 48 Hrs	Restoration of critical infrastructure/essential services	<p>77. Ensure that the essential services/critical infrastructure of the affected areas have been restored or alternative arrangement is made for ensuring safety of people and smooth management of emergency response.</p> <p>78. Ensure that key administrative and lifeline buildings are brought back to operation quickly</p> <p>79. Ensure following primary necessities are restored</p> <ul style="list-style-type: none"> o Power o Water o Telecommunication o Roads o Bridges 	COR, Line Depts., Dist. Collector, Municipal Commissioner
	Disposal of Dead bodies	<p>80. Ensure following procedure is followed before disposal/handing over of dead bodies:</p> <ul style="list-style-type: none"> o Photographs of the dead bodies are taken, o Identification of the dead bodies is done, o Post Mortem where ever necessary and possible is carried out, o Handing over dead bodies of persons known/identified to their relatives, o Disposal of unclaimed and unidentified dead bodies. 	Revenue Dept., Collector, Municipal Commissioner, Home Dept., Health Dept., Local Authorities
		<p>81. Animal Husbandry Department to ensure medical aid to cattle which are injured</p> <p>82. Disposal of animal carcasses with the help of local bodies/health dept.</p>	Animal Husbandry Dept, Local Authorities, health dept.
	Public Information and Media Management	<p>83. Ensure that information about progress of rescue and relief is provided to media/public in an organized manner at least twice a day.</p>	COR, Information Dept. and Dist.

		84. Establish help lines for facilitating communication between the victims and their relatives residing outside the affected area/s. 85. Establish Information Centers at strategic locations for providing information about persons evacuated to the relief centres/hospitals.	Collector, Municipal Commissioner
	Miscellaneous rescue and relief works	86. Assess the situation and take appropriate action to accelerate the Search & Rescue Operations. 87. Depute additional officers and supporting staff to Tsunami affected areas from non-affected areas (if required) to accelerate the rescue and relief operations.	COR, Districts Collector, Municipal Commissioner
		88. Ensure that the relief assistance received from outside is centrally received, stored and sent for distribution to Tsunami affected areas according to their need and proper accounts are maintained about both receipt and distribution.	COR, Civil Supply Dept.
		89. District Collector may oversee the functioning of relief centres and ensure adequate supply of relief materials.	Revenue Dept, Civil Supply Dept.
Time = 0 + 48 to 96 Hrs		90. Arrange for procurement of additional relief material required for relief operations (on the basis of need assessment). 91. Mobilize additional relief material required for relief operations. 92. Maintain constant touch with State & Districts EOCs.	COR, Dist. Collector, Municipal Commissioner, Civil Supply Dept.
		93. Arrangement for transportation of injured from field hospital to base hospital 94. Arrangement for transport of dead bodies to their native places.	Revenue Dept., Health Dept., Transport Dept
		95. Ensure maintenance of record, timely reporting and information management. 96. Ensure maintenance of record and information database	Line Depts., Dist. Collector, COR
Time = 0 + 96 to 168 Hrs		97. Review the restoration of all the public and essential in Tsunami affected areas	COR

		98. Review and follow-up all necessary arrangements for emergency response & relief in the affected area/s.	
		99. After receiving the message of de-warning, ensure that people are moved back safely to their houses.	COR, Collector, DSP
		100. Organize a quick rapid visual survey of the affected areas (through a technical team of engineers) to ascertain the safety of the structures decide on giving the go-ahead to people to move back to their respective houses.	COR, Dist. Collectors, Municipal Commissioner, R&B
		101. Ensure relief disbursement, allotment of funds and grants to line department and district collectors for organizing emergency response, relief and evacuation arrangements.	Revenue Dept.

3.7 Relief Measures

3.7.1 Short Term Relief Measures

- a. Provide temporary shelter to affected people
- b. Temporary shelter site should be safe and easily accessible.
- c. Continue to provide essential services (food, water, clothing, sanitation, medical assistance, power, etc.) to the affected people.

The COR, Secretaries of Line Departments and concerned Collectors to ensure the following in the relief camps:

- i. Special emphasis on Hygiene and sanitation aspects should be given in relief camp sites. (Health Dept.)
- ii. Separate area should be earmarked within the relief camp for storage of relief materials. (Civil Supply & R & B Dept.)

- iii. Adequate manpower and transport facilities for the camp site. (Transport Department)
- iv. Arrangements to be made for trauma management. (Health Department)
- v. Mobile medical units to be sent to remote areas with a view to provide medical assistance to the victims/injured. (Health Dept.)
- vi. Information centre should be established by the administration. (I&B Department)

3.7.2 Interim Relief Measures

- a. Arrangements to be made for quick identification and maintenance of the records of disposal of dead bodies in the affected areas (Home, Revenue, Health Dept., Local Authorities).
- b. Arrangements to be made to record the complaints of all persons reported missing. Follow up action in terms of verification of the report

- also needs to be made. (Home Dept.)
- c. District Magistrates and Sub-Divisional Magistrates to be empowered to exempt the requirement of identification and post-mortem in case of mass casualties. Revenue Dept may depute additional Sub-Divisional Magistrates to expedite disposal of the dead bodies. (Revenue & Home Dept.)
 - d. Unclaimed/unidentified dead bodies to be disposed off with the help of pre identified voluntary Agencies at the earliest after keeping their records. (Home, Revenue, Health Dept. & Local Bodies)
 - e. Additional manpower to be deployed in the affected areas for supplementing the efforts of the local administration. (GAD).
 - f. Separate Cell to be established at state/ district/ taluka level to coordinate with the NGOs and outside donor/aid agencies. (Revenue Dept.)
 - g. Regular meetings of the different stakeholders/departments should be organized at state level for sharing of information, developing strategies for relief operations. (Commissioner of Relief & Collectors at District Level).
 - h. Information & Public Relation Dept. to coordinate with the media to play a positive role in disseminating appropriate information to public and the government in order to facilitate the speedy recovery. (I & B Dept.)

3.7.3 Assessment of Damage/Loss and Relief Needs

- a. The Commissioner of Relief to issue instructions to the District Collectors to provide 'the need assessment' report. The Commissioner of Relief should consolidate the same and to prepare "States Need Assessment Report".
- b. The Commissioner of Relief to issue instructions to the District Collectors to provide the damage and loss assessment report. The Commissioner of Relief to consolidate the same and to prepare "State's Damage and Loss Assessment Report" which will be useful in planning and implementing the relief operation after the disaster for the victims of the disaster.
- c. Adequate manpower, vehicles, stationery, etc. should be provided to supplement the efforts for need/loss assessment. (Commissioner of Relief & Revenue Dept.)
- d. The Relief Need Assessment Report should be provided by the Collectors. (Commissioner of Relief & Collectors)
- e. The damage assessment Performa is also attached in the annexure 10. (COR & Collectors)
- f. Identification and demolition of dangerous structures in the affected areas to minimize further loss of life and injuries. (R & B Dept., Revenue Dept and Local Bodies)
- g. Arrangements for distribution of gratuitous relief and cash doles. (Revenue Dept., Panchayat & Rural Housing Dept., UD&UHD Dept. and Collectors)
- h. Arrangements to be made for survey of human loss and distribution of ex-gratia relief to the

- families of deceased persons.
(Revenue Dept.)
- i. Teams to be formed and dispatched to the affected areas for detailed assessment of houses and property damage assessment. (Revenue Dept and Local authorities)
 - j. As reconstruction of houses will take a long period, arrangements to be made to provide interim shelters to the affected. (Revenue Dept and Line Departments like Water Supply Dept., GEB, R & B Dept. etc)
 - i. Identification of the site for interim shelter
 - ii. Allocation of areas to affected families
 - iii. Providing appropriate shelters to the affected families
 - iv. Providing essential services as under in the interim shelter sites like water, transportation, power, road, drainage/ sanitation, school, PDS, health, protection, distribution of shelter materials to individual families, etc.

Chapter 4

Action Plan for Flood

4.1 Introduction

Floods are among the most common and destructive natural hazards causing extensive damage to infrastructure, public and private services, environment and economy. Recurring flood losses have handicapped the economic development of the State. The frequency and intensity of floods has grown in the State over the years primarily because of the unplanned development and increased encroachment of flood plains.

This demands better flood preparedness to make sure that appropriate and effective response measures are taken during flood emergency to minimize the loss of life and property. Apart from an effective disaster response system, it is important to have a good flood prevention and mitigation strategy to achieve the objectives of vulnerability reduction.

The Action Plan consists of the following activities:

1. Declaration of Flood disaster
2. Flood Forecasting and Warning
3. Trigger mechanism
4. Response mechanism of the concerned line departments along with the roles and responsibilities
5. Relief

4.2 Declaration of Flood Disaster

The Gujarat State Disaster Management Act, 2003 (Section 32)

provides for the State Government to declare any area where flood have occurred or likely to occur as disaster affected area on the recommendations of the State Relief Commissioner or the District Collector. The purpose of the declaration is to organize effective response in mitigating the flood effects. Such a declaration provides wide powers and responsibilities to the State Relief Commissioner and the District Collectors in order to handle the incident effectively.

4.3 Flood Forecasting and Warning

Flood forecasting is a process whereby the authorities are alerted to impending conditions where floods may be likely. Flood forecasting requires understanding of meteorological and hydrological conditions and is therefore the responsibility of the appropriate government agencies. National organisation is required but information needs to be made available at a river basin scale. This allows forecasting to integrate with flood warning arrangements.

The main components of a national flood forecasting and warning system are as follows:

- Collection of real-time data and prediction of flood severity and time of onset of particular levels of flooding
- Preparation of warning messages, describing what is

happening, predictions of what will happen and expected impact. Messages can also include what action should be taken.

- The communication and dissemination of such messages
- Interpretation of the predictions and other flood information to determine flood impacts on communities
- Response to the warnings by the agencies involved and communities
- Review of the warning system and improvement in the system after flood event
- If predictions fail, the reasons of prediction failure should be communicated to communities in order to establish trust.

For a flood warning system to work effectively, all these components must be present and they must be integrated with each other rather than operating in isolation.

4.3.1 Community Based Flood Forecasting and Warning Systems

It is important that the people in each community receive information as early as possible about the possibility of flooding in their area. In addition to the valuable information from the official flood warning system, communities should attempt to develop their own warning systems. At community level, it is important that warnings are received by all individuals. The way in which messages are disseminated in communities will depend on local conditions, but may include some or all of the following:

- a. Media warnings (print and electronic)
- b. General warning indicators, for example sirens

- c. Warnings delivered to areas by community leaders or emergency services
- d. Dedicated automatic telephone warnings to at-risk properties
- e. Information about flooding and flood conditions in communities upstream. One approach to disseminating messages is to pass warning messages from village to village as the flood moves downstream
- f. Keep watch and be regularly informed about the river level and embankment conditions in the local area. The monitoring of the river and embankment should be increased as the water level increases and crosses the critical danger level
- g. A community-based warning system to pass any information about an approaching flood to every family.

4.3.2 Involvement of Communities in Data Collection and Local Flood Warning Systems

If communities become involved in data collection for flood forecasting, and the importance of their role is understood, a sense of ownership is developed. Individuals can be appointed for the following tasks:

- a. Taking care of installations/equipment
- b. Trained as gauge readers for manual instruments (rain gauges, water level recorders)
- c. Radio operators to report real-time observations

Trained individuals within the community should be able to gather and update information to:

- a. Know the depth of past severe floods in the local area
- b. Know the causes of flooding in the local area
- c. Know how quickly the waters might rise

- d. Know how long the floodwaters might remain in the locality
- e. Know the direction of movement of the floodwaters

The involvement of members of the community also helps to prevent vandalism and damage to installations going unreported.

4.3.3 Procedure for Disseminating Warnings to Remote Areas

Communities in remote areas may not be able to receive the types of warnings described in the previous section. Responsibilities need to be defined clearly for lower tiers of administration and the emergency services to have predefined links with communities in remote areas. This should include:

- a. Local radio which should be supplied with clear and accurate information
- b. Use of appointed community wardens with direct two-way radio or mobile telephone access to warning agencies and emergency authorities
- c. Local means of raising alarms, for example church bells, sirens, loud hailers, loudspeakers, etc. The latter could be the responsibility of selected individuals or wardens, who need to be provided with equipment and transport, for example motor cycles or bicycles;
- d. 'Sky Shout' from emergency service helicopters.
- e. High Priority Telegram
- f. Doordarshan and the local cable channels (TV channels & radio Channels including FM radio)
- g. Bulletins in the Press

- h. Satellite based Disaster Warning Systems
- i. Fax
- j. Telephone

4.4 Trigger Mechanism: Plan Activation

The flood response system will be activated on the occurrence of a heavy rain. The Commissioner of Relief (COR) will activate all the Departments for emergency response including the State EOC. He will issue instructions to include the following details:

- a. Specify exact resources required
- b. The type of assistance to be provided
- c. The time limit within which assistance is needed
- d. The state, district or other contact persons/agencies for the provision of the assistance
- e. Other Task Forces with which coordination should take place

The state EOC and other control rooms at the state level as well as district control rooms should be activated with full strength. The State Government may publish a notification in the official gazette, declaring such area to be disaster-affected area under GSDMA Act (Section 32 (2) (a)). Once the situation is totally controlled and normalcy is restored, the COR declares End of Emergency Response and issues instructions to withdraw the staff deployed in emergency duties.

4.5 Roles and Responsibilities

S. No.	Response To be Taken	Responsible Department
1.	Report the occurrence of flood to CoR, GSDMA, Heads of line departments, Chief Secretary and Chief Minister's office and National Disaster Management EOC, Gol	State Emergency Operation Centre (SEOC)
2.	Establish communication links by alternate communication equipments like phone, radio etc. in state/district EOC and Taluka control rooms	State Emergency Operation Centre (SEOC)
3.	Deploy Mobile Emergency Communication Units to affected areas for establishing communication links.	COR
4.	Verify authenticity of flood from agencies like IMD, SSNL and also from Districts/Taluka control rooms.	State Emergency Operation Centre (SEOC)
5.	Hold first meeting with Duty Officers	COR
6.	Contact the Heads of all the line departments to reach State EOC	COR
7.	Dispatch of Search & Rescue teams to the affected areas.	COR
8.	Make arrangements for the aerial survey of affected areas.	COR
9.	Instruct local administration to evacuate victims to safer sites	COR
10.	Assess the condition of road and rail network for quick mobilization of Emergency teams and resources to affected areas and take follow up steps.	Secretaries of Transport, R & B Dept. COR
11.	Maintain constant touch with National/District and Taluka EOCs	COR

Distribution of activities among various state agencies in Gujarat during Relief

S. No.	Response To be Taken	Responsible Department
1.	Providing temporary shelters to evacuated persons	R & B, Revenue Dept.
2.	Providing food materials to the victims	Revenue, Civil Supplies
3.	Providing safe drinking water to the victims	Water supply Dept.
4.	Provision of hygienic sanitation facilities	Health Dept., NGO, Community groups
5.	Provision of health assistance	Health Dept.
6.	Clothing and utensils	Civil Supplies
7.	Relief camps	R & B, Revenue Dept.
8.	Providing transport services to shelter sites	Revenue Dept., Transport Dept.

4.6 Relief Measures

4.6.1 Short Term Relief Measures

a. Food & Nutrition

In an extreme flood situation, people lose standing crops and stored food grains. In such cases, free distribution of foods shall be made to avoid hunger and malnutrition. Wherever possible, dry rations should be distributed for home cooking.

b. Water

Water supply is invariably affected in natural disasters. Availability of safe drinking water is very challenging particularly during floods. It must be ensured that affected people have adequate facilities and supplies to collect, store and use clear and safe water for drinking, cooking and personal hygiene.

c. Health

During post disaster phase, many of actors increase the risk of diseases and epidemics because of overcrowding, inadequate quantity and quality of water, poor environmental and sanitary conditions, decaying biological matter, water stagnation and inadequate shelter & food supplies. There should be adequate supply of medicines, disinfectants, fumigants, etc. to check outbreak of epidemics. It should be ensured that the medicines have not reached expiry date.

d. Clothing & Utensils

The people affected by the disaster shall be provided with sufficient clothing, blankets, etc. to ensure their safety and well-being. Each disaster affected household shall be provided with cooking and eating utensils.

e. Shelter

In case of flood, a large number of people are rendered homeless. In such situations shelter becomes a critical factor for survival and safety of the affected population. In view of this, flood affected people who have lost their houses shall be provided sufficient covered space for shelter. Disaster affected households shall be provided with necessary tools, equipment and materials for repair, reconstruction and maintenance for safe use of their shelter.

f. Relief camp

Relief camps also provide good temporary arrangements for people affected by flood. Adequate numbers of buildings or open space should be identified where relief camps can be set up during emergency. The requirements for operation of relief camps should be worked out in detail in advance. The temporary relief camps should have adequate provision of drinking water and bathing, sanitation and essential health-care facilities.

g. Sanitation and Hygiene

Sanitation services are crucial to prevent an outbreak of epidemics in post disaster phase. Therefore a constant monitoring of any such possibilities needs to be carried out. It should be ensured that disaster affected households have access to sufficient hygiene measures.

4.6.2 Interim Relief Measures

- a. Arrangements to be made for quick identification and maintenance of the records of disposal of dead bodies in

the affected areas (Home Dept., Revenue Dept., Health Dept. and Local Authorities).

- b. Arrangements to be made to record the complaints of all persons reported missing. Follow up action in terms of verification of the report also needs to be made. (Home Dept.)
- c. District Magistrates and Sub-Divisional Magistrates to be empowered to exempt the requirement of identification and post-mortem in case of mass casualties. Revenue Dept may depute additional Sub-Divisional Magistrates to expedite disposal of the dead bodies. (Revenue & Home Dept.)
- d. Unclaimed/unidentified dead bodies to be disposed of with the help of pre identified voluntary agencies at the earliest after keeping their records. (Home Dept., Revenue Dept., Health Dept. & Local Bodies)
- e. Additional manpower to be deployed in the affected areas for supplementing the efforts of the local administration (GAD).
- f. Separate Cell to be established at state/district/ taluka level to coordinate with the NGOs and outside donor/aid agencies. (Revenue Dept.)
- g. Regular meetings of the different stakeholders/departments should be organized at state level for sharing information, developing strategies for relief operations. (Commissioner of Relief & Collectors at District Level)
- h. Information & Public Relation Dept to coordinate with the media to play a positive role in disseminating appropriate information to public and the government in order to facilitate the speedy recovery. (I. & B. Dept.)

4.6.3 Assessment of Damage/Loss and Relief Needs

- a. The Commissioner of Relief to issue instructions to the District Collectors to provide the 'Need Assessment Report'. The Commissioner of Relief should consolidate the same and to prepare 'State's Need Assessment Report'.
- b. The Commissioner of Relief to issue instructions to the District Collectors to provide the 'Damage and Loss Assessment Report'. The Commissioner of Relief to consolidate the same and to prepare 'State's Damage and Loss Assessment Report' which will be useful in planning and implementing the relief operations for disaster victims.
- c. Adequate manpower, vehicles, stationery etc. should be provided to supplement the efforts for need/ loss assessment. (Commissioner of Relief & Revenue Dept.)
- d. The relief need assessment report should be provided by the Collectors. (Commissioner of Relief & Collectors)
- e. Identification and demolition of dangerous structures in the affected areas to minimize further loss of life and injuries. (R & B Dept., Revenue Dept and Local Bodies)
- f. Arrangements for distribution of gratuitous relief and cash doles. (Revenue Dept., Panchayat & Rural Housing Dept., UD & UHD Dept. and Collectors)
- g. Arrangements to be made for survey of human loss and distribution of ex-gratia relief to the families of deceased persons. (Revenue Dept.)
- h. Teams to be formed and dispatched to the affected areas for detailed assessment of houses and property damage assessment. (Revenue Dept. and Local authorities)

Chapter 5

Action Plan for Nuclear & Radiological Emergencies

5.1 Introduction

The growth in the application of nuclear science and technology in the fields of power generation, medicine, industry, agriculture, research and defence has led to an increase in the risk of occurrence of Nuclear and Radiological emergencies.

As on date, twenty one power reactors and eight research reactors are in operation in India, five power reactors are under construction, and plans exist to set up thorium-based reactors to meet the ever-increasing energy needs. Further, India is also one amongst the seven declared nuclear weapon states which uses nuclear technology for strategic purposes.

Kakrapar Atomic Power Station

The Kakrapar Atomic Power Station (KAPS) is a nuclear power station in India, which lies in the proximity of the Surat city in the State of Gujarat. It consists of two 220 MW pressurized water reactors with heavy water as moderator and another two power station with the capacity of 700MW each is under construction. KAPS-1 went critical on 3 September 1992 and began commercial electricity production a few months later on 6 May 1993. KAPS-2 went critical on 8 January 1995 and began commercial production in 1 September 1995. In addition, there are two heavy water plants in Gujarat (at Vadodara and Hazira).

5.2 Scope of the Action Plan

The scope of this document is from receiving of emergency intimation to the immediate response actions.

5.3 Nuclear and Radiological Emergency/Disaster Scenarios

- a. An accident taking place in any nuclear facility of the nuclear fuel cycle including the nuclear reactor, or in a facility using radioactive sources, leading to a large-scale release of radioactivity in the environment.
- b. A 'criticality' accident in a nuclear fuel cycle facility where an uncontrolled nuclear chain reaction takes place inadvertently leading to bursts of neutrons and gamma radiation (as had happened at Tokaimura, Japan).
- c. An accident during the transportation of radioactive material.
- d. The malevolent use of radioactive material as Radiological Dispersal Device (RDD) by terrorists for dispersing radioactive material in the environment.
- e. A large-scale nuclear disaster resulting from a nuclear weapon attack (as had happened at Hiroshima and Nagasaki in Japan) which would lead to mass casualties and destruction of large areas and properties.

5.4 Authority

- a. The Department of Atomic Energy (DAE) has been identified as the

- nodal agency in the country for providing the necessary technical inputs to the national or local authorities for responding to any nuclear or radiological emergency in the public domain.
- b. The Ministry of Home Affairs (MHA) is the nodal ministry in such emergencies. For this purpose, a Crisis Management Group (CMG) has been functioning since 1987 at DAE.
 - c. In the event of any radiological or nuclear emergency in the public domain, the CMG is immediately activated and will co-ordinate between the local authority in the affected area and the National Crisis Management Committee (NCMC). The CMG comprises of senior officials drawn from various units of DAE like the Nuclear Power Corporation of India Ltd. (NPCIL), Bhabha Atomic Research Centre (BARC), Heavy Water Board (HWB) and the Directorate of Purchase and Stores (DP&S). It also includes a senior official from the regulatory authority, the Atomic Energy Regulatory Board (AERB). Each member is backed by an alternate member, so that the CMG can be activated at a very short notice. Several resource agencies from BARC also back up the CMG. They can provide advice and assistance in the areas of radiation measurement and protection and medical assistance to radiation affected personnel.
 - d. For an effective response to any major nuclear emergency, an immediate communication 18 Emergency Response Centres (ERCs) have been established

across the country, by BARC and DAE which is shown in Annexure 14. For Gujarat, Kakrapar is the ERC.

- e. In case of Gujarat, the ERC at Gujarat and other national resources such as the Armed Forces etc. shall deal with the situation. The role of the State Government and its agencies such as the Gujarat State Disaster Management Authority (GSDMA) will only be supportive and be at the directions of the CMG.

5.5 Regulatory Body

- a. AERB is the nuclear regulatory authority in India which, as per the legal framework of Atomic Energy Act, 1962, has the mandate for issuance of licenses to nuclear and radiation facilities upon ensuring compliance with the applicable standards and codes.
- b. It is emphasised that the AERB, which oversees nuclear and radiological safety in the country, has the powers to not only licence the operation of a facility but also the power to order partial or full shutdown of any facility that violates its guidelines.
- c. The AERB has been playing a very crucial role in the prevention of nuclear/radiological accidents by ensuring that proper safety design features and operating procedures in all nuclear and radiation facilities are in place.

5.6 Trigger Mechanism

The trigger mechanism prescribes the manner in which the disaster response system shall be automatically activated after receiving early warning signals of a disaster happening or likely to

happen or on receipt of information of an incident.

As a basic regulatory requirement, emergency preparedness exists at KAPS to respond to any on-site emergency in their areas. But to handle radiological emergencies arising from a transport accident or from movement/handling of “orphan sources” (radioactive sources that have lost regulatory control) or due to malevolent acts like explosion of a Radiological Dispersal Device (RDD), Radiation Exposure Device (RED) or Improvised Nuclear Device (IND) any time or anywhere in the State, a network of 18 number of Emergency Response Centres (ERCs) has been established by Bhabha Atomic Research Center (BARC) (for Gujarat the ERC is Kakrapar) and Department of Atomic Energy (DAE). This network is basically meant for responding to such emergencies and also for providing timely advice and guidance to the first responder at the State and National level. The Kakrapar ERC is equipped with radiation monitoring instruments, protective gear and other supporting infrastructures. Various units of Nuclear Emergency Response Teams (ERTs), consisting of personnel from different DAE units are also being raised. The centralised agency called the management activities not only by activating these ERC and ERTs but also by mobilising the resources from all DAE facilities at the time of crisis.

The proposed National Policy on CBRN lays down that in each metropolitan area with population of over 20 lakhs, Additional Emergency Response Centers (AERCs) will be set up on priority basis under the Commissioner of

Police of that city. In Gujarat, 50 sets of equipment in Ahmedabad, 25 sets of equipment in Surat and 25 sets of equipment in Vadodara will be supplied by the NDMA (Specifications of equipment is given in Annexure 16).

Other AERCs will be set up in cities with a population of over 10 lakhs, and each such city shall have 15 sets of equipment.

5.6.1 Line of Communication and Responsibility for the State

Nuclear disaster is a situation where chances of receiving any early warning are very low. In such a situation where no early warning signals are available, the primary objective of the trigger mechanism is to mount immediate isolation. The following procedure shall be followed in such situations:

- a. For metropolitan areas, the Incident Commander for all nuclear hazards shall be the Commissioner of Police. For other areas it will be the District Magistrate (DM).
- b. The field functionary at ground zero shall inform the District Emergency Operation Centre (DEOC), the Commissioner of Police in a metropolitan area and the District Magistrate of the incident. DEOC / District Magistrate/ Commissioner of Police shall inform the State Emergency Operation Center (SEOC), Emergency Response Centers (ERCs), the Commissioner of Relief (COR) and GSDMA.
- c. Immediately thereafter, personnel from the AERC will determine the source of the radioactive emission

and its strength (Annexure 15, IAEA-EPR-FIRST RESPONDERS 2006) and report the same to the Commissioner of Police. In non-Metropolitan Area, the District Collector will inform the GSDMA, Emergency Response Centers for carrying out the function.

- d. The COR or GSDMA shall convene an immediate meeting of the Crisis Management Group under the Chief Secretary.
- e. COR shall inform National Emergency Operation Center and if required coordinate with Bhabha Atomic Research Center (BARC) for specialised support team from the 18 ERCs.
- f. The Commissioner of Police in a metropolitan area and the District Collector in others shall review the situation and activate coordination, command and control.
- g. Commissioner of Health (CoH) shall place medical and para-medical teams if required at the disposal of the Incident Commander.
- h. The Fire Brigade as well as personnel/ vehicles/ equipments from GSDMA's Emergency Response Centers (ERCs) will report to the Incident Commander.
- i. Commissioner of Relief (COR) shall also coordinate immediate evacuation of potentially affected civilians with the CP, Municipal Commissioner and Collector.
- j. Team for Rapid Assessment of damage shall be deployed.
- k. Chemical Biological Nuclear and Radiological team (CBRN) shall be formed and deployed to ground

zero by the incident commander, i.e. Commissioner of Police in metropolitan areas and by the District Collector in other areas.

5.7 Response Mechanism

Response measures are those which are taken instantly prior to and following a Nuclear & Radiological emergency aimed at limiting injuries, loss of life and damage to property and the environment and rescuing those who are affected or likely to be affected by it.

National Executive Committee (NEC) will ensure that the functions and responsibilities of the nuclear facility operators and response organisations are clearly defined and understood by all stakeholders. The MHA and the NEC will also determine the actions that need to be performed by each organisation during an emergency and whether it has the necessary resources and capabilities needed for the purpose. The advice of National Crisis Management Committee (NCMC) will also be sought in this matter.

5.7.1 Emergency at Nuclear Facility

In plant emergency, the consequences of the accident are expected to be limited to the plant facility only.

The Site Emergency, wherein the consequences of an accident are not expected to cross the site boundary, that is, the Exclusion Zone - which means that even under this condition, there is no radiological emergency in the public domain.

The off-site Emergency which assumes the highly unlikely possibility of

radiological releases in the public domain and detailed response plans have been drawn up even for this hypothetical scenario at each site. The initial safe distances suggested in Radiological Emergencies (IAEA 2006)

are given in Annexure 15. The local District Administration, the Crisis Management Group, DAE and the NCMC get involved in this type of Emergency.

Emergency	Activity	Responsibility
Off-Site Emergency	<ul style="list-style-type: none"> • Declare an off-site emergency in consultation with Site Director. • Activate an offsite emergency control centre. • Establish immediate communication with ERC, State Government and the CMG, DEA. • Arrange an immediate deployment of various ERTs in affected sector(s). • Based on the emergency monitoring teams from off-site areas initiate countermeasures (such as sheltering and prophylaxis) of different grades. 	Collector
	<ul style="list-style-type: none"> • Arrange an evacuation of the public to safer places. • Activate systems of the State machinery to meet the necessary requirements of the public in the camp till the people are in a position to go back to their homes after the affected areas are cleared and declared safe. • Deploy QRMTs/MFRs consisting of physicians, triage officer, RSO, nurses and paramedical staff. 	Collector, Municipal Commissioner , ERC, Home Dept., Health Dept.,
	<ul style="list-style-type: none"> • To ensure that necessary arrangements at evacuation/ relief centers is made with sufficient availability of: <ol style="list-style-type: none"> a. Food, b. Water, c. Blankets/Clothing d. Medicines e. Lighting f. Sanitation and hygiene etc. • To ensure necessary security arrangements for the personnel (emergency responders/ relief teams) who are working at relief centers and involved in distribution of relief materials. • To ensure that law & order is maintained at evacuated, relief centers and affected areas 	COR, Civil Supply Dept., Collectors, Municipal Commissioner , Water Supply Dept., Health Dept., GEB, Power & Energy Dept., GWSSB & Local Authorities, Home Dept.

	<ul style="list-style-type: none"> • Make an arrangement for providing useful, timely, correct, consistent, and appropriate information to the public in the event of a nuclear or radiological emergency. • Ensure that the information to media/ general public about the coordinated response is released in an organized manner. 	Collector, COR, Info. Dept., Municipal Commissioner
	<ul style="list-style-type: none"> • Immediately activate and co-ordinate between the local authority in the affected area and the NCMC. 	CMG
Nuclear/ Radiation emergency	<ul style="list-style-type: none"> • Recognise the existence of an abnormal situation. • Identify and characterise the source and its origin. • Initiate a quick and reliable monitoring methodology to detect the onset of an accident/emergency condition and assess its magnitude. • Communicate the situation to fire fighting and medical services, police, civil defence, transport, and other agencies. • Estimate the dose via the relevant pathways. (Dose Limits for exposures to ionising radiations for occupational workers given in Annexure 17) 	ERC,DEA, AERB, CMG, Dist. Collector, CP, Municipal Commissioner
	<ul style="list-style-type: none"> • Support decision making on protective measures for the population and the environment. • If required, distribute iodine tablets at the earliest (iodine prophylaxis). • Respond quickly to the situation and mobilise resources at short notice. • Initiate countermeasures at the earliest (for relief and rescue operations on the basis of actual radiation dose levels prevailing in different zones). • Make sure immediate measures need to be taken as the situation develops. • Ensure that the actions taken by the various agencies are well coordinated. 	Dist. Collector, Municipal Commissioner , Health dept., ERC, COR,
	<ul style="list-style-type: none"> • Send prior information (in respect of dos and don'ts) to those likely to be affected by the 	COR, Home Dept., State EOC, Civil

	<p>accident/emergency. These include:</p> <ul style="list-style-type: none"> ○ Evacuation/ temporary relocation of the affected population, if required. ○ Withdrawal and substitution of supplies of food and drinking water (based on actual measurement of contamination found in food and drinking water). ○ Animal Husbandry and Agriculture Department personnel to ensure radiological protection following a nuclear emergency. ○ Initiation of the recovery phase at an appropriate time. 	<p>Supply Dept., Animal and Husbandry dept., Information dept.</p>
<p>'Criticality' Accidents</p>	<ul style="list-style-type: none"> ● Critical Situation in a nuclear facility is a situation of national emergency. In case of Gujarat, the ERC at Gujarat and other national resources such as the Armed Forces etc. shall deal with the situation. The role of the State Government and its agencies such as the Gujarat State Disaster Management Authority will only be supportive and be at the directions of the Crisis Management Group set up by the Union /Central Government. 	<p>ERC, CMG, NEC, DEA</p>
<p>Transportation of Radioactive Materials</p>	<ul style="list-style-type: none"> ● On discovery of any such accident, the District Magistrate in a district or the Commissioner of Police in a metropolitan area, shall inform the following – <ul style="list-style-type: none"> ○ ERC at Kakrapar ○ SEOC at Gandhinagar ○ Commissioner of Relief 	<p>DM or CP</p>
<p>Radiological Dispersal Device Emergency</p>	<ul style="list-style-type: none"> ● Mobilise and operate incident command ● Oversee victims triage ● Make sure that the site is cordoned and the perimeters are controlled and managed ● Ensure notification and activation of special teams ● Ensure traffic and access control ● Ensure protection to at risk and vulnerable population ● Gender issues must be kept in mind ● Provide resources support and requests for assistance ● Ensure public works coordination 	<p>CMG, Dist. Collector, DM, Municipal Commissioner , CP, ERC, EOC, COR, Info. Dept., Home Dept., local authority, Health Dept. Civil supply Dept.,</p>

	<ul style="list-style-type: none"> • Ensure public information, outreach, and communication activities. • Seal off the inner zone of 400m radius from the blast point as 'no entry area' except for emergency measures. • Perform life-saving rescue and emergency first aid for seriously injured. <ul style="list-style-type: none"> ○ Remove injured persons as far away as practical from the incident scene, especially in case of fire. ○ If medical attention is needed, assist in arrangements for medical assistance. ○ The medical personnel will be informed that radioactive contamination might exist on the victims and/or their clothing. • Identify all those who may have been exposed to a possible release of radioactive material. • Identify those involved with the incident or potentially contaminated by the incident at the scene, except those requiring emergency medical evacuation. • All individuals will be monitored and decontaminated, if necessary, and cleared after further medical treatment and discharged. • Record names, addresses, destinations, and telephone numbers of those individuals who cannot be persuaded to stay at the incident scene. • Prohibit eating, drinking and smoking in the incident area • Use a handy evaluation tool when demonstrating counter measures. • Advice to the local public following a Radiological Dispersal Device Explosion <p>The public living in approximately twice the radius of the inner cordoned area are advised the following:</p> <ul style="list-style-type: none"> ○ If present in the inner zone, to get monitored at the earliest ○ Avoid inadvertent ingestion ○ Move away from the immediate area, 	
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	<p>atleast several tens of metres from the explosion site and get inside a closed building. This will reduce exposure to both radiation and radioactive airborne dust</p> <ul style="list-style-type: none"> ○ Not to eat food until certified free from contamination ○ Avoid any smoke/dust ○ Turn on local radio/ TV channels for advice from emergency response centres/ health authorities ○ Remove contaminated clothes and place these in a sealed plastic bag ○ Take a shower to wash off dust and dirt. This will reduce total radiation exposure ○ If radioactive material was released, local news broadcasts will advise people where to report for radiation monitoring and for blood and other tests to determine whether they were in fact exposed and steps to be taken to protect their health 	
<p>Loss or Theft of Radioisotopes/ Radioactive Material</p>	<ul style="list-style-type: none"> ● It is the user's responsibility to maintain an inventory of all sources at all times so in case of loss or theft of a radioactive source, the matter needs to be reported to the police, CMG and AERB immediately. ● Theft of sources should be dealt jointly by law and order enforcement agencies and radiation protection experts. 	<p>Home Dept., Dist. Collector</p>

Chapter 6

Action Plan for Industrial & Chemical Disasters

6.1 Introduction

6.1.1 Background

Gujarat, being a highly industrialized State is prone to chemical and industrial hazards which are well supported by the fact that 35% of the total Major Accident Hazard (MAH) units of the country are located mostly at Vapi, Hazira, Ankleshwar, Daheject. There are over 42065 factories including 402 MAH units (as on 2014) in Gujarat handling a large number of chemicals as raw materials, in processes, products and wasters, with flammable, explosive, corrosive, toxic and noxious properties. Any accident involving these may have an adverse impact on both the community and the environment.

Particularly, a stretch of 400 km from Ahmedabad to Vapi, known as the 'Golden Corridor' is potentially hazardous from the point of view of industrial/chemical accidents. The State has a distinction of having maximum number of MAH units. 70% of country's oils and gas imports are transported through the state via road/rail routes or gas/oil pipelines. It has increased the incidence of chemical accidents during transportation.

6.1.2 Sources of Chemical Disasters

Chemical accidents may originate in:

1. Manufacturing and formulation installations including during commissioning and process operations; maintenance and disposal
2. Material handling and storage in manufacturing facilities, and isolated storages; warehouses and godowns including tank farms in ports and docks and fuel depots
3. Transportation (road, rail, air, water, and pipelines)

6.1.3 Causative Factors Leading to Chemical Disasters

Chemical disasters, in general, may result from:

1. Fire
2. Explosion
3. Toxic release
4. Poisoning
5. Combinations of the above

6.1.4 Initiators of Chemical Accidents

A number of factors including human errors could spark off chemical accidents with the potential to become chemical disasters. These are:

a. Process and Safety System Failure

1. Technical errors: design defects, fatigue, metal failure, corrosion, etc.
2. Human errors: neglecting safety instructions, deviating

- from specified procedures, etc.
3. Lack of information: absence of emergency warning procedures, nondisclosure of line of treatment, etc.
 4. Organisational errors: poor emergency planning and coordination, poor communication with public, noncompliance with mock drills/exercises etc. which are required for ensuring a state of quick response and preparedness.

b. Natural Calamities

The Gujarat state is highly prone to natural disasters, which can also trigger chemical disasters. The release of acrylonitrile at Kandla Port, during an earthquake in 2001, is one of the examples.

c. 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.

6.2 Authority

a. Central Level

Enforcement and monitoring of chemical safety and emergency management involves various central/state ministries/departments viz. MHA, MoEF, MoLE, MoA, MoP& NG, MoC&F, MoSRT&H, MoC&I, DEA, MoF etc. The MoLE, MoEF and MoSRT&H are responsible for enacting regulations.

b. At the State Level

At the State level, the State Crisis Group (SCG) is an apex body to deal

with major chemical accidents and to provide expert guidance for handling them. The same existing and established structure could be used for handling chemical disasters also. SCG, under the Chairmanship of Chief Secretary consists of Secretary – Labour & Employment, Relief Commissioner, CEO – GSDMA, Secretary – Forest & Environment, Chairman – GPCB, PS – Industries & Mines, Secretary – Home, Director General – Police, Secretary – Health & Family Welfare, Secretary – Water Supply, Director – Industrial Safety & Health and Professional Head of the Fire Service Department, Home.

c. At the District Level

At the District level, the District Crisis Group (DCG) is an apex body to deal with major chemical accidents and to provide expert guidance for handling them. The same existing and established structure could be used for handling Chemical Disasters also. DCG has a strength of 34 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-I, Dy. Director – Information to name a few.

6.3 Flow of Information (Communication)

A procedure has to be laid out to communicate the accident / attack to the DEOC giving details such as location of incident, chemical(s)

involved, severity of incident, casualties (if any), etc. The person in-charge at DEOC shall then inform the first three responders i.e. Police, Fire & Emergency Services and Medical Department. He will then inform the District Collector and all other members of the DCG. The District Collector, in turn, would inform the Gujarat State Disaster Management Authority (GSDMA) and the SCG about the incident and ask for additional help in terms of resources and manpower (if at all required) after assessing the situation on site.

The SCG or the GSDMA would then inform the Central Crisis Group (CCG) about the incident along with other relevant details on hand. The first responders, after reaching the site, will secure more information about the incident and try to establish communication with the concerned agencies / departments for deploying resources / personnel as per the need of the situation.

6.4 Regulatory Framework

This plan derives its authority from the following acts and rules:

a. Acts

- i. The Factories Act, 1948, as amended in 1976 and 1987
- ii. The Environment (Protection) Act, 1986
- iii. Disaster Management Act, 2005
- iv. The Public Liability Insurance Act, 1991 as amended in 1992
- v. The National Environment Tribunal Act, 1995
- vi. Gujarat State Disaster Management Authority Act, 2003
- vii. The Explosive Act, 1884

- viii. The Petroleum Act, 1934
- ix. Electricity Act, 2003
- x. Dock Workers (Safety, Health & Welfare) Act, 1986

b. Rules

- i. The Gujarat Factories Rules 1963 under the Factories Act, 1948 as amended in 1995
- ii. The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 as amended in 1994, 2000 and 2004
- iii. The Public Liability Insurance Rules, 1991 as amended in 1992
- iv. The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996
- v. Explosive Rules, 2008
- vi. Central Motor Vehicles Rules, 1989
- vii. Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules, 2008.

6.5 Trigger Mechanism for Industrial (Chemical) Disasters

The occupier / manager of the establishment responsible for releasing or discharging a hazardous chemical will notify incident the appropriate local control room and DEOC. Industry can additionally report to local control rooms of mutual aid partners, GVK 108, and local fire and police departments, as per the local emergency response plans.

On getting the first hand information about an emergency/disaster, the in-charge of the DEOC should immediately inform the District Collector and the first three responders i.e. Police, Fire & Emergency Services

and Medical Services. Informed District Collector then runs down to DEOC, where Dy. DISH and two experts will join him.

The notification should specify the location of the incident, the type of chemical released/ used (if known), possible consequences and provide written reports on actions taken and on health effects. The District Collector should then inform the SEOC, the GSDMA and the Chairman of the SCG about the incident.

The SEOC will then issue alert or direct all the Emergency Responder Agencies at the State and District level for providing their services immediately. The SEOC will immediately take decision to deploy SRTs in the affected area/s.

During the initial stages of the emergency it is likely that the reports may be unclear and conflicting. Therefore, the first responders conducting the on-site assessment should secure reliable sources of information to allow an objective assessment of the situation. The assessment should include casualty, material damages, and the likely health consequences. It should also suggest antidotes and treatment regimes for those affected by medical care if the type/nature of chemical released/used during the attack is known.

The SCG, after analyzing the information received from the District Collector and the first responders would then decide on mobilization of additional resources, medical aid and

rescue equipment as required through various sources.

The SCG should also instruct the Fire & Emergency/Rescue Services and Hospitals of the neighbouring districts to be on alert in case their services are needed.

The Team Commander of the ERT should cordon off the affected area. He should instruct the neighbouring population to stay away from the site. He should instruct the medical unit to detect the substances used during the attack through the available equipment/kit. He should also decide the place for establishing the decontamination unit at an appropriate location in consultation with doctors and paramedics. The Search & Rescue unit of the ERT should rescue and evacuate the affected people to a safe location.

6.6 Response for Industrial (Chemical) Disasters

Response measures are those which are taken instantly prior to, and following, a Industrial (Chemical) emergency/attack aimed at limiting injuries, loss of life and damage to property and the environment and rescuing those who are affected or likely to be affected by it.

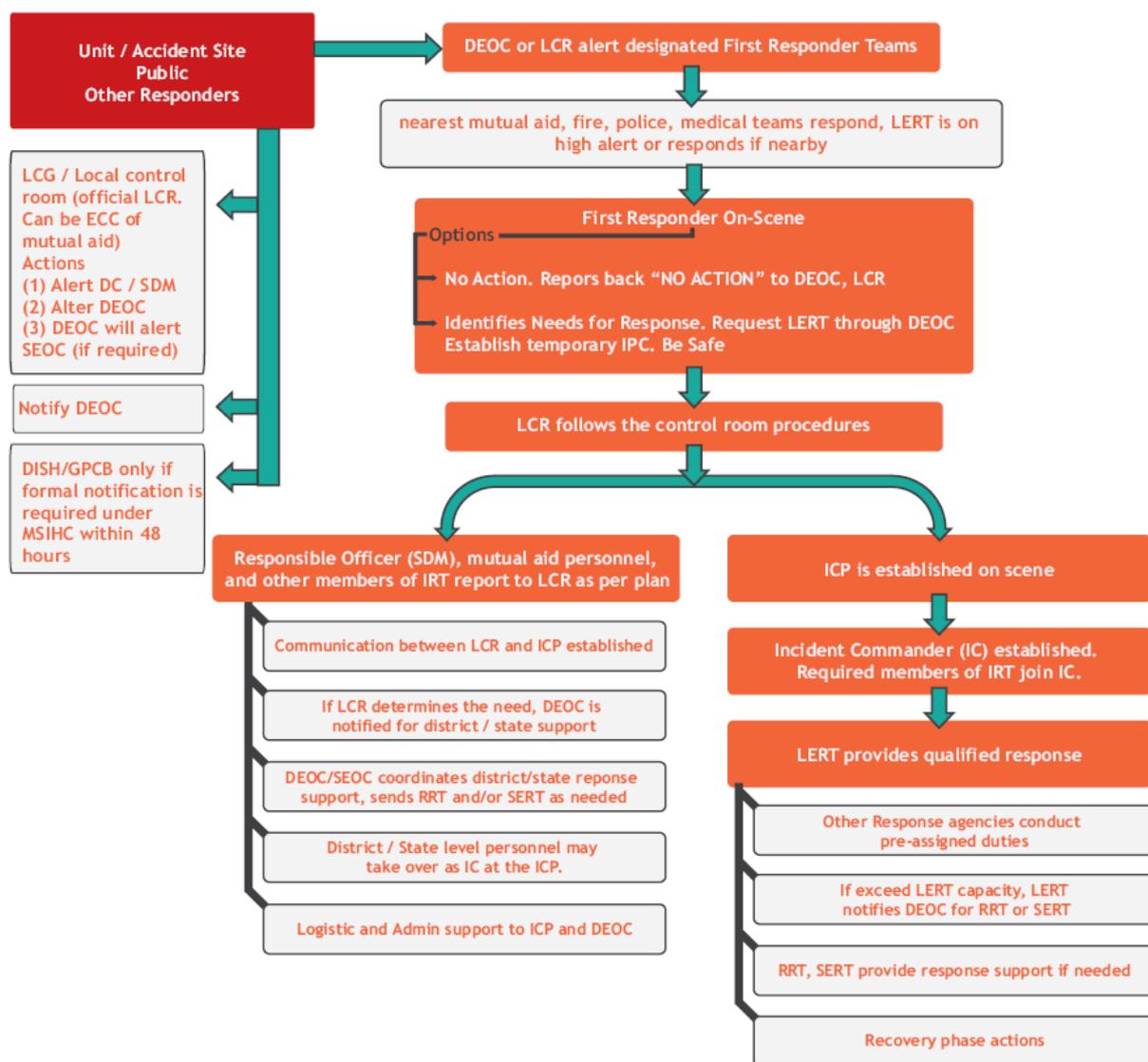
SCG will ensure that the functions and responsibilities of the chemical facility operators and response organisations are clearly defined and understood by all stakeholders. The CCG and the SCG/DISH will also determine the actions that need to be performed by each organisation during an emergency and whether it has the

necessary resources and capabilities needed for the purpose.

For the fastest response, it is very important that the person who is receiving the information shall immediately pass on to the first responders, District Collector, Sub Div. Magistrate (Chairman for LCG) and other members of DCG. If he receives,

further information after making the first call, he will convey that also in same order. Alternatively, if the information is more relevant to any particular department, he will first pass that information to its head.

Detailed emergency response process and roles and responsibility of different departments are as under:



S. No.	Task	Activity	Responsibility
1.	Disaster Declaration and Plan Activation	<ul style="list-style-type: none"> • Declare an off-site emergency in consultation with SCG and activate an off-site emergency plan • Activate DCG • Establish immediate communication with LCG, DCG, DEOC, SEOC, GSDMA and CCG 	Collector
2.	Mobilization & Deployment	<ul style="list-style-type: none"> • Arrange an immediate deployment of various ERTs in affected sector(s). (Police, Fire, S&R, Medical, etc.) • Based on the emergency monitoring teams from off-site areas initiate counter measures (such as sheltering and medical help) • Arrange an evacuation of the affected/ likely to be affected workers and population to safer places • Activate systems of the State machinery to meet the necessary requirements of the public in the camp till the people are in a position to go back to their homes after the affected areas are cleared and declared safe • Deploy QRMTs/ MFRs consisting of physicians, triage officer, nurses and paramedical staff <ul style="list-style-type: none"> • To ensure that necessary arrangements at evacuation/ relief centers is made with sufficient availability of: <ul style="list-style-type: none"> i) Food, ii) Water, iii) Blankets/Clothing iv) Medicines v) Lighting vi) Sanitation and Hygiene, etc. • To ensure necessary security arrangements for the personals (Emergency responders/relief teams) who are working at relief centers and involved in distribution of relief materials • To ensure that law and order is maintained at evacuation/relief centers and in the affected areas as well 	<p>Collector, Municipal Commissioner, DISH, DCG, Home Dept., Health Dept., Industry/ Industrial Association</p> <p>COR, Civil Supply Dept., Collectors, Municipal Commissioner, DISH, Water Supply Dept., Health Dept., GEB, Power & Energy Dept., GWSSB & Local Authorities, Home Dept.</p>

3.	Addressing Health Related Issues	<ul style="list-style-type: none"> • Ensure that the required medical assistance/ aid and medicines/ antidotes are provided to the affected people at site as well as at evacuation/ relief centers in the affected area and necessary records are maintained • Ensure that the hospitals are well prepared to deal with seriously injured persons • Keep adequate stock of essential medicines, antidotes, first-aid etc. at taluka/district hospitals. • If required, take the help of doctors/paramedics from the list of doctors/paramedics available at the taluka/district level for immediate medical assistance 	Health Dept.
4.	Information to public and media	<ul style="list-style-type: none"> • Make an arrangement for providing useful, timely, correct, consistent, and appropriate information to the public and media in the event of a chemical attack/disaster. • Ensure that the information to media/general public about the coordinated response is released in an organized manner. 	Collector, DISH, COR, Commissioner of Info., Municipal Commissioner
5.	Disposal of Dead bodies	<ul style="list-style-type: none"> • Ensure following procedure is followed before disposal/handing over of dead bodies: <ol style="list-style-type: none"> a. Photographs of the dead bodies are taken, b. Identification of the dead bodies is done, c. Post Mortem wherever necessary and possible is carried out, d. Handing over dead bodies of persons known/identified to their relatives • Disposal of unclaimed and unidentified dead bodies 	Revenue Dept., Collector/s, Home Dept., Health Dept., Local Authorities, Industry/Industrial Association
		<ul style="list-style-type: none"> • Animal Husbandry Department to ensure medical aid to cattle that are injured. • Disposal of animal carcasses with the help of local bodies/health dept. 	Animal Husbandry Depts., Local Authorities, health dept.

Roles and Responsibility of Some of The First Responders during Chemical Attack/ Emergency			
1	Police	<ul style="list-style-type: none"> • 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 • Give warning, carry out SAR operation and carry out relief & rehabilitation operation too <p>In case of Chemical attack:</p> <ul style="list-style-type: none"> • Secretary, Home and Director General of Police (DGP) will direct the participation of Police in the emergency response. • Secretary, Home and DG, Police will constitute an integrated command. • Secretary, Home and DGP will report to the SCR immediately upon the receipt of information about the disaster. • DGP will establish contact with the District Police Control Room immediately. He will get a situation estimate and assess the operational requirements for the police. • DGP 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. • DGP 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. • DGP will ensure that the police force will not enter the area under disaster without the permission of the Fire & Emergency Services and Health officials. 	Home Dept.

		<ul style="list-style-type: none"> • In case of big explosion and fire, the DGP will assess the situation and suggest a Plan of Action based on his assessment of the immediate causation. • The DGP will order deployment of the police force for evacuation of the people from the zone of the danger. • The DGP 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 DGP will review the traffic management in the area. The primary aim would be to ensure the transportation of the injured to the hospital, easy access for emergency responders and safe evacuation of the people from the danger zone. • The DGP will also issue directives that all the Private and Public Transport (trains and buses) be diverted from the disaster area. • The DGP will contact the DIG and ask him to organize the deployment of police force from other Districts, based on the need assessment. The DGP will also contact the Central Industrial Security Forces and other paramilitary forces to seek their deployment, if needed. • The DGP will supervise law and order situation. He will take all the possible precautions to ensure that public order is maintained and no one takes undue advantage of the situation. 	
2	Fire and Search & Rescue	<ul style="list-style-type: none"> • 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 fire fighting with suitable medium 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 • Secretary, Industries will coordinate 	Fire and Emergency Services (F&ES), Municipal Corporation, GIDC

		<p>redeployment of GIDC Fire Tenders from other places, as required</p> <ul style="list-style-type: none"> • Secretary, Industries will also coordinate with the Private and Public Sector industries for deployment of their Fire Brigades to the site of the disaster. • The SCG, in consultation with the District Collector and other local officials will ensure that CFO, Fire & Emergency Services, Dy. Director - Industrial Safety and Health, Officer in charge Police and Health Personnel all work closely with full coordination • Ahmedabad, Vadodara, Valsad, Surat, Rajkot and Jamnagar are the main providers of Fire Services in the state. The DEOC will decide upon the deployment of Fire Services, based on distance and accessibility. • 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. 	
3.	Medical Services	<ul style="list-style-type: none"> • The Secretary - Health, Commissioner of Health, and emergency medicine experts will provide the necessary expertise and specialized services to the SCG • The SCG will consider the level of exposure on the basis of situation estimate received from the District Administration. It will consider the intrinsic toxic potential of the chemical, its concentration, the duration of exposure and the health status of the people exposed • Based on the information upon the level and extent of contamination, the SCG will decide on the issue of alert and warning to the people in the affected areas through the All India Radio, Doordarshan and Cable TV • The SCG will contact the Civil Surgeon and the District Health Officer of the concerned district and ask them to 	Dept. of Health and Family Welfare

		<p>deploy all the necessary medical facilities including doctors, nurses, medicines and ambulances</p> <ul style="list-style-type: none"> • The SCG will alert major hospitals in the area and ask them to be in readiness for receiving patients • In case the nature of contamination requires much greater intervention, the SCG will inform the CCG and ask for the necessary medical assistance of experts, doctors and equipments. 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 SCG will review the diagnostic support services: clinical laboratory, blood banks, radiology, pathology, pharmacy, paramedics, Red Cross, NGOs and volunteer personnel. It will seek all the steps to organize the necessary medical help through the deployment of doctors, paramedics, and provision of blood and medicines, as required • The SCG 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 SCG will collect information on the number of deaths and persons injured; the nature of injuries and the likely long-term consequences • The SCG 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 SCG must also make financial provision for spending on long-term treatment. 	
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6.7 Post Disaster Responsibilities

Once the situation at the site is under control, fire has been extinguished; the emission of vapours to the atmosphere has been effectively checked, the following actions have to be performed by various sub-teams of the SRT and the respective line departments as well as the District Administration.

6.7.1 Search & Detection of Leak / Toxic Release

The Search & Detection Team would 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. The team should also preserve the samples from the site of the incident such as sand, water, air and other infected substances for further investigation which could aid in strengthening the case later on.

Technical expertise of GPCB, Fire & Emergency Services and the Health Department may be used by the Search & Detection Team in carrying out the activities if required.

6.7.2 Structural Inspections after Fires or Explosions

A major explosion could damage or destroy numerous buildings and any nearby bridges or tunnels. Similarly large fires can have major effects on buildings and other infrastructure facilities over a vast surrounding area. In either case, residents / owners of the partially damaged buildings will want to know if the structures are safe to occupy while they await repairs.

Questions pertaining to the safety of highway or railway bridges must also be resolved quickly to avoid traffic complications. It must be ensured that the inspection personnel have special precautions (i.e. chemical protective gear) in addition to normal safety equipment for cases where the structure may still be contaminated by hazardous residues.

Fire & Emergency Services personnel along with the structural experts from the R & B Department shall be responsible for inspecting the structural integrity of damaged buildings, bridges or other structures in the aftermath of a fire or explosion.

6.7.3 Search, Rescue and Evacuation

After getting the go ahead from the technical personnel responsible for ensuring structural safety of the buildings in and around the incident site, the Search & Evacuation Team should carry out their job and evacuate the affected population from the site of the incident. They should brief the Information Officer about the rescue and evacuation status (including the place of temporary shelter) to ensure that no rumours are spread to avoid any panic amongst the general public. The team, with the help of Police personnel should also stop general public from moving towards the danger zone. The Team should provide guidance to people regarding evacuation route, first aid and decontamination area. They should also help the Medical Team in rushing the victims to nearby hospitals.

6.7.4 Post Incident Testing for Contamination

De-contamination Team would be responsible to decontaminate the affected area, population, members of SRT and equipment used during the operation on the site of the incident. In addition, the Team should also be responsible for erecting the decontamination chambers for the affected population. After the operation is completed in all respects, the Team should ensure that the site is totally decontaminated from the toxic substances. The team should also ensure that the water that was used for decontamination is properly discharged preferably to a sewerage system outlet and safely disposed.

Technical personnel from the GPCB, Fire & Emergency Services and the nearby industrial units as well as the personnel from the Medical Team should help the De-contamination Team to carry out their duty. Further, the Team shall also check crops, water (ground & surface), homes, stored foods and animals for possible chemical contamination.

6.7.5 Providing Medical and First Aid to the Victims

The Medical Team should provide first aid to the victims of the incident. If need arises, the team should also help the hospital staff of the hospital where the victims would be transported from the incident site. They should monitor the level of triage of the victims through checking their breathing and pulse. They should also decide on the type of decontamination (either wet or dry) depending upon the substances/

chemicals used during the disaster. The team should also identify the trauma cases and counsel them appropriately.

6.7.6 Counselling and Rehabilitation of Victims

The psychological impact of a chemical disaster manifests as psychosocial trauma including psychological reactions, post-traumatic stress disorder and other psychological ailments in displaced disaster victims which need to be addressed. Counselling by psychologists and psychiatrists for those suffering from mental trauma is an essential element of medical rehabilitation.

6.7.7 Provision of Alternate Water Supplies

There are a number of circumstances under which a potable water supply may become unfit for human consumption for a time and require replacement. This is most commonly accomplished by bringing in supplies of bottled water and / or tankers / trailers capable of carrying water. The district Administration must ensure the availability of potable water for consumption of affected population as well as first responders engaged at the incident site.

6.7.8 Re-Entry into Evacuated Areas

Based on the assessment of the situation at the site, the DCG would take a decision on the termination of emergency. However, before taking this decision, several other actions needs to be ascertained such as restoration of electricity, gas and water

supplies in the affected areas/buildings, transport arrangements for bringing the affected population back from the temporary shelters, restoration of law & order in the affected area/s, etc. through the concerned Teams/departments.

6.7.9 Responsibility of the Other Statutory Authority

The designated authority under various statutes like Indian Boiler Act, Factory Act, E.P. Act, Explosive Act, Static and Mobile Pressure Vessel Act, etc. shall perform post emergency activities prescribed and also as directed by District Collector under Gujarat State Disaster Management Act, 2003.

a. Immediate Financial Relief to Victims

Under the Public Liability Insurance Act, 1991, MoEF has published the list of chemicals and threshold qualities beyond which the occupier or owner must take third-party PLI for providing relief to accident victims as per the direction of the collector. The Act also provides for an Environment Relief Fund (ERF) and enables payment of relief over and above the insured amount. The occupier or owner should pay an amount equal to the PLI premium to the ERF and deposit the same with the insurer. At state level GPCB is responsible to ensure compliance with PLI Act and at district level the collector

and regional officer of GPCB are responsible. This act provides for immediate access to relief funds so that the compliance with Act should be verified and strengthened. It is already recommended that the maximum liability under the Act (currently Rs 5 cores) should be substantially enhanced.

b. Restoration and Regeneration of Ecosystem

The potential of chemical accidents to cause severe environmental damage has been realised on a number of occasions such as at Seveso, Bhopal, Mexico City (LPG disaster), Chernobyl, and Alaska (Exxon Valdez). For the remediation of the affected environment, it is essential to assess the environmental impacts which include determining the quantitative and qualitative nature of impact and ascertaining the components of the environment most at risk from chemical accidents. This assessment is dependent on certain factors such as the chemicals involved, pollutant concentrations in the environment, environment media polluted by the accident, topography, and meteorology. After assessing the impact, the government can choose the appropriate recovery strategy.