SYAMA PRASAD MOOKERJEE PORT - HALDIA DOCK COMPLEX

DISASTER MANAGEMENT PLAN (DMP)

By

IRCLASS
Indian Register of Shipping

December - 2021

This is to state that at the request of Syama Prasad Mookerjee Port (SMP), the undersigned surveyors have prepared Disaster Management Plan for Haldia Dock Complex (HDC).

This work has been carried out for HDC as per their work order dated 29th July, 2021 and is confidential. No part of this report may be released to any outside organization unless explicitly advised by the owners in writing.

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REPORT REVISION RECORD

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Draft	Draft report issued for review and comment to SMP-HDC.	30.11.2021
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IMPORTANT NOTE

The Disaster Management Plan (DMP) outlines the steps required for the management of responses to Natural and Man-Made disasters that are the responsibility of the HDC and companies within port estate.

The DMP of HDC is a comprehensive document covering all identified Hazards, Risk and Vulnerability analysis, Elements at risk and Level of impact. The plan provides clarity on the roles, delegation of authority and responsibility of each involved staff member in the organization.

It is intended that this plan would provide guidance for quick response in case of an emergency and help in realizing sustainable Disaster Risk Reduction for the Port.

This plan has been prepared as per the template issued by National Disaster Management Authority (NDMA), National Disaster Management Plan (NDMP) 2019 and NDMA guidelines.

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ABBREVIATIONS

ATI	Advanced Training Institute
BARC	Bhabha Atomic Research Centre
BPCL	Bharat Petroleum Corporation Limited
CBRN	Chemical, Biological, Radiological and Nuclear
CCA	Central Coordinating Authority
CEC	Chief Emergency Controller
CMO	Chief Medical Officer
CIC	Chief Incident Controller
CISF	Central Industry Security Force
CMG	Crisis Management Group
CMV	Central Motor Vehicle
CWC	Cyclone Warning Centers
CVO	Chief Vigilance Officer
CZMP	Coastal Zone Management Plan
DCA	District Coordinating Authority
DCC	District Contingency Committee
DDMA	District Disaster Management Authority
DISH	Director of Industrial Safety and Health
DMP	Disaster Management Plan
EAP	Emergency Action Plan
EOC	Emergency Operation Centre
EPPR	Emergency Prevention, Preparedness and Response
ERDMP	Emergency Response Disaster Management Plan
GNOME	General NOAA (National Oceanic and Atmospheric Administration) Oil Modeling Environment
GPS	Global Positioning System
HDC	Haldia Dock Complex
HPC	High Powered Committee
HPCL	Hindustan Petroleum Corporation Limited
HVLR	High Velocity Long Range
IDRN	Indian Disaster Resource Network
INCOIS	Indian National Centre for Ocean Information Services
IMD	India Meteorological Department
IMO	International Maritime Organization
ICZM	Integrated Coastal Zone Management
IAP	Incident Action Plan
IRT	Incident Response Team
IOCL	Indian Oil Corporation Limited
ITOPF	International Tanker Owners Pollution Federation
LCA	Lead Combat Agency
MLO	Media Liaison Officer
MMD	Mercantile Marine Department

MMOH	Manager Marine Operation Haldia
MoEF	Ministry of Environment & Forest
MRCC	Maritime Rescue Coordination Centre
MSDS	Materials Safety Data Sheet
MSIHC	Manufacture, Storage and Import of Hazardous Chemical Rules
NEC	National Executive Committee
NCMC	National Crisis Management Committee
NDMA	National Disaster Management Authority
NIDM	National Institute of Disaster Management
NOSDCP	National Oil Spill Disaster Contingency Plan
OH&S	Occupational Health and Safety
OOSA	Online Oil Spill Advisory
OSRL	Oil Spill Response Limited
OSRO	Oil Spill Response Organization
OSTM	Oil Spill Trajectory Model
PAS	Public Address System
PESO	Petroleum and Explosives Safety Organisation
P&IR	Personnel and Industrial Relations
PHD	Public Health Division
PHO	Port Health Organization
PRD	Port Railway Division
PNGRB	Petroleum and Natural Gas Regulatory Board
POC	Port Operation Centre
PRO	Public Relation Officer
RADMMD	The Revenue Administration, Disaster Management and Mitigation Department
RMC	Regional Meteorological Centre
SA	Statutory Agency
SAR	Search and Rescue
SCMG	State Crisis Management Group
SEC	State Executive Committee
SIC	Site Incident Controller
SIDM	State Institute of Disaster Management
SMP	Syama Prasad Mookerjee Port, Kolkata
SMPV	Static and Mobile Pressure Vessel
SDMA	State Disaster Management Authority
RITES	Rail India Technical and Economic Service
UNDP	United Nations Development Programme
WBCZMA	West Bengal Coastal Zone Management Authority
WBPCB	West Bengal Pollution Control Board
WBSDMA	West Bengal State Disaster Management Authority
WMO	World Meteorological Organization

Part I

1.0 PRELIMINARIES

1.1 PROFILE OF THE PORT

Syama Prasad Mookerjee Port (SMP) established in 1870, the oldest Major Port in India, is located on the east coast of West Bengal. It is a riverine port located on the west bank of Hooghly River. As part of modernisation efforts to SMP for establishing a deep-water port, Haldia Dock Complex (HDC) was established as an extension in the year 1977. It is strategically located in the hinterland of major steel plants, power plants, iron ore and coalmines.

The port has 17 berths mentioned as below:

- 14 Berths (B - 1 to B - 14),
- Layup Mooring Buoy (B – 15),
- HOJ – I / SSOJ (B – 16 (O)),
- HOJ – II (B – 17 (O)),
- HOJ – III (B -18 (O)),
- River Mooring Buoy.

HDC handled 46.68 million metric tonnes of cargo during the financial year 2019-20.

1.1.1 Location

The port lies in the Purba Medinipur district at latitude: 22°02’ N; longitude: 88°06’E.

- 104 km downstream from Kolkata;
- 130 km upstream from Sandheads;
- 45 km upstream from Pilotage station;
- Average Pilotage time – 3 hours.

1.1.2 Port Channel

The SMP has two approaches from the sea, one through Eastern Channel (Light vessel position latitude: 21°03’.03.12” N; longitude: 88°11’30”E) and the other through Western Channel (Light vessel position latitude: 21°05’.03.09” N; longitude: 87°50’215.95”E).

Currently Eastern Channel is being used for navigation for Kolkata bound vessels whereas Western Channel is used for navigation by Haldia bound vessels. Whereas, the Pilotage distance to Haldia is 115 kms comprising 30 kms of river and 85 kms of sea pilotage.

The Port maintains a pilot Vessel/Station at Sagar Island. At Haldia, the pilot bringing the vessel from Upper Auckland hands over the vessel inside the lock to the Dock Pilot. All vessels bound for oil jetties are taken alongside by the Pilot.

1.1.3 Navigational Channel map

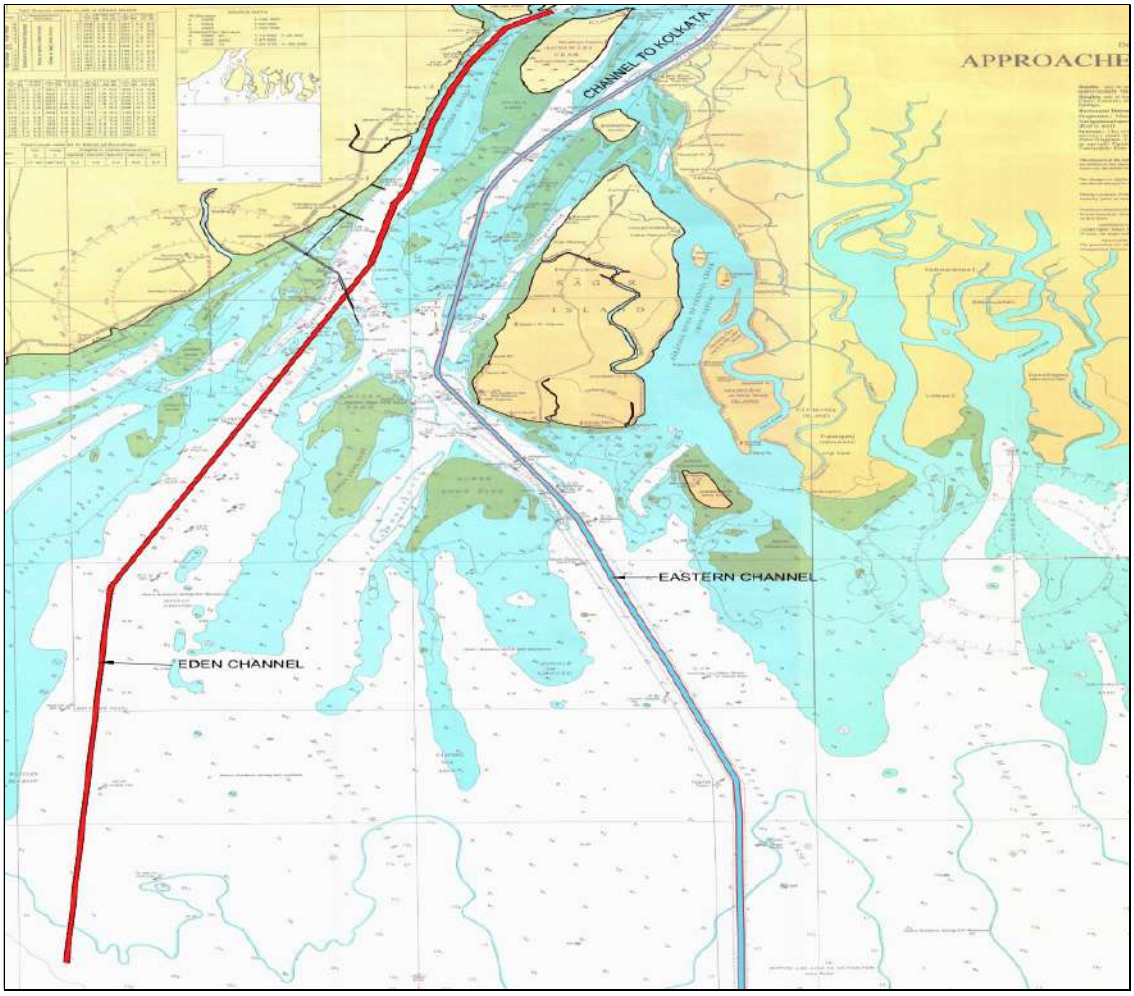


Figure 1.1: Navigational Channel Map

Anchorage locations:

Anchorage	Position	Permissible Draft
X	Latitude: Longitude:	
NX1	Latitude: 21° 18’ 15” N Longitude: 88° 13’ 45” E	9.5 meters
NX2	Latitude: 21° 16’ 45” N Longitude: 88° 14’ 00” E	10.0 meters
NX3	Latitude: 21° 15’ 30” N Longitude: 88° 14’ 00” E	10.5 meters

Table 1.1: Anchorage point co-ordinates

1.1.4 Port Layout

Figure 1.2: Port Layout

1.1.5 Port Area

Location / Storage Type	Area (m^2)
Inside Custom Bonded Area	
- Transit Shed	17,000
- Hardstand	3,57,000
- Available bare land	8,48,000
Outside Custom Bonded Area	
- Liquid Storage	1,93,500 KL
- Dry Bulk/Container Storage etc.	1,09,950
- Available Storage area	7,32,240

Table 1.2: Port Area

1.1.6 Berth Particulars

Sr. No.	Berth Details	Quay Length (m)	LOA (m)	Draft (m)	Capacity (MMT)
1.	OJ-I	290	236	12.2	2.6
2.	OJ-II	330	277	12.2	3.7
3.	OJ-III	345	275	12.5	4.4
4.	Berth no. 2	260	238	10.0	4.2
5.	Berth no. 3	337	239	12.2	2.3
6.	Berth no. 4	284	239	12.2	4.0
7.	Berth no. 4A	245	230	12.2	4.1
8.	Berth no. 4B	181	180	12.2	4.2
9.	Berth no. 5	195	183	12.2	4.2

10.	Berth no. 6	234	212	12.2	4.2
11.	Berth no. 7	234	212	12.2	4.2
12.	Berth no. 8	218	220	12.2	4.2
13.	Berth no. 9	218	210	12.2	0.9
14.	Berth no. 10	220	210	12.2	0.2 million TEU
15.	Berth no. 11	220	210	12.2	
16.	Berth no. 12	220	210	12.2	1.9
17.	Berth no. 13	220	210	10.0	4.2
18.	POL Barge Jetties				0.4
19.	Fly Ash Jetties				

Table 1.3: Berth Particulars

1.1.7 Pipeline facilities

Originating Berth	Companies
Oil Jetty I, II, III	IOCL, BPCL, HPL, IPPL, MCPI, Sanjana Cryogenic, Emami, PHBPL, Reliance.
Multipurpose Berth	IOCL, MCPI, Sanjana Cryogenic, Emami, Ruchi.
Finger Jetty	Ruchi Ind., Aegis, Emami.
Barge Jetties	IOCL

Table 1.4: Pipeline facilities

1.1.8 Cargo handling Jetties/Berths

1.1.8.1 Oil Jetty-I (OJ-I)

OJ-I is located upstream of the lock gate entrance and was commissioned during 1968 for handling Crude Oil, MS, Lube Oil, Para-xylene, LPG, Naphtha, Benzene, Butadiene, PY Gas, Butane, FO, Bitumen, MTBE, Liquid ammonia. There are direct pipeline connections from this berth to the Indian Oil Refinery, Hindustan Fertilizer, Haldia Petrochemicals, IPPL, MCPI, Sanjana Cryogenic, PHBPL and Reliance. The jetty can handle tankers up to 90,000 DWT.

1.1.8.2 Oil Jetty-II (OJ-II)

OJ-II was commissioned in 1991 and is located adjacent to OJ-I. It has facilities for handling Crude, LPG and POL products (MS, SKO, HSD, Naphtha, and FO) and has direct pipeline connection to user industries such as Haldia Petrochemical, IPPL, BPCL, Aegis and IOC refinery. The jetty can handle tankers up to 150,000 DWT.

1.1.8.3 Oil Jetty-III (OJ-III)

OJ-III was commissioned in April 2000 and is located downstream of the lock gate. It has facilities for handling crude oil, LPG, Naphtha, POL products Edible Oil and MTBE and has direct pipeline connection to the storage facilities of BPCL, IOCL, RIL and Emami at Haldia. The jetty can handle tankers up-to 150,000 DWT.

1.1.8.4 Berth-2

Berth 2 is currently handling Iron Ore, Thermal Coal, Para-xylene, Coking coal, Non-Coking coal, Met coke, R.P coke, C.P coke, Limestone and Rock Phosphate. The berth can handle ships up to 75,000 DWT.

1.1.8.5 Berth-3

Berth 3 has handling capacity of 2.25 MTPA and was originally designed for handling iron ore but at present handles thermal coal, Para-xylene and POL products. The berth handles ships up to 90,000 DWT. This berth has open storage of 50,000 m^2.

1.1.8.6 Berth-4

Berth 4 is designed for shipping thermal coal with the help of mechanized loading system and it can handle ships up to 90,000 DWT. The berth has a backup storage area of 50,000 m^2.

1.1.8.7 Berth-4A

Berth 4A is a fully mechanized berth under the license agreement with the International Seaports (Haldia) Pvt Ltd. to handle coal. The berth can handle ships of maximum DWT of 90,000 DWT.

1.1.8.8 Berth-4B

The berth was commissioned in February 2002 to handle coal, coke, iron ore and other dry and break bulk cargo. The berth can handle ships up to 90,000 DWT. The berth is connected to its backup area through a railway line.

1.1.8.9 Berth-5

Berth 5 is designed to handle Iron Ore, Coking Coal, and Fertilizer Raw Material and is equipped with two clam shell unloaders connected to storage area (open and covered). Direct rail connectivity has been provided from berth to the back-up area. Total storage areas available for this berth are 75,000 m^2.

1.1.8.10 Berth-6 & 7

These two berths are located on each side of a Finger Jetty, conventionally handling bulk and break bulk cargos with the help of vessels' own gears. Besides, these berths have facilities for pipeline discharge of different liquid bulk cargo such as Phosphoric Acid, Carbon Black Feed Stock, Edible Oil, Molasses etc. A floating Pipeline facility is available for unloading Edible Oil.

1.1.8.11 Berth-8

The cargo handled at this berth is mainly coking coal, limestone, steel, general and other bulk cargo. The berth has dedicated back-up area and rail connectivity. The berth can handle ships up to 90,000 DWT.

1.1.8.12 Berth-9

The berth 9 has a continuous quay face with berth 8 and has a capacity of 1 MTPA where a ship up to 90,000 DWT can be handled. It is a general cargo berth used for handling dry bulk, breakbulk and containerized cargo. This berth has covered storage shed of floor area of 100,000 sq. ft. This berth has direct rail connectivity to its back up area.

1.1.8.13 Berth-10 & 11

These were general cargo berths and were used for handling containerized cargo along with break bulk, dry bulk. These berths have total combined area of 11,000 m^2. These berths have been allocated to a Haldia International Container Terminal. These berths have direct Broad Gauge rail access to Container Parking Yard.

1.1.8.14 Berth-12

The berth has an open storage area of 14,000 m^2 and a covered storage area of 3000 m^2. The berth mainly handles breakbulk cargo and can handle ships of maximum up to 90,000 DWT.

1.1.8.15 Berth-13

Berth 13 is handling dry bulk and general cargo and it can handle ships of maximum up to 75,000 DWT.

1.1.9 Cargo Handling Equipment

The HDC has a mix of conventional and mechanised handling equipment at various berths as listed below.

Berth	Cargo Type	Equipment
4	Thermal Coal	2 - 1500 TPH Wagon Tipplers, 2 - Stacker-cum-Reclaimer 1500 TPH, 2 - Wagon Feeding Tipple – 12 wagons/hr.
4A	Coking Coal	2 – Grinding unloader – 1700 TPH, 2 - Stacker-cum-Reclaimer 1400 TPH, 1 - Wagon loader – 1000 TPH.
4B	Coking Coal	2 Mobile harbour crane of capacity 100 TPH
2 & 8	Dry Bulk	2 Mobile harbour crane of capacity 100 TPH each. For Shore handling operation: 25 dumpers, 9 pay loaders, 1 bulldozer and 2 excavators
9	Dry Bulk, Break Bulk	Shore handling operation performed by licensed handling agents.
10 & 11	Containers	2 – Rail Mounted Quay Cranes (RMQC), 4 - Rubber Tyre Yard Gantry Cranes (RTYGC), 3 Reach Stackers, 16 Tractor-Trailer combinations, Fork-Lift & Top Lift trucks
12	Dry Bulk and General Cargo	1 Mobile harbour crane
13		2 Mobile harbour crane

Table 1.5: Cargo handling equipment's

1.1.10 Port Railways

The HDC Railway system is connected with the South Eastern Railway at Gaurichak near Durgachak station in Panskura-Haldia broad gauge railway section through a fully electric single line corridor connecting general marshalling yard and further extended up to the Bulk handling yard which is 7 km from the take off-point.

Capacity	Nos & Type
Track Length	115 Km
Route length	11.5 Km
Interchangeable yard	2
Capacity	30 MMT
Locomotives	12

Table 1.6: Capacity

1.1.11 Stakeholders

1. Port Authority,
2. Ship owners and operators,
3. Container Terminal operator,
4. Liquid Cargo operators,
5. Solid Bulk Cargo Operators,
6. Stevedoring companies,
7. Port Railways,
8. Truck and Shipping companies,
9. Contractors to support the day- to- day activities of the port.

1.2 METEOROLOGICAL PARAMETERS

1.2.1 Temperature and Rainfall

January to February is the winter period and March to May is usually the hot weather period.

The highest maximum and minimum temperature were observed 40.9^0 C and 9.30^0 C respectively. The annual mean maximum temperature at Haldia is 30.8^0 C, while annual mean minimum temperature is 23.0^0 C. Month wise maximum and minimum temperature at the Haldia is presented in table below.

Month	Mean of Maximum Temperature (^{0} C)	Mean of Minimum Temperature (^{0} C)
January	25.6	14.7
February	28.4	18.4
March	31.8	22.8
April	33.1	25.7
May	33.4	26.6
June	33.0	27.2
July	31.8	26.8
August	31.6	26.8
September	31.8	26.4
October	31.8	24.6
November	29.8	20.1
December	27.0	15.7

Table 1.7: Month wise - Maximum and Minimum Temperature

The south-west monsoon occurs from June to September. The later period is often indicated as the post monsoon period. About 74% of annual rainfall is received during the southwest monsoon season, i.e. between June to September. October contributes to about 8% of the annual rainfall as given in table below. The heaviest rainfall in 24 hours recorded at Haldia was 294.6 mm on 05th June 1984.

Month	Average Rainfall (mm)
January	12.1
February	35.6

March	37.4
April	66.7
May	106.7
June	298.5
July	376.7
August	371.8
September	358.1
October	131.8
November	62.8
December	1.8

Table 1.8: Average monthly distribution of Rainfall

1.2.2 Relative Humidity

The average humidity ranges from nearly 57% in January to about 86% in August.

1.2.3 Wind

The predominant wind direction reported at Alipur, Kolkata and Sagar Island, is from south and southwest. About 25 % of the time wind was reported to be blowing from north and northeast. The highest wind speed of 16 knots was reported in the month of May. During the months of April to August wind speed was found to be higher than 10 knots.

1.2.4 Sea Conditions

1.2.4.1 Visibility

Visibility is found to be lower at times due to heavy rainfall during the southwest monsoon. On an average, fog is reported on 5-7 days in each month from November to February during morning hours.

1.2.4.2 Tides

The tidal details at Haldia are as follows:

- Highest High Water Level (HHWL): + 7.26 m
- Mean High Water Springs (MHWS): + 5.70 m
- Mean High Water (MHW): + 5.01 m
- Mean High Water Neaps (MHWN): + 4.26 m
- Local Mean Water Level (LMWL): + 3.23 m
- Mean Low Water Neaps (MLWN): + 2.10 m
- Mean Low Water (MLW): + 1.34 m
- Mean Low Water Springs (MLWS): + 0.80 m
- Lowest Low Water (LLW): - 0.07 m

The above water levels are with respect to chart datum.

1.2.4.3 Currents

The coastal currents that are prevalent along the West Bengal coast are of two types. The northerly drift – during the months of May to October and the southerly drift- during November to March.

1.2.4.4 Waves

Wave heights are in the range of 1.5m to 3.5m (INCOIS – 2017-2018 data).

1.2.5 Meteorological Observatory

Meteorological Observatory receive forecast for Rainfall, Cyclone, and Wind warnings from Regional Meteorological Centre (RMC) - Haldia.

Meteorological Observatory provides data on Pressure, Temperature, Humidity, Rainfall, Wind Speed and Direction and Tide level.

1.3 RATIONALE

1.3.1 International Framework

1.3.1.1 Sendai framework for Disaster Risk Reduction (SFDRR- 2015-2030)

The Post-2015 goals and agenda are set forth in the three landmark global agreements reached in2015 – the Sendai Framework for Disaster Risk Reduction (Sendai, Japan, March 2015), Sustainable Development Goals (UN General Assembly, New York, September 2015) and Climate Change Agreement (Conference of Parties, COP21, Paris, December 2015). The three documents set the stage for future global actions on DRR, sustainable development and climate change.

1.3.2 National Framework

1.3.2.1 Disaster Management Act, 2005;

The Disaster Management Act, 2005 (DM Act 2005) lays down institutional and coordination mechanism for effective Disaster Management (DM) at the national, state, district and local levels. As mandated by this Act, the GoI created a multi-tiered institutional system consisting of the National Disaster Management Authority (NDMA) headed by the Prime Minister, the State Disaster Management Authorities (SDMA) headed by the respective Chief Ministers and the District Disaster Management Authorities (DDMA) headed by the District Collectors/ District Magistrate and co-chaired by Chairpersons of the local bodies.

1.3.2.1.1 The Disaster Management Act 2005, Section 36

This section of the act lays down the primary responsibility of ministries in the GoI and departments with respect to institutional framework for prevention and mitigation of disasters, allocating sufficient funds and other resources to the National and State government agencies.

1.3.2.1.2 The Disaster Management Act 2005, Section 37

This section of the act lay down the primary responsibility of ministries in the GoI and departments with respect to preparation of Disaster Management Plan, their review, Updation and its approvals. Measures for financing the activities within the plan are also required to be spelled out in the plan.

1.3.2.1.3 The Disaster Management Act 2005, Section 41

This Act specifies the function of local authorities with regards to Disaster Management.

It includes the following functions:

- Ensure that its officers and employees are trained for disaster management;

- Ensure that the resources relating to DM are so maintained as to be readily available for use in the event of any threatening disaster situation or disaster;
- Ensure all construction projects under it or within its jurisdiction conform to the standards and specifications laid down for prevention of disasters and mitigation by National Authority, State Authority and District Authority;
- Carry out relief, rehabilitation and reconstruction activities in the affected area in accordance with the State Plan and District Plan.

1.3.2.2 National Disaster Management Plan – 2019;

The National Disaster Management Plan (NDMP) provides a framework and direction to the government agencies for all phases of disaster management cycle. The NDMP is a "dynamic document" in the sense that it will be periodically improved keeping up with the emerging global best practices and knowledge base in disaster management. It is in accordance with the provisions of the DM Act 2005, the guidance given in the National Policy on Disaster Management (NPDM) 2009, and the established national practices.

1.3.2.3 NDMA suggested framework – 2019;

1.3.2.4 Prime Minister of India – Ten-Point Agenda for Disaster Risk Reduction

1. All development sectors must imbibe the principles of disaster risk management
2. Risk coverage must include all, starting from poor households to SMEs to multi-national corporations to nation states
3. Women's leadership and greater involvement should be central to disaster risk management
4. Invest in risk mapping globally to improve global understanding of Nature and disaster risks
5. Leverage technology to enhance the efficiency of disaster risk management efforts
6. Develop a network of universities to work on disaster-related issues
7. Utilize the opportunities provided by social media and mobile technologies for disaster risk reduction
8. Build on local capacity and initiative to enhance disaster risk reduction
9. Make use of every opportunity to learn from disasters and, to achieve that, there must be studies on the lessons after every disaster
10. Bring about greater cohesion in international response to disasters

1.3.2.5 Indian Ports Act, 1908 and amendment;

1.3.2.6 Merchant Shipping Act, 1958 and amendment;

1.3.2.7 Major Port Trust Act, 1963 and amendment;

1.3.2.8 Calcutta Port Rules, 1994 and amendment;

1.3.3 Legal provisions and it's amendments to regulate Fire and Chemical risk in industries

1. Explosives Act, 1884;
2. Petroleum Act, 1934;
3. Factories Act, 1948;
4. Insecticides Act, 1968;

5. Environment Protection Act, 1986;
6. Motor Vehicles Act, 1988;
7. Public Liability Insurance Act, 1991;
8. Dock Workers Act, 1986;
9. Other relevant rules and its amendments
    - NDMA guidelines on Chemical Disaster, 2007;
    - NOSDCP,2015;
    - MSIHC Rules, 1989;
    - Chemical Accidents (Emergency Planning Preparedness and Response) Rules, 1996;
    - SMPV Rules, 1981;
    - CMV Rules, 1989;
    - Gas Cylinder Rules, 2016;
    - Hazardous Waste Management Rules, 2016.

1.3.4 Safety initiatives to address Natural Disasters

NDMA guidelines on Disasters like Wind & Cyclone, Tsunami, Earthquake and Floods Management are relevant and these have been prepared to provide the directions to ministries, departments and state authorities for the preparation of their detailed Disaster Management Plans.

1.4 SCOPE OF THE PLAN

1.4.1 Aim and Objective

This plan reflects the commitment to the safety of employees and increases the organizational safety awareness. It defines the roles and actions necessary to prepare for and respond to any disaster situation in a coordinated manner. Thus, minimize or avoid the potential losses from hazards and disasters caused due to human, technical or natural phenomena inside the Port and Port water limits, through the implementation of rapid, effective and appropriate response & recovery procedures.

DMP is intended to provide guidance to all concerned departments within the port with a general concept of potential emergency assignments before, during and following emergency situations in accordance with the priorities of SENDAI framework.

1.4.2 Disaster Management Cycle

Based on the culture of prevention and mitigation following a disaster or near disaster event, the capacity building measures are institutionalized.

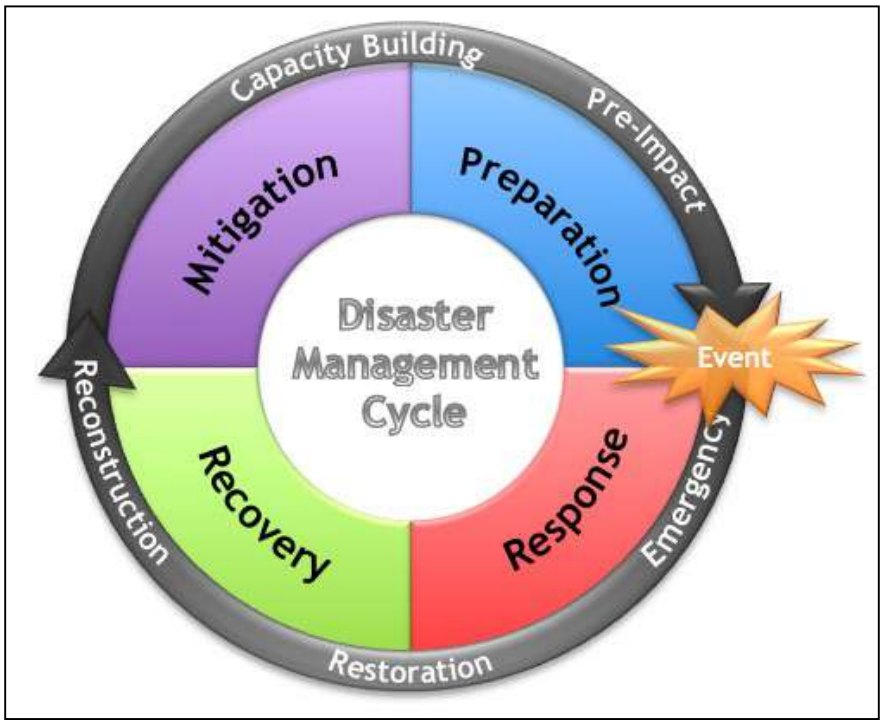


Figure 1.3: Disaster Management Cycle

The primary objectives of the DMP are to:

a. To contain and control the emergency incidents,
b. Proactively safeguard the lives of the HDC employees, contractors, stakeholders, visitors and neighboring population,
c. Mitigate the effect and minimize the damage to the environment,
d. Limit damages of port assets,
e. To ensure that the HDC responds according to the priorities set by the Chief Incident Controller (CIC) during response operation,
f. Safely restore operations back to normal as quickly as possible after occurrence of any accident, to enable business to be resumed at the earliest,
g. To initiate off-site emergency plan in-case of necessity as and when required.

The scope covers –

- The existing preventive and mitigation measures besides those that are additionally required to reduce the risk in time bound manner;
- Identification of potential scenarios that are likely to occur considering risk profile of port;
- the preparedness to develop plans for actions when disaster or emergencies occur;
- the responses that mobilize the necessary emergency services including responders like fire service, police service, medical service including ambulance, government as well as non-governmental agencies;

- the initiation of off-site emergency plan, should the situation escalate to call for support of civic administrations (district and/or state) and their resources;
- the post disaster recovery with aim to restore the affected area to its original conditions.

1.5 VISION

"To build, operate and maintain a safer and disaster resilient Port by a holistic, pro-active, technology driven and sustainable development strategy that involves all stakeholders and fosters a culture of prevention, preparedness and mitigation"

1.6 TIME FRAMES

Port is committed to establish required timeframes for capacity building, introducing research and experienced based steps for prevention and mitigation in accordance with SENDAI framework (2015-2030). As part of the effort to institutionalize such timeframes Hazard specific thematic areas and their timeframes have been tabulated in paragraph 3.2.

Timeframe as per NDMP considered in paragraph 3.2 are as below:

Short Term	Two Years
Medium Term	Two to Five Years
Long Term	Ending up to 2030

1.7 INSTITUTIONAL FRAMEWORK FOR DISASTER MANAGEMENT

1.7.1 National Level

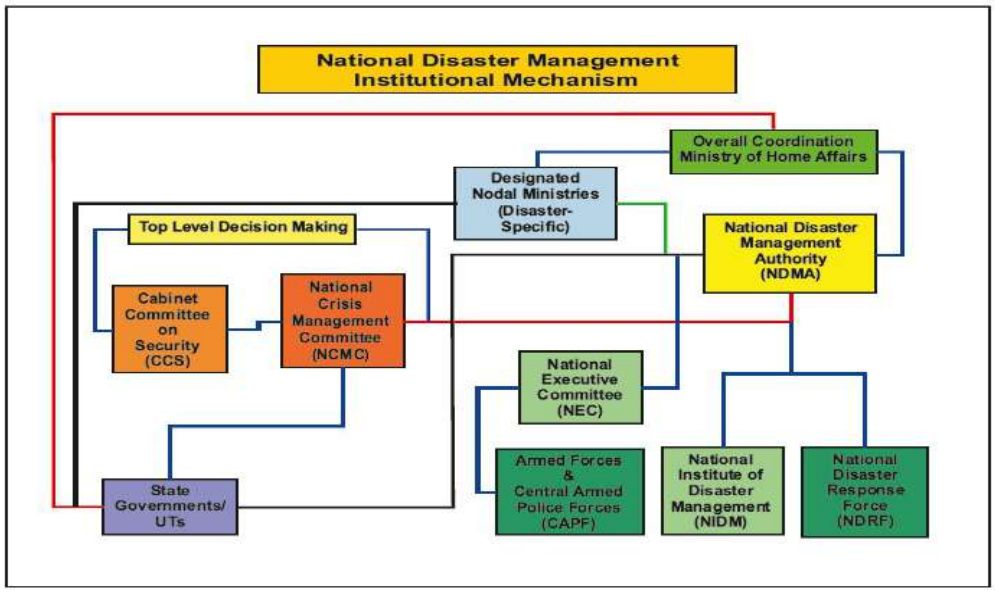


Figure 1.4: National –level disaster management – basic institutional framework

1.7.2 State Level

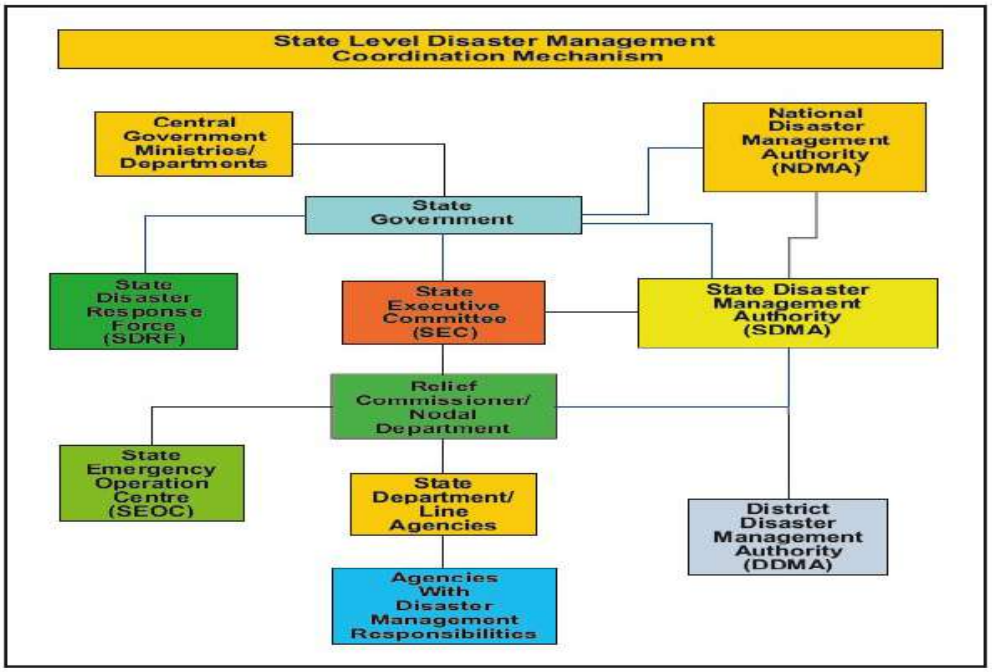


Figure 1.5: State –level disaster management – basic institutional framework

1.7.3 District Level

The DDMA will be headed by the District Collector, Deputy Commissioner, or District Magistrate of Purba Medinipur as the case may be, with the elected representative of the local authority as the Co-Chairperson.

1.7.4 On-site Emergency response team of HDC

Team will be headed by the CIC with the elected representative of the Port department and various functional heads of stakeholders.

Refer **Figure 1.6 and Figure 1.7** for Onsite and Offsite Emergency Organization Chart.

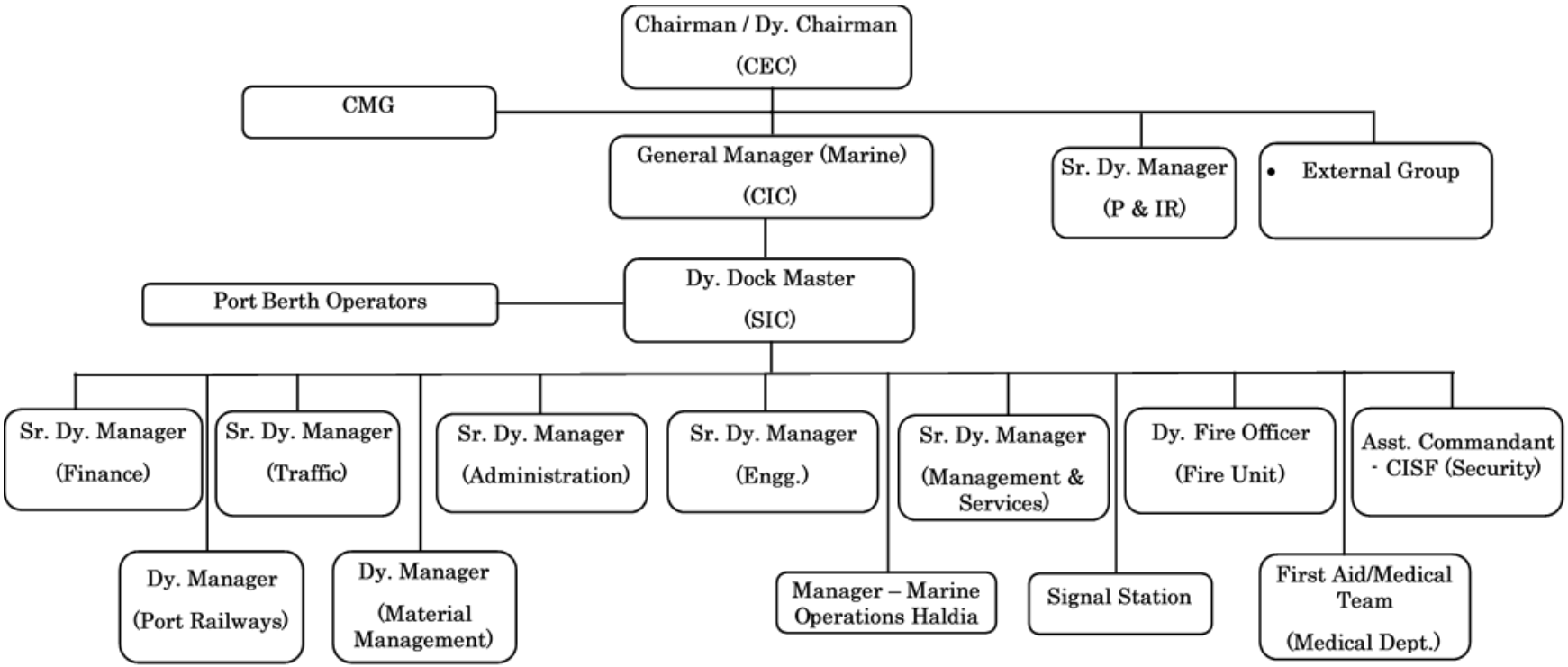


Figure 1.6: On-Site Emergency Organization Chart

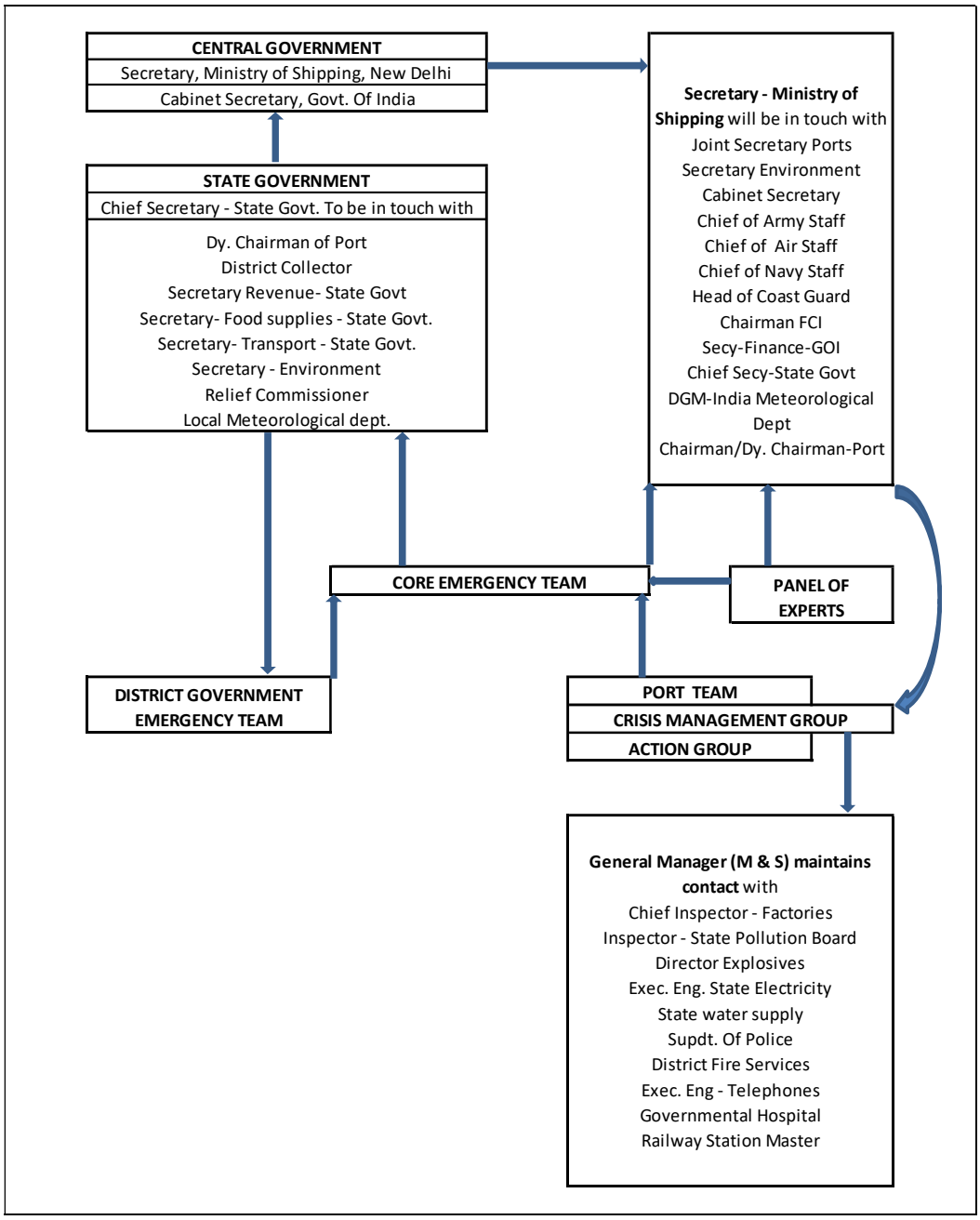


Figure 1.7: Off-Site Emergency Organization Chart – Level 2 and 3

2. HAZARD, RISK, VULNERABILITY & CAPACITY ANALYSIS

2.1 DISASTER RISKS, VULNERABILITIES AND CHALLENGES

2.1.1 Disasters Classification (as per NDMA)

- Man-Made Disasters
  - Chemical

- Natural Disasters
  - Wind and Cyclone
  - Flood
  - Earthquake
  - Tsunami

2.1.1.1 Chemical Disaster

Chemical disasters (Fire, explosion, toxicity) may be traumatic in their impacts on human beings and may have casualties and also damages nature and property. The elements which are at highest risks due to chemical disaster primarily include the Port, its employees & staff, adjacent industries, hazardous chemicals vehicles, the residents of nearby settlements, adjacent buildings, occupants and surrounding community.

Chemical disasters may arise in number of ways, such as:

1. Process and safety systems failures
   - Human errors
   - Technical errors
   - Management errors
2. Induced effect of natural calamities
3. Accidents during the land transportation (Loading/Unloading/Pipeline/ Truck/Rail) and sea navigation
4. Hazardous waste processing/ disposal
5. Terrorist attack/ unrest leading to sabotage.

2.1.1.2 Wind and Cyclone

Cyclones can cause damage to port infrastructures including damage to mangroves, trees and flooding of low line and poor drainage affected areas. In addition, ships in the harbor can also sustain serious damage and grounding.

Cyclones are classified by

- Strength of associated winds,
- Storm surges
- Exceptional rainfall occurrences.

Type of Disturbances	Wind Speed in km/h	Wind Speed in Knots
Depression	31-49	17-27
Deep Depression	49-61	27-33
Cyclonic Storm	61-88	33-47
Severe Cyclonic Storm	88-117	47-63
1 knot - 1.85 km per hour		

Table 2.1: Wind speed Criterion for deep depression and cyclonic storm

The east coast of India is prone to frequent cyclones, storm surges and floods. Major damage is resulted due to the inundation caused by the combined effects of tides, waves and storm surges, as compared to the damage occurs from the strong winds. Occurrence of storms and depressions in the Bay of Bengal is very high during October and November. It is also high during southwest monsoon. The initial movement of the cyclones is towards north westerly/westerly direction, but occasionally they change their direction and move in a north-easterly direction (generally referred to as re-curvature of a cyclone). This re-curvature of cyclones takes place during April-May and October-November months.

In accordance with national and regional hazard map available with BMTPC ***the Haldia (purba medinipur district) falls under very high damage risk zone (max. wind speed of 50 m/s).***

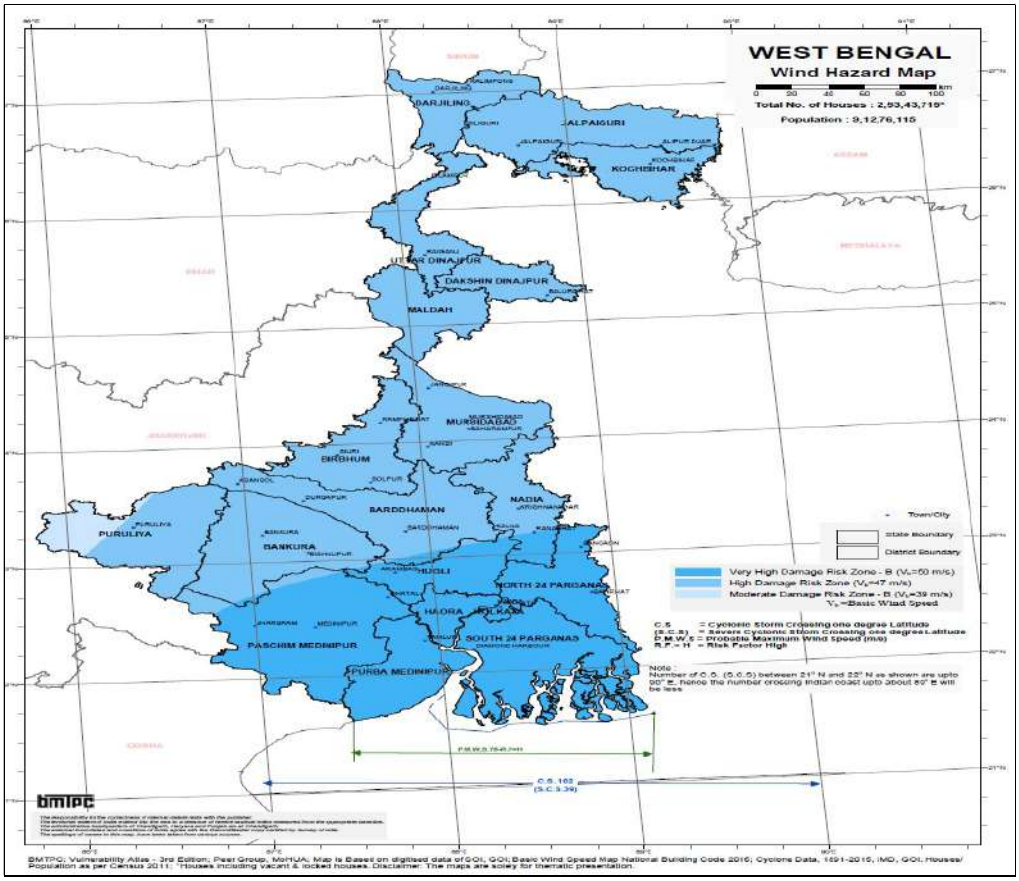


Figure 2.1: Wind Hazard Map (Source: Vulnerability Atlas of India)

2.1.1.3 Floods

The port infrastructure poses a flooding risk as per below BMTPC map. The HTL & LTL has been demarcated by WBCZMA in the published maps.

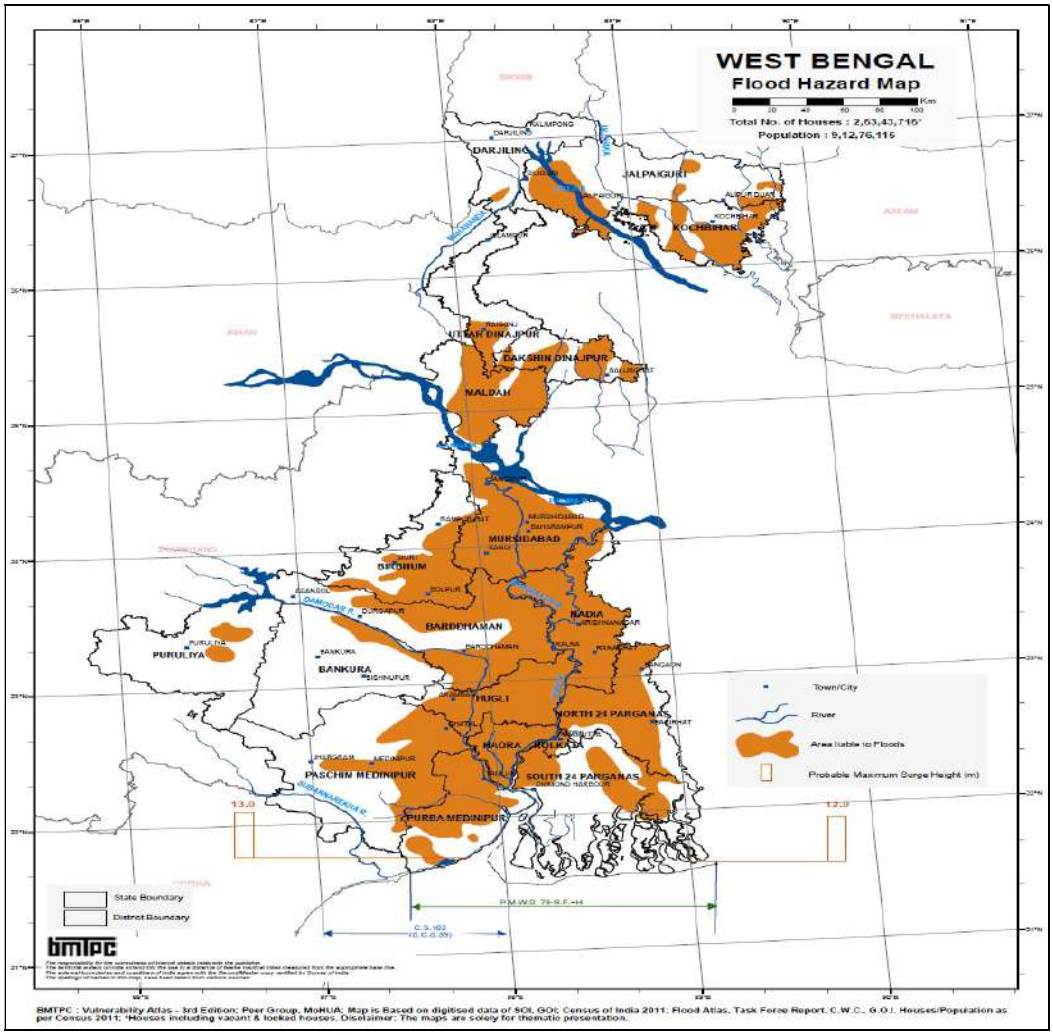


Figure 2.2: Flood Hazard Map (Source: BMTPC, India)

Port development plans for future expansion will take into account the strategy to take care of the HTL affected zones within the areas earmarked for expansion allowing sufficient and planned capacity of storm drainage and natural slopes including reservoirs if any that might come within the development zone.

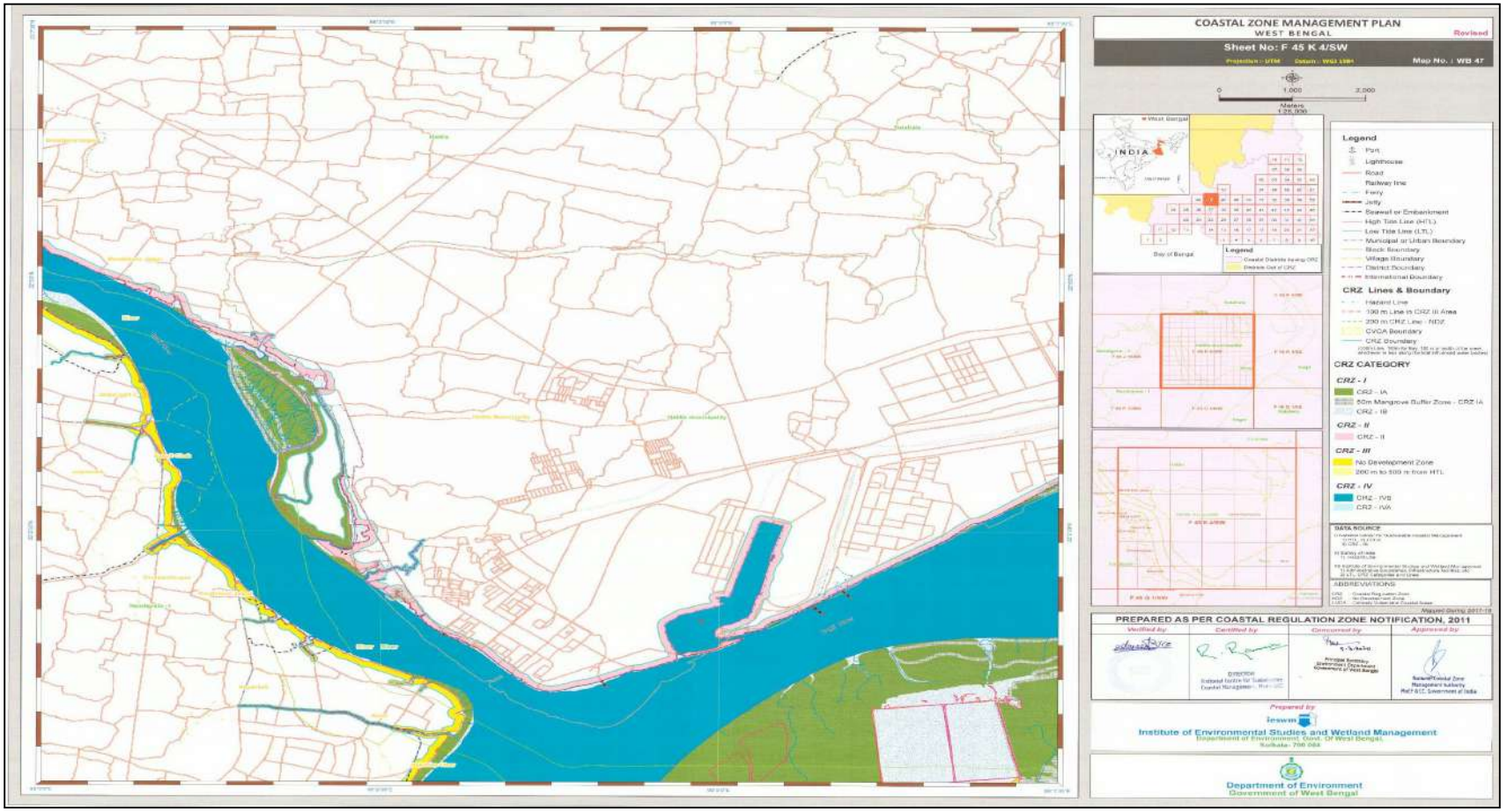


Figure 2.3: Demarcation of HTL, LTL and CRZ mapping

2.1.1.4 Earthquake

Haldia (Purba medinipur district) falls under ***Moderate earthquake damage Risk zone (zone category III)***.

Class	Richter Scale
Great	8 or more
Major	7-7.9
Strong	6-6.9
Moderate	5-5.9
Light	4-4.9
Minor	3-3.9

Table 2.2: Classification of Earthquakes

The offices, utility buildings and berthing structures including cranes are required to be constructed for damage zone III. The relevant BIS standards are as follows:

a) For office and other utility buildings (IS 1893:2016)
b) For berthing structures (IS 1893:2002)

Some infrastructure has deteriorated with time due to wind weather effects and aging. A time bound strategy will be undertaken by the port to assess the condition and strengthening of the older buildings and quay side structures that might be affected.

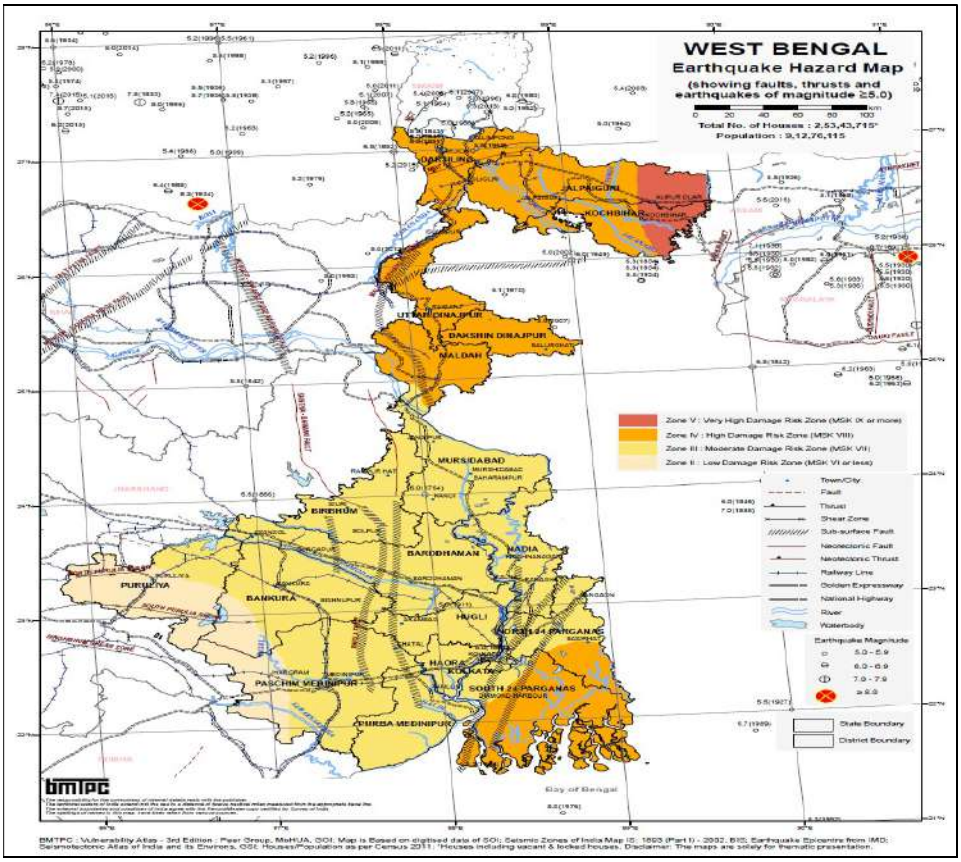


Figure 2.4: Earthquake Hazard Map (Source: Vulnerability Atlas of India)

2.1.1.5 Tsunami

An Early Warning System for information related to earthquakes and generation of tsunami has been created under the Ministry of Earth Science, GoI.

A network of tsunami coastal stations has been setup which relay information to the center via satellites.

INCOIS provides such data to port on a regular basis. Hence, adequate early warning will be available to the port. Necessary evacuation measures and provision of tsunami shelters will be provided.

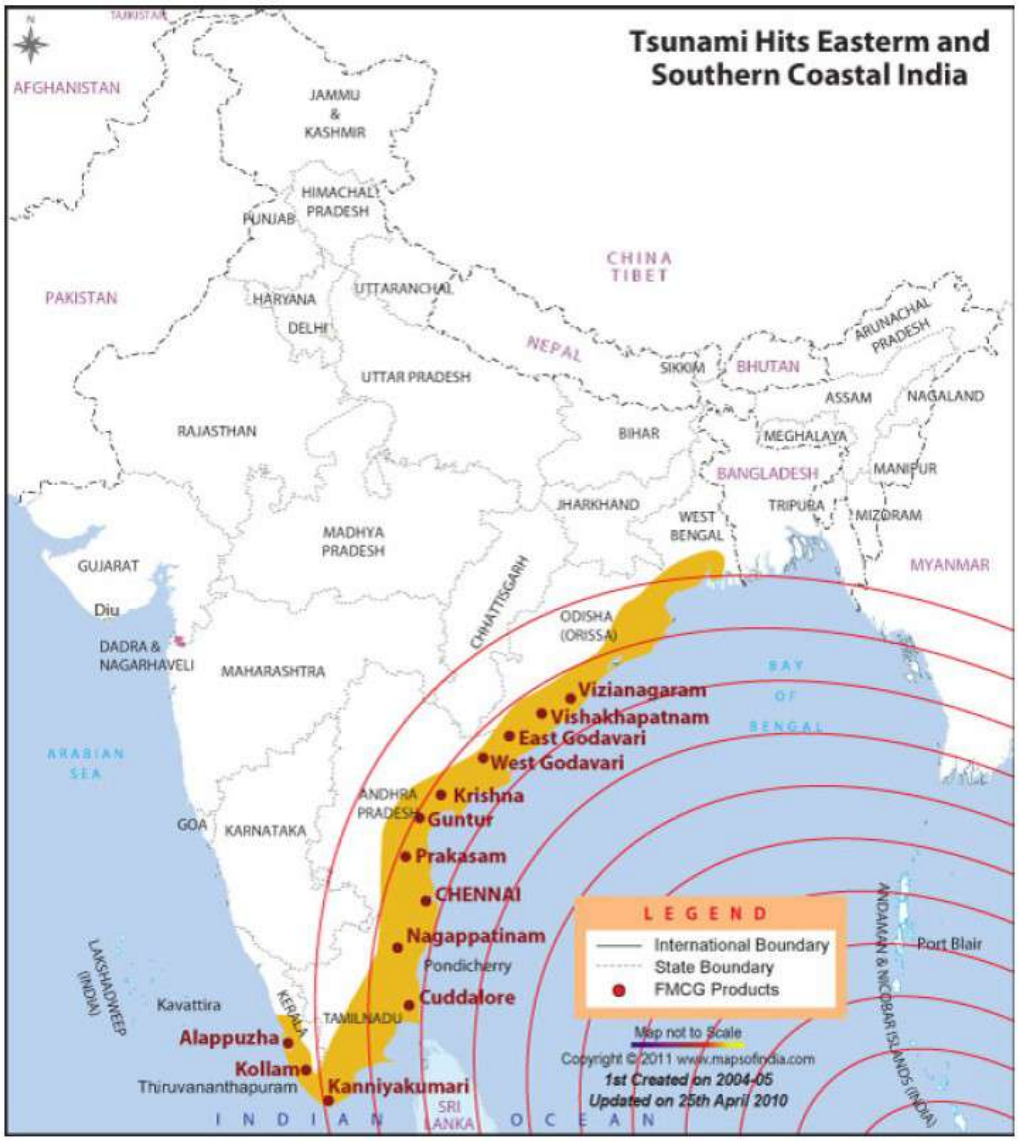


Figure 2.5: Tsunami (Source: West Bengal Disaster Management and Civil Defense Department Website)

2.2 UNDERSTANDING DISASTER RISKS

2.2.1 Navigational Risk

In view of the complex nature of the navigational operations connected with pilotage of ships inside the navigational channel and their traffic regulation by VTMS, weather variations including tidal windows etc., berthing complexities, turning circle, lock gate and usage of tugs; HAZID workshop (Refer **Appendix A**-Navigational risk using Bow Tie model) with various stakeholders connected to marine department was carried out. As a result, a better understanding of navigational risk was achieved.

Potential scenarios considered in this plan are as follows:

Scenario 1: Collision with small craft - Tanker / Container/ Bulk Carrier/Heavy Lift vessel (Area B);
Scenario 2: Collision between two vessels (Area A, B);
Scenario 3: Collision of Vessel with dredger (Area A, B);
Scenario 4: Dragging anchor (Area A);
Scenario 5: Grounding- Tanker/Container/ Bulk Carrier/Heavy Lift vessel – Pilot On-board (Area B);
Scenario 6: Grounding- Tanker/Container/ Bulk Carrier/Heavy Lift vessel – Pilot not on-board (Area A);
Scenario 7: Tanker /Container/ Bulk Carrier/Heavy Lift vessel tug assisted berthing - Contact with Berth/Jetty/Shore installation (Area B, C);
Scenario 8: Contact/Collision with the lock gate (Area C);
Scenario 9: Contact with channel marking buoys (Area A, B);
Scenario 10: Fire on vessel in the Navigational Channel (Area A, B);
Scenario 11: Fire on vessel in the anchorage (Area A);
Scenario 12: Fire on vessel in the Berth/Jetty (Area B, C);

Note:
Area A: Approaches to Haldia Dock Complex (West anchorage point to Pilot boarding point),
Area B: River passage area (from Pilot boarding point to lock gate),
Area C: Lock gate to Berth/Jetty impounding dock basin.

2.2.2 Chemical Disaster (Fire / Explosion/Toxicity) Risks

These can be caused due to loss of containment of hazardous cargo (LPG, Ammonia, Naphtha, MS, ATF, Xylene etc.) handled at a Port. Fire incidents can also occur in the port office building, VTMS, control centres, transit sheds, electrical substations, lock gate, etc. This type of hazard can be due to both Man-Made and Natural Disasters.

Consequence Assessment using software analysis has been carried out for the following scenarios. The impact zone results are placed in **Appendix E.**

Sr. No.	Cargo handling activity	Location	Loss of Containment scenario
1.	LPG unloading and transfer to terminal	OJ-I, OJ-II, OJ-III	Small, Large and Full Bore Rupture of unloading arm, LPG transfer pipeline.
2.	Ammonia unloading and transfer to terminal	OJ-I	Small, Large and Full Bore Rupture of unloading arm, Ammonia transfer pipeline.
3.	MS, HSD unloading and	OJ-I, OJ-II, OJ-III	Small, Large and Full Bore Rupture of unloading arm/hose, transfer pipeline.

	transfer to terminal		
4.	Butene, Butadiene, Xylene unloading and transfer to terminal	OJ-I	Small, Large and Full Bore Rupture of unloading arm/hose, transfer pipeline.
5.	Benzene, Xylene unloading and transfer to terminal	Multipurpose berths	Small, Large and Full Bore Rupture of unloading hose, transfer pipeline.
6.	HSD unloading and transfer to terminal	Multipurpose berths	Small, Large and Full Bore Rupture of unloading hose, transfer pipeline.

Table 2.3: Potential Scenarios for liquid bulk cargoes

Existing capacities for counter measures to deal with the above emergencies in the form of the firefighting arrangement (fixed and portable) and fire station with trained man power are available in **Appendix B**. In addition, efforts will be made for Mutual aid agreement between Port and industries. Joint drills with all stakeholders are carried out periodically.
The shortfalls and gaps if any in these areas will be addressed through time bound measures as given in the hazard specific measures (Refer para 3.2).

2.2.3 Oil Spill Disaster Risk

An Oil Spill Contingency Plan (OSCP) in accordance with the requirements of National Oil Spill Disaster Contingency Plan (NOS-DCP) will be applicable in case of an oil and chemical spill disaster.
Collision and Grounding of ships as described in para 2.2.1 above have the secondary risk potential for causing oil spills of magnitude of Tier 1 (700 tonnes) and above. For oil spill trajectory analysis Refer **Appendix D**.

2.2.4 Natural Disasters Risk

In view of the historical records and HRVCA profile of the port the following natural disasters are considered for the preparation of the action plans and their implementation.

1. Wind and Cyclone
2. Flood
3. Earthquake
4. Tsunami

The port is committed to update plans for the above mentioned geological and meteorological disasters on a periodical basis. Such updates include preparation/updation of SOPs, structural assessments, project planning, environmental and utility management and provision of emergency equipment. These steps will highlight the strengths and weakness of capabilities, thus creating resilience. The remedial steps if any will form part of institutional capacity building as described in chapter 3 and contained in the paragraph 3.2 of hazard specific preventive and mitigative measures.

2.2.5 CBRN/ Terrorism risk

Considering the threats of nuclear / radiological risk due to concealment of cargoes and mis-declaration, the port will take actions as directed by Ministry of Ports, Shipping and Waterways, and equipment and capability provided within the ambit of such directives.

2.2.6 Vulnerability & threat matrix

An assessment of vulnerabilities and threats were carried out and a representative matrix was prepared depicting the vulnerability as low, moderate and high categories for various operational areas inside the port limit.

Threats → / Vulnerable Areas ↓	Vessel Accidents: Collision Grounding Fire Explosion	Land Transport Personnel Accident: Rail, Road	Fire & Explosion Manifold Pipeline/ Conveyor/ Crane	Toxic Gas Leakage Pipeline Manifold	Pollution: Oil Chemical	Technical Failures: Power, Transport, Communication, Infrastructure	Cyclone -Floods	Tsunami Earthquake
VESSEL MOVEMENT								
Navigational Channel	xxx	-	-	-	xxx	x	xx	xx
Lock Gate	xx	-	-	-	x	xx	xx	xx
Oil Jetties - Riverine	xx	-	xxx	xxx	xx	x	xx	xx
Coal Berths	x	-	xx	-	x	x	xx	xx
Multipurpose Berth	x	-	xx	x	x	x	xx	xx
Container Berth	x	-	xx	x	x	x	xx	xx
Iron Ore Berth	x	-	x	-	x	x	xx	xx
Gen Cargo Berth	x	-	x	-	x	x	xx	xx
Finger Jetty	x	-	x	-	x	x	xx	xx
STORAGE-TRANSFER								
Coal stack yards	-	x	x	-	x	x	xx	x
Container Storage Yard	-	x	x	x	x	x	xx	xx
CARGO TRANSFER								
Oil Jetty Transfer Pipeline	-	xx	xxx	xxx	xx	xx	x	xx
Multipurpose Berth Transfer Pipeline	-	xx	xx	xxx	xx	xx	x	xx
Trucks/Mobile equipment	-	x	x	x	x	x	x	x
POL Railway Wagon	-	xx	xx	-	x	xx	x	x
Cranes & Ship Loaders	-	x	x	-	x	xx	xx	xx
Bulk cargo	-	x	x	-	-	x	x	x
Conveyor system - Coal	-	x	x	-	x	x	xx	xx
SERVICES								
Control gates	-	x	x	-	-	x	xx	xx
Electric Substations	-	-	x	-	-	xx	xx	xx
Train siding Locos, Wagons,	-	x	x	-	-	xx	xx	xx
Signal station (VTMS)	-	-	x	-	-	xx	xx	xx
Port tugs, crafts, dredger, launches	xx	-	x	-	x	xx	xx	xx
ADMINISTRATION								
Office Building & Parking	-	x	x	-	-	x	xx	xx
Customs Area & Weigh Bridge	-	x	x	-	-	x	xx	xx
Port officers & CISF Quarters	-	x	x	-	-	-	xx	xx

Note: x=slightly vulnerable; xx=moderately vulnerable; xxx=highly vulnerable

Table 2.4: Vulnerability and Threat Matrix

2.2.7 Hazard Assessment worksheet

The identified hazards have been assessed considering the history of incidents, vulnerability and risk assessment and are placed in the following Hazard Assessment worksheet.

Table 2.5: HAZARD ASSESSMENT WORKSHEET

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
DISASTER DURING CARGO STORAGE/TRANSFER																		
1	C	**Leakage - Fire/Explosion**	Fire /Explosion due to LPG/POL/ Chemical leakage from loading arm / hose at Oil Jetty (1, 2)	Leakage at the connections of the hose/unloading arm to the manifold, damage to the pipeline, Static Electricity	Standard Operating Procedure, Ship-Shore checklist, Mobile/or fixed fire-fighting system – Manually operated, LPG gas detectors, Portable gas detectors	Minor Damage to vessel &/or other vessels/ Shore structures, injury/fatality to personnel	Major damage to shore structures e.g. loading arms etc., Major damage to vessel & pollution, Capsizing & port closure, fatalities	3	2	1	2	2	4	3	2	3	3	Report incident to Port & relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
2	C	Leakage - Fire/Explosion	Fire /Explosion due to LPG/POL leakage from loading arm / hose at Oil Jetty – 3	Leakage at the connections of the unloading arm to the manifold, damage to the pipeline, Static Electricity	Standard Operating Procedure, Ship-Shore checklist, Mobile and ***Fixed fire-fighting system – automatic operation, F&G detection system.***	Minor Damage to vessel &/or other vessels/ Shore structures, injury	Major damage to shore structures e.g. loading arms etc., Major damage to vessel & pollution, Capsizing & port closure, fatality	2	1	1	1	2	3	2	1	2	3	Report incident to Port & relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
3	C	**Toxic**	Toxic gas (Ammonia) leak from loading arm during operation – on Ship or Ashore at Oil Jetty - 1	Leakage at the connections of the loading arm to the manifold, valves.	Standard Operating Procedure, Ship-Shore checklist, Portable extinguishers, Manually operated fixed fire-fighting system, ***Portable Ammonia gas detector***, PPE.	Injury to personnel, Minor environment damage	Multiple fatalities	**3**	**0**	**1**	**1**	**2**	**4**	**0**	**2**	**3**	**3**	Report incident to Port & relevant authority, Shipboard EAP, Port DMP
4	C	**Leakage - Fire/Explosion**	Fire /Explosion due to chemicals leakage from hose at Multipurpose berth no. 4	Leakage at the connections of the unloading hose to the manifold, damage to the pipeline, Static Electricity	Standard Operating Procedure, Ship-Shore checklist, Mobile/or fixed fire-fighting system – manual operation, portable detectors.	Minor Damage to vessel &/or other vessels/ Shore structures, injury to personnel	Major damage to shore structures e.g. hose etc, Major damage to vessel & pollution, Capsizing & port closure, fatality	**2**	**1**	**1**	**1**	**2**	**3**	**3**	**2**	**3**	**3**	Report incident to Port & relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
5	C	**Fire and Explosion**	Rupture/ leakage of POL/ Chemical **Pipeline** from Oil Jetties (1,2 and 3) (Manifold to terminal within port area)	Failure of the equipment, Human error, Inadequate precautions during maintenance work e.g. pigging, Earthquake.	SOP, work permits, Patrolling of the area, Periodic Inspection and Maintenance of pipeline and equipment	Minor damage to pipeline and port property, personal injury.	Major damage to the port property due to fire and explosion, fatality, oil/ chemical pollution, closure of jetty	**1**	**1**	**1**	**1**	**2**	**3**	**2**	**2**	**3**	**4**	Report incident to Port & relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP
6	C	**Toxic, Fire and Explosion**	Rupture /leakage of Liquid Ammonia **Pipeline** from Oil jetty - 1.	Failure of the equipment, Human error, Inadequate precautions during maintenance work, Earthquake.	SOP, Work permits, Patrolling of the area, Periodic Inspection and Maintenance of pipeline and equipment, PPE	Minor damage to pipeline, personal injury.	Major damage to the port property due to fire /explosion, multiple fatalities due to toxic release/fire /explosion , closure of jetty	**1**	**1**	**0**	**1**	**2**	**3**	**2**	**1**	**3**	**4**	Report incident to Port & relevant authority, Shipboard EAP, Port DMP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
7	C	Corrosive	Corrosive acid (Phosphoric/Sulphuric) leakage from hose at Oil jetty – 1 & 2.	Leakage at the connections of the hose to the manifolds	Standard Operating Procedure, Ship-Shore checklist, Fixed fire-fighting system, PPE	Minor Damage to vessel, Shore structures, minor injury to personnel	Major damage to shore structures e.g. hoses, Major damage to vessel & pollution, Serious injuries to personnel/fatality	1	1	1	1	2	3	2	2	3	3	Report incident to Port & relevant authority, Shipboard EAP, Port DMP
8	C	Fire/Leakage	Leakage/Fire due to Crane Accidents (Container drop/ crane fall)-secondary event	Human Error, Equipment failure	Emergency Shutdown system, Overload alarm, Standard Operating Procedure	Minor Damage to container and berth, Injury to personnel	Major Damage to crane, container and berth, Serious injury to personnel/ fatality, Berth closure	1	2	0	1	1	3	3	1	2	3	Activation of terminal EAP and port DMP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
9	C	Fire	Fire in Coal Stack yard	Self-ignition of coal	Fire hydrant line around stack yard, Manual Sprinkler system	Minor damage to property, Minor injury to the person	Major damage to the property (coal), Serious injury to the person	1	1	1	1	1	2	2	3	2	3	Activation of Terminal EAP and port DMP
10	C	Fire	Fire in the conveyor system carrying coal	Self-ignition of coal	Fire-fighting and extinguishing system on the conveyor.	Minor damage to the conveyor system, minor injury to personnel	Major damage to the conveyor system, multiple injuries	1	1	1	1	2	2	2	2	2	3	Activation of Terminal EAP and Port DMP
11	C	Fire	Fire in the rail tank wagons carrying POL	Leakage at the wagon / connections to the manifolds	Standard Operating Procedure, fire-fighting system,	Minor Damage to rail wagon, pollution, minor injury to personnel	Major damage to rail wagon & pollution, Serious injury to personnel/ Fatality	1	1	1	1	2	3	3	1	3	3	Report incident to port & relevant, Shipboard emergency procedure, Port DMP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
NAVIGATIONAL DISASTERS																		
12.1	B	**Collision**	Collision with small craft – Tanker / Container / BC/Heavy lift vessel in (Area B)	Vessel equipment failure/ malfunction (navigational, propulsion, steering, auxiliary, tugs), Human error (pilot, tug master), Language communication issues, Failure to follow Collision Regulations, Environmental conditions (poor visibility, high current flow, unpredicted current eddies, channel size/depth, rough weather, high wind speed)	PMS, VTMS, Exchange of information between Pilot & Master (Pilot exchange card), Training of personnel, Security boat, Navigational channel is buoyed & well marked, weather monitoring, suspension of vessel movement on increase of wind speed beyond permissible limit.	Avoiding action fails resulting in glancing blow with moderate damage to one or both vessel, Delay in berthing	Oil pollution (damage to flora & fauna, loss of fishing activity), serious damage to small craft, possible total loss of the craft (sinking), loss of cargo / containers, Injuries / loss of life	**1**	**1**	**0**	**0**	**2**	**3**	**4**	**1**	**2**	**3**	Report incident to Port & relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP.

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
12.2	A & B	Collision	Collision between two vessels (Area A, B)	Non-compliance with collision regulation, Human error (fatigue, lack of situational awareness, knowledge etc.), Ship's equipment breakdown, Local congestion, difficulty in communication, maneuvering to (dis)embark pilot, Environmental conditions (poor visibility, high current flow, unpredicted current eddies, rough weather, high wind speed).	VTMS, VHF, Security boat, Pilot information exchange card, Designated anchorage area & designated boarding area & designated channel for port operation &pilot (designated VHF frequency), Navigational channel is buoyed & well marked, weather monitoring, suspension of vessel movement on increase of wind speed beyond permissible limit.	Moderate damage to one or both vessel, Delay in berthing, injuries to personnel, Temporary passage block	Serious damage to vessels and Oil / HNS pollution (damage to flora & fauna, loss of fishing activity), Fire and Explosion, Blockage of the navigational Channel, loss of cargo / containers, Injuries / Loss of life.	1	2	0	1	3	3	3	2	4	4	Report incident to Port & relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP.

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
12.3	A & B	Collision	Collision of vessel with dredger (Area A, B)	Vessel equipment failure / malfunction (navigational propulsion, steering, auxiliary), Human error (Misjudgment, improper communication, fatigue), Environmental conditions (poor visibility, high current flows, unpredicted current eddies, channel size/ depth), results of avoiding action (e. g. Small craft), Shifting of sand bars in the channel.	PMS, VTMS, training, adequate work/rest hour, situational awareness, weather monitoring, standard operating procedure, suspension of vessel movement on increase of wind speed beyond permissible limit, Periodical survey of channel and regular survey of governing sand bars.	Temporary Grounding of either of the vessel, Temporary passage block.	Grounding or sinking of either of the vessel, Possible loss of cargo or containers, Oil/HNS pollution(damage to flora & fauna, loss of fishing activity), Fire/Explosion, Blockage of Navigational channel, Injuries / Loss of life.	0	1	0	1	3	3	3	2	3	4	Report incident to Port & relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
12.4	A	**Collision**	Dragging Anchor (Area A)	Bad weather e.g. Norwester season, Poor monitoring, Poor holding ground, Insufficient scope of anchor chain, Human error, vessel equipment failure, heavy underwater current, loss of anchor	MET warning through VTMS, Bridge team management, Vessel to drop anchor in designated anchorage area, Vessel to ensure that sufficient chain is paid out, training of personnel, PMS, main engine standby vessel, Tug assistance, VTMS.	Minor Damage to vessels and/or other vessels, Injury to personnel	Grounding, Oil / HNS pollution (damage to flora & fauna, loss of fishing activity), Grounding and capsizing, Possible loss of cargo or containers, Blockage of Navigational channel, Injuries / Loss of life.	**1**	**1**	**0**	**0**	**2**	**3**	**3**	**2**	**2**	**3**	Report incident to Port & relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
12.5	B	**Grounding**	Grounding – Tanker/ Container/ BC/ Heavy lift vessel – Pilot onboard (Area B)	Misjudgment by pilot / master / tug master, Environmental conditions (poor visibility, high current flow, unpredicted current eddies, rough weather, high wind speed), small craft impedes passage, vessel equipment failure / malfunction (navigational, propulsion, steering, auxiliary), outdated electronic chart, wrong position fixing, improper maintenance of navigational aids, shifting of sand bars in the approach channel.	VTMS, Use of electronic aids and proper bridge team management, leading lights, Weather monitoring, suspension of vessel movement on increase of wind speed beyond permissible limit, Use of Anchor, continuous monitoring of the drift by pilot and "Course made Good", Proper ship signal, Use of security boat signals, Assistance of tugs, updated navigational chart to be used at all times, preventive maintenance of navigational aids, Experience pilots, Periodical maintenance dredging.	Minor damage to shell plating – possible water ingress, Temporary passage block	Major hull damage leading to stranding of vessel, Oil / HNS pollution (damage to flora & fauna, loss of fishing activity), Possible loss of cargo or containers, Blockage of Navigational channel, Fire / explosion, injuries / loss of life	**0**	**1**	**0**	**1**	**2**	**3**	**3**	**2**	**3**	**3**	Report incident to Port & relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
12.6	A	Grounding	Grounding – Tanker/ Container/ BC/ Heavy lift vessel – Pilot not onboard (Area A)	Vessel equipment failure / malfunction (navigational propulsion, steering, auxiliary), vessel transiting too fast, outdated electronic chart, wrong position fixing, Environmental conditions (poor visibility, high current flow, unpredicted current eddies, rough weather, high wind speed), improper maintenance of navigational aids, Human error (fatigue, lack of situational awareness, knowledge etc.)	PMS, Use of anchor, vessel to transit in safe maneuring, VTMS monitoring, updated navigational chart to be used at all times, suspension of vessel movement on increase of wind speed beyond permissible limit, preventive maintenance of navigational aids, Bridge team management.	Damage to shell plating, possible water ingress, Temporary passage block	Major hull damage leading to vessel stranding, Possible loss of cargo or containers, Oil / HNS pollution (damage to flora & fauna, loss of fishing activity), Blockage of Navigational Channel, Fire / explosion, Injuries / loss of life.	1	2	0	1	2	3	3	2	3	3	Report incident to Port & relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible					Worst Credible					
								Impact					Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
12.7	B & C	Contact	Tanker/ Container/ BC/Heavy lift vessel tug assisted berthing – Contact with Berth / Jetty / Shore installation (Area B, C)	Vessel equipment failure / malfunction (navigational propulsion, steering or main engine), Misjudgment by pilot/master/tug master, Environmental conditions (poor visibility, high current flow, unpredicted current eddies, rough weather, high wind speed), Breakdown of tugs, Parting of tow line, Inadequate illumination at Berth / Jetty, Damaged or missing fenders.	PMS, Assistance of tugs and use of anchor, Use of electronic aids and proper bridge team management, Weather monitoring, VTMS, Pilot information card, Use of ship's and tugs illumination for night berthing, DGPS, Harbor / Dock pilot system, Ship ECDIS, preventive maintenance of fenders.	Minor damage to side shell plating of vessel, Minor damage to quay or fendering system.	Serious damage to side shell plating of vessel, Serious damage to quay/ Fender/shore installation, Loss of cargo / containers, Oil / HNS pollution (damage to flora & fauna, loss of fishing activity), fire/ explosion, personnel injuries or loss of life	0	1	0	1	2	3	3	1	3	4	Report incident to Port & relevant authority, Shipboard EAP, Remove vessel from damage areas and re-berth, Port DMP, POLREP, Port OSCP.

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
12.8	C	Contact / Collision	Contact / Collision – with the lock gate (Area C)	Environmental conditions (poor visibility, high current flows, unpredicted current eddies, channel size/ depth), unexpected Wind effect, Parting of tow line, High rate of turn, Misjudgment, Human error (fatigue, lack of knowledge, etc.), Breakdown of tugs, vessel equipment failure, maneuvering constraint of vessel.	Weather monitoring, suspension of vessel movement on increase of wind speed beyond permissible limit, Use of additional tugs, Use of electronic aid, proper bridge team management, use of all navigational aids, PMS.	Minor Damage to vessel &/or Tug / Lock gate	Major damage to Tug / Lock gate, Temporary port closure, Injury to Personnel.	**0**	**1**	**0**	**0**	**2**	**1**	**2**	**0**	**3**	**3**	Report incident to Port & relevant authority, Shipboard EAP, Port DMP.

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
12.9	A & B	Contact/Riding over the buoy	Contact with channel marking buoys (Area A, B)	Vessel equipment failure/ malfunction (navigational propulsion, steering, auxiliary), Human error (improper communication, Fatigue), Environmental conditions (poor visibility, high current flows, unpredicted current eddies, channel size/ depth), results of avoiding action (e. g. small craft), navigational failure (markers, lights), Drifting of channel marking buoy.	PMS, VTMS, Training, adequate work/rest hour, situational awareness, weather monitoring, Standard operating procedure, suspension of vessel movement on increase of wind speed beyond permissible limit, information about the location of missing buoys.	Minor Damage to vessel &/or buoy	Major damage to the buoy, Grounding, Oil pollution (damage to flora & fauna, loss of fishing activity), Blockage of navigational channel	0	1	0	0	2	0	2	1	2	4	Report incident to Port & relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP.

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
12.10	A & B	Fire	Fire on vessel in the Navigational channel (Area A, B)	Fire caused by faulty equipment (e.g. engine room fire, electrical fire), fire caused by human error (fatigue), failure to take appropriate precautions with gas bottles and/or inflammable vapour, failure to take the appropriate precaution when carrying specific cargoes (Coal/Sulphur etc.), fire in containers.	PMS, VTMS, Proper electrical connections and earthing, training, adequate work/rest hour, situational awareness, SMS, fire-fighting assistance from FIFI tugs, Inert Gas system.	Minor damage to vessel, Injury to personnel	Major damage to vessel, Stranding / Grounding or sinking of vessel, Oil / HNS pollution (damage to flora & fauna, loss of fishing activity), Drifting of vessel and collision with other vessel, Blockage of navigational channel, Loss of life.	2	2	0	1	2	3	3	1	3	3	Report incident to Port & relevant authority, Shipboard EAP, Port DMP, POLREP, Port OSCP.

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
12.11	A	Fire	Fire on vessel at anchorage (Area A)	Fire caused by faulty equipment (e.g. engine room fire, electrical fire), fire caused by human error (fatigue), inadequate precautions during hot work, failure to take appropriate precautions with gas bottles and/or inflammable vapour, failure to take the appropriate precaution when handling specific cargoes (Coal/Sulphur etc.), fire in containers.	PMS, VTMS, Proper electrical connections and earthing, training, adequate work/rest hour, situational awareness, Safety precautions, SOP, fire-fighting assistance from FIFI tugs, Inert Gas system.	Minor damage to vessel, Injury to personnel	Major damage to vessel, Stranding / Grounding of vessel, Oil / HNS pollution (damage to flora & fauna, loss of fishing activity), drifting of vessel leading to collision with other vessel, Loss of life.	2	2	0	2	2	4	4	2	3	3	Report incident to Port & relevant authority, Shipboard EAP, Port DMP, POLREP and Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
12.12	B & C	Fire	Fire on vessel at Berth / Jetty (Area B, C)	Fire caused by faulty equipment (e.g. engine room fire, electrical fire), fire caused by human error (fatigue), inadequate precautions during hot work, failure to take appropriate precautions during operations, Fire spread from one jetty to other, fire in containers.	PMS, Proper electrical connections and earthing, training, adequate work/rest hour, situational awareness, SMS, SOP, Fixed firefighting system, intrinsically safe equipment, fire-fighting assistance from FIFI tugs and port fire-fighting system.	Minor damage to vessel, Injury to personnel.	Major damage to vessel, Stranding / Grounding or sinking of vessel, Oil / HNS Pollution (damage to flora & fauna, loss of fishing activity), Loss of life.	1	1	0	1	2	3	3	1	3	3	Report incident to Port & relevant authority, Shipboard EAP, Port DMP, POLREP and Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
DISASTER IN SERVICE AND ADMINISTRATION FACILITIES																		
13	C	**Fire**	Fire in the Admin building/ VTMS/ Control rooms/ Hospital/E lectrical Substation	Short circuit, Smoking	Portable Fire extinguishers, Fixed fire-fighting system	Minor fire incident leading to minor damage, injury to the personnel.	Major fire incident, Property damage, Loss of life	**2**	**1**	**0**	**1**	**2**	**3**	**3**	**1**	**3**	**4**	Activation of port DMP
HUMAN RELATED DISASTER																		

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
14	A, B, C	**Civil Disturbance**	Fire/ Explosion	War and Terrorism, Bomb Threat	Continuous Monitoring on News channel, Radio, Newspapers, mails, Security, Continuous Vigilance	Damage to vessels, Shore structures	Major damage to shore structures e.g. cranes, Major damage to vessel & Oil/ HNS pollution, Capsizing & port closure	**3**	**3**	**3**	**4**	**-**	**4**	**4**	**4**	**4**	**-**	CISF EAP, Activation of port and terminal DMP, POLREP, Activation of port and terminal OSCP
NATURAL DISASTER																		

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
15.1	A, B, C	**Natural Disaster**	Cyclone	Natural cause (high wind)	Weather Monitoring and Public Warning system, SOP for cyclone /cyclone contingency plan implemented by respective terminals and port.	Minor Damage to tugs, pilot boats, Shore structures, Injury to personnel, uprooting of tress	Major damage to shore structures e.g. loading arms etc, Major damage to tugs, pilot boats & pollution, Capsizing & port closure, Serious injury to personnel, Flooding and damage to road structures and uprooting of trees	**2**	**2**	**1**	**2**	**1**	**4**	**4**	**3**	**4**	**2**	Shipboard EAP, Port DMP and terminal EAP, POLREP, Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
15.2	A, B, C	Natural Disaster	Flood	Natural cause (thunderstorm, cyclone), Inadequacy and improper maintenance of the drainage system, rise of tide level and wave heights	Weather Monitoring and Public Warning system, drainage system, physical barriers	Minor Damage to tugs, pilot boats, Shore structures & port property, Injury to personnel, minor damage to the road structures	Major damage to shore structures e.g. loading arms etc, Major damage to tugs, pilot boats & pollution, Capsizing & port closure, Serious injury to personnel, major damage to road structures	1	2	1	2	1	3	3	2	4	2	Shipboard EAP, Port DMP and terminal EAP, POLREP, Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
15.3	A, B, C	Natural Disaster	Tsunami	Natural cause (Earthquake in seabed)	Weather Monitoring and Public Warning system, Shipboard emergency procedure	Not Applicable	Major damage to shore structures e.g. loading arms etc, Major damage to tugs, pilot boats & pollution, Capsizing & port closure, Serious injury/fatality to personnel	-	-	-	-	-	4	4	3	4	4	Port DMP and terminal EAP, POLREP, Port OSCP

Scenario No. *	Area #	Category	Hazard /Disaster Detail	Possible Causes	Hazard Reduction Barriers	MCS	WCS	Hazard/Disaster Assessed										Mitigation
								Most Credible Impact					Worst Credible Impact					
								People	Property	Environment	Business	Frequency	People	Property	Environment	Business	Frequency	
15.4	A, B, C	**Natural Disaster**	Earthquake	Natural cause	Earthquake resilient structural design (as per relevant standards), Periodic Assessment and reinforcement of old structures	Minor damage to properties/ structures/ cranes, Injury to personnel	Major damage to shore structures e.g. loading arms etc, major damage to pipelines, Oil/ chemical pollution, Major damage properties/structures/cranes, port closure, Serious injury/ fatality to personnel	**1**	**1**	**0**	**1**	**3**	**4**	**3**	**1**	**4**	**4**	Shipboard EAP, Port DMP and terminal EAP, Port OSCP

Note:
Area A – Approach to Haldia Dock Complex (West Anchorage Point to Pilot Boarding point)
Area B – Riverine passage area (from Pilot Boarding point to lock gate)
Area C – Lock gate to Berth / Jetty impounding dock basin

2.2.8 Risk Estimation

2.2.8.1 Consequence (Impact) and Frequency Assessment

Assessment of consequence has been done considering the effect of potential accidents on -

- Life (e.g. personal injury, fatality, etc.),
- Property damage (e.g. damage to port, damage to ship),
- Environment (Oil pollution, Air pollution, soil contamination etc.),
- Port Business (reputation, financial loss, etc.).

Scale	People	Property	Environment	Port Business / Port stakeholders
I0	No injury	No damage	Negligible environmental impact (<1T)	Negligible
I1	Minor (Single slight injury)	Minor damage	Minor (<100 T) Tier 1 oil spill, Minimal environmental harm	Minor
I2	Slight (multiple minor or single major injury)	Local damage	Moderate (100T – 700T) Tier 1 (limited outside assistance) oil spill or environmental amenity impaired, Moderate environmental impact	Moderate Bad local publicity or short-term loss of dues, revenue, etc.
I3	Serious (multiple major injuries or single fatality)	Major damage	Serious (>700T) Tier 2 (regional assistance) oil spill, localized flooding or multiple amenities impaired, Long term or serious environmental damage	Serious Bad widespread publicity, temporary port closure or prolonged restriction of navigation
I4	Major (More than one fatality)	Total loss	Major Tier 3 (national assistance) oil spill, widespread flooding or extensive damage to amenities, Major environmental harm. e.g. major pollution incident causing significant damage or potential to health or the environment	Major Port closes, navigation seriously disrupted for more than 1-2 days. Long term loss of trade

Table 2.6: Scale of Impact (I0 – I4)

Category	Descriptive term	Definition
F1	Frequent	An event occurring once in a operating year
F2	Likely	An event occurring once a year to once every 10 operating years
F3	Remote	An event occurring once every 10 operating years to once in 50 operating years
F4	Unlikely	An event occurring once every 50 operating years to once in 100 operating years
F5	Rare	An event occurring once in more than 100 operating years

Table 2.7: Frequency scale (F1- F5)

2.2.8.2 Risk Assessment Matrix

For each identified hazard, risk quantification is done based on a scale of 1 (low risk) to 10 (high risk) as described in the Table 2.8 as below:

Impact	**I4**	**5**	**6**	**7**	**8**	**10**
	I3	**4**	**5**	**6**	**7**	**9**
	I2	**3**	**3**	**4**	**6**	**8**
	I1	**1**	**2**	**2**	**3**	**6**
	I0	**0**	**0**	**0**	**0**	**0**
Frequency		**F5**	**F4**	**F3**	**F2**	**F1**

Table 2.8: Risk Assessment Matrix

Where: -

0 & 1 - Negligible Risk
2 & 3 - Low Risk
4 & 5 – Assessed to be in ALARP region
6 – Heightened Risk
7, 8 & 9 - Significant Risk
10- High Risk

Based on the values of frequency and impact as assessed, Risk Ranking have been done in Table 2.9 for each of the four impact entities as described in Table 2.6 both for the 'most likely' and the 'worst credible' scenarios as mentioned in Table 2.5 Hazard Assessment Worksheet.

2.2.8.3 Risk Ranking

The risk score of each of the four categories (People, Property, Environment and Business) is analyzed to obtain four indices for each hazardous scenario as follows:

a) The average risk value of the four categories in the 'most likely' set.
b) The average risk value of the four categories in the 'worst credible' set.
c) The maximum risk value of the four categories in the 'most likely' set.
d) The maximum risk value of the four categories in the 'worst credible' set.

The hazardous scenarios list is then sorted in order of the aggregate of the four indices to produce an Assessed Risk Ranking List, in descending order, with the highest risk scenario prioritized at the top.

Scenario No.	Rank No.	Category	Hazard Detail	Assessed Risk							
				Most Credible				Worst Credible			
				People	Property	Environment	Business	People	Property	Environment	Business
25	1	**Natural Disaster**	Cyclone	8	8	6	8	8	8	7	8
26	2	**Natural Disaster**	Flood	6	8	6	8	7	7	6	8
1	3	**Fire / Explosion**	Fire /Explosion due to LPG/POL/ Chemical leakage at Oil Jetty (1, 2)	7	6	3	6	7	6	4	6
8	4	**Fire**	Leakage/Fire due to Crane Accidents (Container drop/crane fall)- secondary event	6	8	0	6	6	6	2	4
9	5	**Fire**	Fire in Coal Stack yard	6	6	6	6	4	4	6	4
3	6	**Toxic**	Toxic gas (Ammonia) leak during operation – on Ship or Ashore at Oil Jetty - 1	7	0	3	3	7	0	4	6
22	7	**Fire**	Fire on vessel at anchorage (Area A)	6	6	0	6	6	6	3	5
4	8	**Fire**	Fire /Explosion due to chemicals leakage at Multipurpose berth no. 4	6	3	3	3	6	6	4	6
21	9	**Fire**	Fire on vessel in the Navigational channel (Area A, B)	6	6	0	3	6	6	2	6
17	10	**Grounding**	Grounding – Tanker/Container/BC/Heavy lift vessel – Pilot not onboard (Area A)	3	6	0	3	6	6	4	6
2	11	**Fire / Explosion**	Fire /Explosion due to LPG/POL leakage at Oil Jetty – 3	6	3	3	3	6	4	2	4
24	12	**Fire**	Fire in the Admin building/ VTMS/Control rooms/Hospital/Electrica	6	3	0	3	5	5	2	5

			l Substation								
11	13	**Fire**	Fire in the rail tank wagons carrying POL	3	3	3	3	6	6	2	6
13	14	**Collision**	Collision between two vessels (Area A, B)	2	4	0	2	5	5	3	6
7	15	**Corrosive**	Corrosive acid (Phosphoric/Sulphuric) leakage at Oil jetty – 1 & 2.	3	3	0	3	6	4	4	6
12	16	**Collision**	Collision of small craft with Tanker / Container / BC/Heavy lift vessel (Area A)	3	3	0	0	6	7	2	4
23	17	**Fire**	Fire on vessel at berth/jetty (Area B, C)	3	3	0	3	6	6	2	6
15	18	**Collision**	Dragging Anchor (Area A)	3	3	0	0	6	6	4	6
16	19	**Grounding**	Grounding – Tanker/Container/BC/Heavy lift vessel – Pilot onboard (Area B)	0	3	0	3	6	6	4	6
5	20	**Fire / Explosion**	Rupture/leakage of POL/Chemical Pipeline from Oil Jetties (1,2 and 3) (Manifold to terminal within port area)	3	3	3	3	5	3	3	5
27	21	**Natural Disaster**	Earthquake	2	2	0	2	6	5	2	6
6	22	**Toxic**	Rupture /leakage of Liquid Ammonia **Pipeline** from Oil jetty - 1.	3	3	0	3	5	3	2	5
10	23	**Fire**	Fire in the conveyor system carrying coal	3	3	3	3	4	4	4	4
18	24	**Contact**	Tanker/Container/BC/Heavy lift vessel tug assisted berthing – Contact with Berth/Jetty/shore installations (Area B, C)	0	3	0	3	5	5	2	5
19	25	**Contact**	Contact / Collision – with the lock gate (Area C)	0	3	0	0	2	4	0	6
14	26	**Collision**	Collision of vessel with dredger (Area A, B)	0	2	0	2	5	5	3	5
20	27	**Contact**	Contact with channel	0	3	0	0	0	3	2	3

			marking buoys (Area A, B)								
28	28	**Civil Disturbance**	Fire/Explosion (War and Terrorism, Bomb Threat)	-	-	-	-	-	-	-	-
29	29	**Natural Disaster**	Tsunami	-	-	-	-	6	6	5	6

Table 2.9: Risk ranking for HDC for identified hazards

Note1: *Scenario number 28 cannot be ranked because frequency of* ***Civil Disturbance*** *scenario cannot be assessed, hence risk rating for the most credible and worst credible impacts on people, property, environment and business have not been given in the Hazard Assessment Worksheet.*

Note2: *Scenario number 29 cannot be ranked because* ***Tsunami*** *can most probably lead to worst case impact on people, property, environment and business and hence rating for the most credible impacts has not been given in the Hazard Assessment Worksheet.*

3. HAZARD SPECIFIC PREVENTION & MITIGATION MEASURES

3.1 PREVENTIVE AND MITIGATION MEASURES

In accordance with the guiding principle of Sendai Framework, Disaster Risk Reduction (DRR) requires responsibilities to be shared by different divisions/departments of port and various stakeholders. The effectiveness in disaster risk reduction will depend on coordination mechanisms within and across departments and with relevant stakeholders at all levels. For each identified hazard/disaster, the approach used in DM plan incorporates the four priorities enunciated in the Sendai Framework into the framework for DRR under the six thematic areas for action as follows

1. Understanding Risk
2. Inter-Agency Coordination
3. Investing in DRR – Structural Measures
4. Investing in DRR – Non-Structural Measures
5. Capacity Development
6. Climate change risk management

3.1.1 Understanding Risk

This thematic area for action focuses on understanding disaster risk, the Priority-1 in the Sendai Framework integrates into it numerous actions needed for strengthening disaster resilience. The major themes for action are: a) Observation Networks, Information Systems, Research, Forecasting, b) Zoning / Mapping, c) Monitoring and Warning Systems, d) Hazard Risk and Vulnerability Assessment (HRVA), and e) Dissemination of Warnings, Data, and Information. Having adequate systems to provide warnings, disseminate information, and carry out meaningful monitoring of hazards are crucial to disaster risk reduction, and improving resilience. They are also an integral part of improving the understanding of risk.

3.1.2 Inter-Agency Coordination

Inter-agency coordination is a key component of strengthening the disaster risk governance Priority-2 of the Sendai Framework. The major themes for action required for improving the top-level interagency coordination are a) Overall disaster governance b) Response c) Providing warnings, information, and data and d) Non-structural measures.

3.1.3 Investing in DRR – Structural Measures

Undertaking necessary structural measures is one of the major thematic areas for action for disaster risk reduction and enhancing resilience. These consist of various physical infrastructure and facilities required to help communities cope with disasters. The implementation of these measures is essential to enhance disaster preparedness, a component of Priority-4 of the Sendai Framework. It is also an important component of investing in disaster risk reduction for resilience, which is Priority-3 of Sendai Framework.

3.1.4 Investing in DRR – Non-Structural Measures

Set of appropriate laws, mechanisms, and techno-legal regimes are crucial components in strengthening the disaster risk governance to manage disaster risk, which is Priority-2 of the Sendai Framework. These non-structural measures comprising of laws, norms, rules, guidelines, and techno-legal regime (e.g., building codes) framework and empowers the authorities to mainstream disaster risk reduction and disaster resilience into development activities.

3.1.5 Capacity Development

Capacity development is a theme in all the thematic areas for action. The Sendai Priority-2 (Strengthening DRR governance to manage DR) and Priority-3 (Investing in DRR for resilience) are central to capacity development. The capacity development includes training programs, curriculum development, large-scale awareness creation efforts, and carrying out regular mock drills and disaster response exercises. The capability to implement, enforce, and monitor various disaster mitigation measures has to be improved at all levels from the local to the higher levels of governance. It is also strengthening the DRR governance at all levels to better manage risk and to make the governance systems more responsive.

3.1.6 Climate change risk management

Climate change significantly alters the geographic spread, frequency and intensity of hydro metrological extreme events. It can also exacerbate their impacts. Investments in DRR can play an important role in supporting communities to adapt to climate change.

3.2 HAZARD-WISE RESPONSIBILITY MATRICES FOR DISASTER RISK MITIGATION

For the successful implementation of DM plans, it is necessary to identify various stakeholders within the port and clearly specify their roles and responsibilities. For each hazard/disaster, in the subsections that follow, themes for action are presented in a separate responsibility matrix for each of the five thematic areas for action. The port will play a pro-active role in disaster situations. In the domains of DM planning, preparedness, and capacity building, the port will constantly work to upgrade DM systems and practices. This section covers the matrices for the identified hazards relevant to HDC as listed below:

Hazard		Chemical Disaster (Riverine Berths - Oil Jetty 1,2 and 3, Barge Jetty 1 & 2, Impound Dock basin - Berth no. 3, 4, 4A, 5, 6, HICT Berth)					
1. Thematic area		Understanding Risk					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Information Systems and Research	Support and coordination	• SMP-HDC – Identified as single entity however port should consider relevant dept. and mentioned with name, • Operators.	• Inventory of chemicals handled, • Coordination with vessel for Ship to Shore checklist.			
		Information on (operation and during emergency) dealing with HAZCHEM	• SMP-HDC, • Operators.	• MSDS copy maintained, • Hazardous Waste Management Plan.			
		Chemical Accident Information Reporting System	• SMP-HDC, • Operators.	• Incidents records maintained with individual terminals	Centralized mechanism for data collection /incident database with SMP-HDC		

Hazard		Chemical Disaster (Riverine Berths - Oil Jetty 1,2 and 3, Barge Jetty 1 & 2, Impound Dock basin - Berth no. 3, 4, 4A, 5, 6, HICT Berth)					
1. Thematic area		Understanding Risk					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
2	Zoning/ Mapping	Industrial zones on basis of hazard potential and effective disaster management for worst case scenarios	• SMP-HDC, • Operators.	• Hazardous area classification has been carried out for oil jetties, • Barricading of area inside impound basin			
			• SMP-HDC, • Operators.	• Updation of zoning carried out regularly after any addition or up-gradation of the facility.	Periodic updating of plans		
		Carry out the mapping and related studies in collaboration with central agencies/ technical organizations	• SMP-HDC, • Operators.	Port layout map, Pipeline layout map, DG storage area map, Firefighting system layout map, Port Railway Route Map.	• Provision of Hazardous bund for DG containers • Updation of map	Adhere to CRZ mapping	Land Use Plan
3	Monitoring	Monitoring compliance with safety norms for HAZCHEM	• SMP-HDC, • Operators.	• Checklist, • Standard Operating Procedure, • CCTV surveillance available covering entire port area.			
		Disposal of hazardous	• SMP-HDC,	• Recording and			

Hazard		Chemical Disaster (Riverine Berths - Oil Jetty 1,2 and 3, Barge Jetty 1 & 2, Impound Dock basin - Berth no. 3, 4, 4A, 5, 6, HICT Berth)					
1. Thematic area		Understanding Risk					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
		waste	• Operators.	Monitoring of generation of hazardous waste, • Disposal of waste through WBPCB approved waste management parties.			
4	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	Undertake and provide technical support to HRVCA as part of preparing and periodic revision of DM plans	• SMP-HDC, • Operators.	• Port DMP as per Disaster Management Act -2005, NDMA Guidelines 2018 and NDMP 2019, • Port OSCP, • Emergency Action Plan (EAP), • Emergency Response Disaster Management Plan (ERDMP).	Update plans		
		Constitute/ strengthen the mechanism for consultation with experts and stakeholders	• SMP-HDC, • Operators.	Mechanism for strengthening of the port disaster management through • Standard Operating Procedures,	• Prepare plans for removal of abandoned pipelines at Oil Jetties, • Provisioning of fixed		Land Use Plan, Business Development Plan, Environment Management Plan.

Hazard		Chemical Disaster (Riverine Berths - Oil Jetty 1,2 and 3, Barge Jetty 1 & 2, Impound Dock basin - Berth no. 3, 4, 4A, 5, 6, HICT Berth)					
1. Thematic area		Understanding Risk					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
				• Periodical inspection, • Audits (Structural, Fire and Safety), • Mock Drills, • Training and Awareness, • Land use planning.	detector at Ammonia handling jetty.		

Hazard	Chemical Disaster (Riverine Berths - Oil Jetty 1,2 and 3, Barge Jetty 1 & 2, Impound Dock basin - Berth no. 3, 4, 4A, 5, 6, HICT Berth)					
2. Thematic area	Inter- agency coordination					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Overall disaster governance	Providing coordination, technical inputs, and support, Periodical inspection from competent agencies.	• SMP-HDC, • Operators.	• Emergency Operation Centre, • Coordination with DRR Cell (at MoS level), • Coordination with SDMA and DDMA, • PNGRB, WBPCB, OISD, MoEF inspection.	Compliance of periodical inspections.		
		Address/ identify gaps in equipment/ infrastructure and human resources with DM tasks	• SMP-HDC, • Operators.	• Developmental project reports, • Safety Committee Meetings	Gap analysis / Periodic reviews in equipment/ infrastructure and human resources e.g. Oil Jetty- Fire fighting		
2	Response	Organizing and coordinating with Government agencies and stakeholders of the port	• SMP-HDC, • Vessel Master, • CISF, • Operators.	• Coordinating with CMG group, • Coordinating with Vessel Master, • Coordinating with Govt. Agencies (DG Shipping, NDMA, SDRF, DDMA, Local admin., ICG,	Periodic renewal of Mutual Aid Agreements		

Hazard		Chemical Disaster (Riverine Berths - Oil Jetty 1,2 and 3, Barge Jetty 1 & 2, Impound Dock basin - Berth no. 3, 4, 4A, 5, 6, HICT Berth)					
2. Thematic area		Inter- agency coordination					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
				MMD, PESO, WBPCB, Navy, etc.), • Mutual aid agreement with relevant stakeholders.			
3	Warnings, Information, data	Effective coordination and seamless communication among various stakeholders	• SMP-HDC, • Vessel Master, • CISF, • Operators.	• VHF/MF/UHF, • Satellite Phone, • Radio Over IP, • Mobile, • Landline, • PA system, • Emergency Siren, • Email and TELEX.			
		Dissemination of warnings and information	• SMP-HDC, • Vessel Master, • CISF, • Operators, • Local and District Authority.	Dissemination of information to/from • Vessel Master, • CMG, • MoS, DG shipping, NDMA, ICG, MMD, PESO, WBPCB, Navy, Local Authorities, • Any other relevant authority			

Hazard		Chemical Disaster (Riverine Berths - Oil Jetty 1,2 and 3, Barge Jetty 1 & 2, Impound Dock basin - Berth no. 3, 4, 4A, 5, 6, HICT Berth)					
3. Thematic area		Investing in DRR – Structural measures					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Evacuation and support facilities. Multiple routes for reliable access and escape. Decontamination facilities	• Identification of hospitals and first aid	• SMP-HDC, • CISF, • Operators, • Local Authorities.	• HDC Hospital, • Tie up with nearby hospitals, • First Aid centers, • Ambulances.		Expansion of Hospital facilities	
		• Ensuring fresh water storage facilities for drinking purpose	• SMP-HDC	• Municipal water supply available, • Water tankers.			
		• Providing wide roads and multiple routes to allow quick access by first responders and to ensure escape pathways	• SMP-HDC	**Evacuation by Land facilities** • Gate complexes available, • Internal roads, • Port and hired vehicles, • Individual terminal vehicles, • Coordination with Local administration, • Land Use Planning, • Vehicle Traffic management.	• Repair of Internal roads, • Secondary Evacuation Pathway for OJ 1 and 2, • Repair of wooden pathway of Barge Jetty.		

Hazard		Chemical Disaster (Riverine Berths - Oil Jetty 1,2 and 3, Barge Jetty 1 & 2, Impound Dock basin - Berth no. 3, 4, 4A, 5, 6, HICT Berth)					
3. Thematic area		Investing in DRR – Structural measures					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
				Evacuation by sea route facilities • Port owned/hired crafts, • Vessel Traffic Management system.			
		• Establish decontamination facilities	• SMP-HDC	Personnel decontamination • HDC Hospital, • Tie up with nearby hospitals, • First Aid Facilities, • Eyewash and Safety Showers.			
2	Disaster Response equipment	Ensuring (as per OISD and other relevant requirements) and maintaining fire-fighting equipment	• SMP-HDC, • Operators.	• Fire-fighting as per OISD-156 is available for OJ-3, • Port Fire Station, • Mutual Aid Agreement with the Stakeholders, • Fire Water storage facilities (available for OJ-3), Sea water used for fire fighting, • FIFI Tugs, • Fire hydrant line for	• Fire-fighting as per OISD-156 funder upgradation for OJ-1 & 2, • Provision of Fire-fighting as per OISD-156 for berths handling class B cargoes e.g. Xylene.		

Hazard		Chemical Disaster (Riverine Berths - Oil Jetty 1,2 and 3, Barge Jetty 1 & 2, Impound Dock basin - Berth no. 3, 4, 4A, 5, 6, HICT Berth)					
3. Thematic area		Investing in DRR – Structural measures					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
				impound basin area with pump house.			
		Ensuring (as per ICG requirements) and maintaining oil pollution response equipment	• SMP-HDC, • Operators.	• Pollution response equipment as per the NOS DCP requirement, • Mutual Aid Agreement with the Stakeholders.	Provision of Oil Spill Tier 1 equipment as per ICG requirement – Deficiencies to be met.		

Hazard		Chemical Disaster (Riverine Berths - Oil Jetty 1,2 and 3, Barge Jetty 1 & 2, Impound Dock basin - Berth no. 3, 4, 4A, 5, 6, HICT Berth)					
4. Thematic area		Investing in DRR – Non- Structural measures					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Laws Regulations, Techno Legal regimes Enforcement, compliance and Monitoring Institutional arrangements	Formulate/ strengthen the SOP for the compliance w.r.t. the statutory requirements ensuring greater safety in hazardous industries and reduce the likelihood of disasters	• SMP-HDC, • Operators.	• Periodical inspection and testing of Oil/chemical Pipelines, • Periodical inspection and testing of Hoses, • Audit - Fire, Safety, • Risk Assessment, • Safety committee meetings.	Compliance of recommendations		
2	Risk Transfer	Insurance	• SMP-HDC, • Operators.	• Workmen Compensation Policy, • Public Liability Insurance, • Property Insurance, • Oil pollution insurance.	Periodic Renewals of Policies		

Hazard	Chemical Disaster (Riverine Berths - Oil Jetty 1,2 and 3, Barge Jetty 1 & 2, Impound Dock basin - Berth no. 3, 4, 4A, 5, 6, HICT Berth)						
5. Thematic area	Capacity Development						
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Training	• Training and orientation programs on management (handling, storage and transfer) and disposal of HAZCHEM • Incorporating disaster response, search and rescue in the training programs	• SMP-HDC, • Operators, • CISF.	• IMO level training (OSR) for the identified personnel, • ISO and OHSAS training, • Fire-fighting training, • Safety Training, • First Aid training, • CBRN training, • Hazard identification and management training.			
2	Mock drills/ Exercises	• Planning and execution of emergency drills by all the	• SMP-HDC, • Operators, • CISF, • Other stakeholders.	• Mock drills conducted regularly with all the stakeholders, • Annual drill schedule.			

Hazard		Chemical Disaster (Riverine Berths - Oil Jetty 1,2 and 3, Barge Jetty 1 & 2, Impound Dock basin - Berth no. 3, 4, 4A, 5, 6, HICT Berth)					
5. Thematic area		Capacity Development					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
		stakeholders					
		• Joint planning and execution of emergency drills	• SMP-HDC, • Operators, • CISF, • Other stakeholders.	• Organise and participation (involving all the stakeholders) mock-drills through various government agencies like ICG, CISF, NDRF, NSG, SDMA, Local authorities, etc.			
3	Documentation	Ensure accurate documentation of all aspects of disaster events for creating good historical records for future research and Risk Management planning	• SMP-HDC, • Operators, • CISF.	• Maintenance of the incident and near miss record. • Accident/incident reporting, analysis, investigation and implementation of recommendations.	Centralized mechanism for documentation		

Hazard		Chemical Disaster (Riverine Berths - Oil Jetty 1,2 and 3, Barge Jetty 1 & 2, Impound Dock basin - Berth no. 3, 4, 4A, 5, 6, HICT Berth)					
5. Thematic area		Capacity Development					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
4	Awareness	Promote culture of disaster risk prevention, mitigation, and better risk management	• SMP-HDC, • Operators, • CISF, • Other stakeholders.	• Safety day/week celebration, • Award and recognition, • Fire week celebration, • Environment day celebration • Safety Bulletins, • Periodic Health Check- up (PME Periodical medical examination), • Road safety week.			

Hazard		Fire (Office buildings, VTMS, Hospital, Electrical substations, Pump house, Control Rooms, Transit shed, HICT, Coal stackyard, Conveyor belt etc.)					
1. Thematic area		Understanding Risk					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Information Systems and Research	Support and coordination	• SMP-HDC, • Operators.	• Port Fire Station, • Nearby fire station.			
2	Zoning/ Mapping	Mapping of sites that pose fire risks	• SMP-HDC, • Operators.	• Fire system layout, • Electrical system layout, • Coal stack yard identified as a fire risk zone, • Dedicated storage area for reefer containers.	• Update layout plans, • Display of layout maps at suitable locations.		
3	Monitoring	Monitoring compliance with safety norms	• SMP-HDC, • Operators.	Continuous monitoring of: • Fire, smoke and heat detection system, • Fire Annunciation Panel, • CCTV surveillance, • Manning/Patrolling of the areas.	Periodic reviews about the efficacy.		

Hazard		Fire (Office buildings, VTMS, Hospital, Electrical substations, Pump house, Control Rooms, Transit shed, HICT, Coal stackyard, Conveyor belt etc.)					
1. Thematic area		Understanding Risk					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
4	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	Undertake HRVCA as part of preparing and periodic revision of DM plans	• SMP-HDC, • Operators.	• Port DMP as per Disaster Management Act -2005, NDMA Guidelines and NDMP, • Emergency Action Plan (EAP)	Periodic Updation of plans		
		Constitute/ strengthen the mechanism for consultation with experts and stakeholders	• SMP-HDC, • Operators.	Mechanism for strengthening of the port disaster management through • Periodical inspection and testing of response equipment, • Fire Audit, • Capacity analysis, • Drills, • Training and Awareness, • Safety Committee meetings.	Compliance of recommendations		

Hazard		Fire (Administration building, VTMS, Hospital, Electrical substations, Pump house, Control Rooms, HICT, Transit shed, Coal stackyard, Conveyor belt etc.)					
2. Thematic area		Inter- agency coordination					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Overall disaster governance	Identify and address the gaps in existing capabilities, equipment, infrastructure, and human resources	• SMP-HDC, • CISF, • Operators, • Hospital.	• Emergency Operation Centre, • Periodic reviews and upgradation of the fire systems/equipment and manpower as per the relevant standards and best practices.			
		Establish fire stations	• SMP-HDC.	• Port Fire station, • Identified list of nearby Fire Stations.			
		Implementation of DM plans	• SMP-HDC, • CISF, • Operators, • Hospital.	• Conducting fire and evacuation drills, • Training and Awareness, • Mutual aid agreement for sharing of resources.	Implementation of the updated DMP, Periodic renewal of Mutual Aid Agreement		
2	Response	Organizing and coordinating the immediate	• SMP-HDC, • CISF, • Operators, • Hospital.	• Activation of DM Plan, • Coordinating with Fire station (HDC & External e.g. Haldia Fire station, etc.),			

Hazard		Fire (Administration building, VTMS, Hospital, Electrical substations, Pump house, Control Rooms, HICT, Transit shed, Coal stackyard, Conveyor belt etc.)					
2. Thematic area		Inter- agency coordination					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
		response Coordinate with Government agencies and stakeholders of the port		• Coordination with SDMA and DDMA.			
3	Warnings, Information, data	Effective coordination and seamless communication	• SMP-HDC, • CISF, • Operators, • Hospital.	Coordination among various port stakeholders and CMG to ensure quick, clear, effective dissemination of warnings, information and data via • VHF /MF/UHF, • ROIP, • Landline, • PA system, • Mobile Phones, • Emergency Siren, • Email and TELEX.			

Hazard		Fire (Administration building, VTMS, Hospital, Electrical substations, Pump house, Control Rooms, HICT, Transit shed, Coal stackyard, Conveyor belt etc.)					
3. Thematic area		Investing in DRR – Structural measures					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Smoke, Heat, Fire detection and fire-fighting systems	Procurement and maintenance of fire Fighting systems as per relevant Standard and Rules	• SMP-HDC, • Operators.	• Periodical testing and maintenance of the fire detection and fire-fighting system • Emergency Siren, • Portable fire-fighting facility at Electrical substation, Hospital, Admin building, VTMS, and Control Centres.	• Periodical up-gradation and maintenance of the fire detection and fire- fighting system.		
2	Evacuation and support facilities. Multiple routes for reliable access and escape.	Identification of Assembly points	• SMP-HDC, • CISF, • Operators, • Hospital.	• Identified assemble points.	Updation of assembly points and sign boards.		
		Providing vehicles for safe transportation	• SMP-HDC, • CISF, • Operators, • Hospital.	List of • Passenger vehicles of HDC as per **Appendix C**. • Passenger vehicles of operators, • Passenger vehicles of CISF.	• Periodical repair of Internal roads.		

Hazard		Fire (Administration building, VTMS, Hospital, Electrical substations, Pump house, Control Rooms, HICT, Transit shed, Coal stackyard, Conveyor belt etc.)					
3. Thematic area		Investing in DRR – Structural measures					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
3	First aid and Decontamination facilities	• Establish First aid and decontamination facilities • Identification of hospital	• SMP-HDC, • CISF, • Operators, • Hospital.	Personnel first aid and decontamination • HDC Hospital, • Other identified hospitals, • First aid facility of HDC as per **Appendix C**.			

Hazard	Fire (Administration building, VTMS, Hospital, Electrical substations, Pump house, Control Rooms, HICT, Transit shed, Coal stackyard, Conveyor belt etc.)						
4. Thematic area	Investing in DRR – Non- Structural measures						
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Rules, laws, guidelines	Strict implementation and strengthening of fire safety rules	• SMP-HDC, • CISF, • Operators, • Hospital.	• Fire-fighting and evacuation plan, • Safety Committee Meeting, • Environment, Health and Safety Policy, • Safety budget, • Work Permit System.			
2	Fire safety audit of structures and buildings	Carry out fire safety audit of buildings and critical infrastructure	• SMP-HDC, • Operators.	• Periodic Fire audit.	Compliance of recommendations.		
3	Risk Transfer	Insurance	• SMP-HDC, • CISF, • Operators, • Hospital.	• Workmen Compensation Policy, • Public Liability Insurance, • Property Insurance.	Periodical renewal of policies.		

Hazard		Fire (Administration building, VTMS, Hospital, Electrical substations, Pump house, Control Rooms, HICT, Transit shed, Coal stackyard, Conveyor belt etc.)					
5. Thematic area		Capacity Development					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Training	Incorporating disaster response in the training programs	• SMP-HDC, • CISF, • Operators, • Hospital.	• Induction/Refresher Training, • Fire-fighting training, • First Aid training.			
2	Mock drills/ Exercises	Planning and execution of emergency drills by all the stakeholders Joint planning and execution of emergency drills	• SMP-HDC, • CISF, • Operators, • Hospital.	• Annual Drill schedule, • Joint Mock Drill.			

Hazard	Fire (Administration building, VTMS, Hospital, Electrical substations, Pump house, Control Rooms, HICT, Transit shed, Coal stackyard, Conveyor belt etc.)
5. Thematic area	Capacity Development

Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
3	Documentation	Ensure accurate documentation of all aspects of disaster events for creating good historical records for future research and Risk Management planning	• SMP-HDC, • CISF, • Operators, • Hospital.	• Maintenance of the incident and near miss record, • Accident/incident reporting, analysis, investigation and implementation of recommendations.	Centralized mechanism for the accident / incident and near miss record.		
4	Awareness	Promote culture of disaster risk prevention, mitigation, and better risk management	• SMP-HDC, • CISF, • Operators, • Hospital.	• Safety day/week celebration, • Award and recognition, • Safety Bulletin, • Periodical Health Checkup.	Promote awareness by posting details of activities on social media platforms regarding important events.		

Hazard		Wind and Cyclone					
1. Thematic area		Understanding Risk					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring /Regular measures**	**Short term**	**Medium term**	**Long term**
1	Observation networks, Information systems, Research, Forecasting, Early warning	Enhancement of Observational Network Stations (ONS)	• SMP-HDC	The port authority relies on observational network operated by external sources and information shared: • VTMS, • Internet sources, • IMD Bulletins, • NAVAREA warnings.			
		Establishment of at least one High Wind Speed Recorder and one surge recorder		• Wind speed recorder, • Surge Recorder.			
2	Zoning / Mapping	Identification of the vulnerable areas	Not applicable to SMP-HDC for zoning and mapping.	• Cyclone hazard map (Very High damage risk zone – maximum wind speed of 50 m/s).			
3	Monitoring	System to monitor cyclone	• SMP-HDC	Monitoring via • TV /Radio, • IMD bulletins.			

Hazard		Wind and Cyclone					
1. Thematic area		Understanding Risk					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring /Regular measures**	**Short term**	**Medium term**	**Long term**
4	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	Undertake HRVCA as part of preparing and periodic revision of DM plans	• SMP-HDC, • Operators.	• Port DMP as per Disaster Management Act -2005, NDMA Guidelines and NDMP, • Emergency Action Plan (EAP), • Emergency Response Disaster Management Plan (ERDMP).	Update Plans		
		Constitute/ strengthen the mechanism for consultation with experts and stakeholders	• SMP-HDC, • Operators.	Mechanism for strengthening through • SOP for Cyclone, • Preventive inspection of cranes, high mast lighting, communication towers and antennae, • Stacking of containers as per wind criteria, • Effective storm drainage system.			Land use planning

Hazard		Wind and Cyclone					
2. Thematic area		Inter- agency coordination					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Overall disaster governance	Providing coordination, technical inputs, and support.	• SMP-HDC, • Operators.	• Emergency Operation Centre, • IMD Bulletins, • Coordination with DRR Cell (at MoS level), • Coordination with SDMA and DDMA.			
2	Warnings, Information, data collection	Effective communication to ensure quick, clear, effective dissemination of warnings, information and data.	• SMP-HDC, • Operators, • Vessel Master, • CISF.	Effective communication via: • UHF/VHF channels, • Mobile Phones, • PA System, • Display of cyclone signals.			
3	Response	Coordinating with port stakeholders and Government agencies	• SMP-HDC, • Operators. • Vessel Master, • CISF.	• CMG group, • Vessel Master, • NDRF, SDRF, Civil Defense, Local authorities.			

Hazard		Wind and Cyclone					
3. Thematic area		Investing in DRR – Structural measures					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Multi-Purpose Cyclone Shelters	Identification of safe buildings and sites with basic facilities like drinking water, food, sanitation and first aid to serve as temporary shelters for people evacuated from localities at risk.	• SMP-HDC	Identified Cyclone Shelters such as schools, community halls, etc. Other measures • Periodic inspection of the shelters. • Emergency supply of power and water. • Tie up with the nearby food suppliers.			
2	Hospitals and First Aid Centres	• Identification hospitals and first aid	• SMP-HDC, • Operators, • Hospital.	• HDC Hospital, • Tie up with nearby hospitals, • First Aid centers.			

Hazard		Wind and Cyclone					
4. Thematic area		Investing in DRR – Non- Structural measures					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Laws Regulations Enforcement mechanisms Techno-Legal regimes Institutional Arrangements Codes for disaster risk reduction Compliance monitoring	Complying with the coastal zone laws	• SMP-HDC, • Operators.	EIA / EMP recommendations regarding environment sustainability measures viz air quality, sewage and effluent.			Land-use planning
		Consider shoreline erosion, risk to structures, monitoring shoreline changes paying attention to the preservation of natural barriers	• SMP-HDC	• Beach nourishment.			
2	Risk Transfer	Insurance	• SMP-HDC, • Operators.	• Workmen Compensation Policy, • Public Liability Insurance, • Property Insurance.	Periodic Renewals of Policies		

Hazard		Wind and Cyclone					
5. Thematic area		Capacity Development					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Training	Training and awareness regarding cyclone related emergencies and do's and don'ts	• SMP-HDC, • Operators, • Hospital.	• Training and awareness as per NDMA guidelines for cyclones		Training by Civil Defense and other agencies	
2	Mock drills/ Exercises	Joint planning and execution of emergency drills	• SMP-HDC, • Operators, • Hospital.	• Cyclone Contingency Plan			
3	Awareness		• SMP-HDC	• To all concerned stakeholders			
4	Empowering following categories of employees • Women • disabled	Emergency evacuation facilities	• SMP-HDC, • Operators.	• Display plan and areas of employment for special category employees, • Provision of transports.			

Hazard		Wind and Cyclone					
6. Thematic area		Climate change risk management					
Sr. No	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Climate change adaptation (CCA)	Sensitization and awareness creation	• SMP-HDC, • Operators.	Port has taken an initiative related to environmental protection as part of Green Port Initiative from GoI. This includes • Solar Power Plant for Office buildings, Canteens etc. • Comprehensive plantation and development of parks, gardens, nurseries in and around the township, Avenue plantation alongside the main roads connecting to different colonies of the port, • Monitoring of the level of air pollution regularly, • Prohibition of disposal of all kind of garbage in sea.	• Provision of net barrier for coal dust pollution, • Installation of Dry fogging system (Dust suppression system).	Use of renewable energy	

Hazard		Flood					
1. Thematic area		Understanding Risk					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Observation networks, Information systems, Research, Forecasting, Early warning	Assessment and Monitoring	• SMP-HDC	• Tide gauging, • Sea, river and impound basin water level monitoring, • IMD bulletins, • CWC/PWD bulletins.			
2	Zoning/ Mapping and classification of flood prone areas	Identification of the vulnerable areas	• SMP-HDC, • Operators	• Coastal zone map of WBSCZMA indicating HTL and LTL are available, • The present port infrastructure poses a flooding risk.			
3	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	Undertake HRVCA as part of preparing and periodic revision of DM plans	• SMP-HDC, • Operators.	• Port DMP as per Disaster Management Act -2005, NDMA Guidelines and NDMP • Emergency Action Plan (EAP) • Emergency Response Disaster Management Plan	Periodic update Plans		

Hazard		Flood					
1. Thematic area		Understanding Risk					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
		Constitute/ strengthen the mechanism for consultation with experts and stakeholders	• SMP-HDC, • Operators.	Mechanism for strengthening through • Project development reports incorporating effective draining and anti-flooding measures.			Land use planning

Hazard		Flood					
2. Thematic area		Inter- agency coordination					
Sr. No	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Overall disaster governance	Providing coordination, technical inputs, and support	• SMP-HDC, • Operators.	• Emergency Operation Centre, • Coordination with IMD, CWC, PWD, • Coordination with DDMA and SDMA.			
2	Warnings, Information, data	Effective communication to ensure quick, clear, effective dissemination of warnings, information and data.	• SMP-HDC, • Operators.	• VTMS, • VHF/ MF/UHF, • Mobile Phones, • PA System, • Tide tables, • Email and Telex, • Internet Sources.			
3	Response	Coordinating with port stakeholders and Government agencies	• SMP-HDC, • Operators.	• CMG group, • NDRF/SDRF, Civil Defense, Local authorities. • ICG and Navy.			

Hazard		Flood					
3. Thematic area		Investing in DRR – Structural measures					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Multi-Purpose Shelters	Identification of safe buildings and sites with basic facilities like drinking water, food, sanitation and first aid to serve as temporary shelters for people evacuated from localities at risk	• SMP-HDC	Identified Shelters such as schools and community halls, etc. Other measures • Periodic inspection of the shelters, • Emergency supply of power and water, • Identified food supply agency.			
2	Hospitals and First Aid centres	Identification hospitals and first aid	• SMP-HDC, • Operators, • Hospital.	• HDC Hospital, • Tie up with nearby hospitals, • First Aid Centres.			
3	Civil works	Upgrade and maintenance of the existing drainage and storm water systems	• SMP-HDC, • Operators.	• Periodic maintenance of drainage system, • Availability of dewatering pump system.			

Hazard		Flood					
4. Thematic area		Investing in DRR – Non- Structural measures					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Operation and Maintenance of Drainage Systems	Budgetary Provision	• SMP-HDC	• Adequate budget to be provided to take care of the men, material, equipment and machinery for O&M of drainage systems on a periodic basis.			
2	Regulation and enforcement of laws, norms, regulations, guidelines	Complying with the coastal zone laws	• SMP-HDC	• Implementing land-use regulation as per flood control norms.	Land-use planning as per the CRZ notification		
3	Risk Transfer	Insurance	• SMP-HDC, • Operators.	• Workmen Compensation Policy, • Public Liability Insurance, • Property Insurance.	Periodic Renewals of Policies		

Hazard	Flood						
5. Thematic area	Capacity Development						
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Training	Training and awareness regarding flood related emergencies and do's and don'ts	• SMP-HDC, • Operators.	• Training and awareness as per NDMA guidelines for Flood.			
2	Mock drills/ Exercises	Joint planning and execution of emergency drills	• SMP-HDC, • Operators, • Hospital.	• Participation in drills/exercises with the District and State Disaster Authorities.			

Disaster	Earthquake						
1. Thematic area	Understanding Risk						
Sr. No	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Seismic Zoning/ Mapping	Identification of the vulnerable areas	• SMP-HDC	• Earthquake hazard map as given in BMTPC.	The requirements of BIS standard 1893- 2016 are to be complied with for seismic zone III as per BMTPC chart.		
2	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	Undertake HRVCA as part of preparing and periodic revision of DM plans	• SMP-HDC, • Operators	• Port DMP as per Disaster Management Act -2005, NDMA Guidelines and NDMP, • Emergency Action Plan (EAP), • Emergency Response Disaster Management Plan (ERDMP).	Periodic updation of Plans.		

Hazard		Earthquake					
2. Thematic area		Inter- agency coordination					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring /Regular measures**	**Short term**	**Medium term**	**Long term**
1	Overall disaster governance	Providing coordination, technical inputs, and support	• SMP-HDC, • CISF, • Operators.	• Emergency Operation Centre, • As per National Disaster Management Authority Guidelines for Earthquakes, • Coordination with DDMA and SDMA.			
2	Response	Coordinating with port stakeholders and Government agencies	• SMP-HDC, • CISF, • Operators.	• CMG group, • NDRF, SDRF, Civil Defense, WBPCB and Local authorities, • ICG and Navy.			

Hazard		Earthquake					
3. Thematic area		Investing in DRR – Structural measures					
Sr. No	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Strengthening and seismic retrofitting of prioritized critical structures and buildings	Implementation strengthening and seismic retrofitting as per recommendations of structural safety audits	• SMP-HDC, • Operators.	• Seismically safe design and construction of jetties, wharfs, trestles, pipeline trestles, office buildings, utilities, township, and conveyor support structure.			

Hazard	Earthquake						
4. Thematic area	Investing in DRR – Non- Structural measures						
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring /Regular measures**	**Short term**	**Medium term**	**Long term**
1	Structural safety audit of lifeline structures and buildings	Carry out structural safety audit of lifeline buildings and critical infrastructure	• SMP-HDC, • Operators.	• Inspection of critical structures and buildings and prioritization for repairs. Special emphasis to be given for structural areas affected by ground settlement.	Compliance of recommendations		
2	Risk Transfer	Insurance	• SMP-HDC, • Operators.	• Workmen Compensation Policy, • Public Liability Insurance, • Property Insurance.	Periodic Renewals of Insurance Policies		

Hazard		Earthquake					
5. Thematic area		Capacity Development					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring /Regular measures**	**Short term**	**Medium term**	**Long term**
1	Training	Training and awareness regarding earthquake related emergencies and do's and dont's	• SMP-HDC, • CISF, • Operators, • Hospital.	• Training and awareness as per NDMA Earthquake guidelines			
2	Mock drills/ Exercises (Evacuation and rescue)	Joint planning and execution of emergency drills	• SMP-HDC, • CISF, • Operators, • Hospital.	• Participation in drills/exercises with the District and State Disaster Management Authorities.			

Hazard		Tsunami					
1. Thematic area		Understanding Risk					
Sr. No.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Zoning/ Mapping	Identification of the vulnerable areas	• SMP-HDC	Tsunami hazard map as per West Bengal Disaster management & civil defense dept.			
2	Receipt of warnings, data and information	Monitor periodic bulletins from agency	• SMP-HDC	Monitoring via • Forecasting agencies, • INCOIS.			
3	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	Undertake HRVCA as part of preparing and periodic revision of DM plans	• SMP-HDC, • Operators.	• Port DMP as per Disaster Management Act -2005, NDMA Guidelines and NDMP, • Emergency Action Plan (EAP), • Emergency Response Disaster Management Plan (ERDMP).	Periodic update Plans		

Hazard	Tsunami						
2. Thematic area	Inter- agency coordination						
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Overall disaster governance	Providing coordination, technical inputs, and support	• SMP-HDC, • Operators.	• Emergency Operation Centre, • Coordination with DDMA and SDMA.			
2	Warnings, Information, data	Effective communication to ensure quick, clear, effective dissemination of warnings, information and data.	• SMP-HDC, • Operators.	• VHF/MF/UHF, • Mobile Phones, • PA System.	Real time information setup from INCOIS.		
3	Response	Coordinating with port stakeholders and Government agencies	• SMP-HDC, • Operators.	• CMG group, • Vessel Master, • NDRF, SDRF, Civil Defense, Local authorities, • ICG, Navy			

Hazard		Tsunami					
3. Thematic area		Investing in DRR – Structural measures					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Strengthening and retrofitting of prioritized vulnerable and critical structures	Ensure compliance with relevant building codes or hazard resistant construction	• SMP-HDC, • Operators.	• Implementation in compliance with relevant building codes/ standards/ technical guidance. E.g. NDMA guidelines for Tsunami and Earthquake			
		Identification and repair/ retrofitting of houses and buildings as per the recommendations of structural audit Detailed assessment of tsunami hazard to the structure and foundation and the benefits of strengthening	• SMP-HDC, • Operators.	• Periodic inspection of vulnerable/critical structures (electrical stations, warehouse, fire stations, office buildings, marine structures etc.). • Repairs/ retrofitting done as and when required for tsunami resistance.			

Hazard		Tsunami					
3. Thematic area		Investing in DRR – Structural measures					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
2	Multi-Purpose Tsunami Shelters	Identification of safe buildings and sites with basic facilities like drinking water, food and first aid to serve as temporary shelters for people evacuated from localities at risk	• SMP-HDC	Identified Shelters in consultation with DDMA and SDMA.			
3	Hospitals and First Aid Centers	Identification of hospitals and first aid	• SMP-HDC, • Operators, • Hospital.	• HDC Hospital, • Tie up with nearest hospitals, • First Aid Centers.			

Hazard		Tsunami					
4. Thematic area		Investing in DRR – Non-Structural measures					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Regulation and enforcement of relevant laws	Ensure compliance with coastal environment protection laws and regulations such as the CRZ	• SMP-HDC	• Implementation of West Bengal State Coastal Zone Regulation.			
2	Non-structural shore stabilization measures and bio-shields	Establishment of bio-shields like mangroves, as natural defense	• SMP-HDC	• Beach nourishment	• Plantation of mangroves		
3	Risk Transfer	Insurance	• SMP-HDC, • Operators.	• Workmen Compensation Policy, • Public Liability Insurance, • Property Insurance.	Periodic Renewals of Policies		

Hazard		Tsunami					
5. Thematic area		Capacity Development					
Sr. no.	**Sub-thematic area**	**Plan components**	**Responsible section**	**Recurring / Regular measures**	**Short term**	**Medium term**	**Long term**
1	Training	Training and awareness regarding Tsunami related emergencies and do's and don'ts **Reference documents:** NDMA and SDMA guidelines for Tsunami	• SMP-HDC, • Operators, • Hospital.	• Training of local administration in forecasting warning dissemination and evacuation techniques.			
2	Mock drills/ Exercises (Evacuation and Rescue)	Joint planning and execution of emergency drills	• SMP-HDC, • Operators, • Hospital.	• Organizing drills on regular basis to check the viability of all plans and to check the readiness of all concerned.			

4. MAINSTREAMING DISASTER RISK REDUCTION

The objective of mainstreaming is ensuring the ongoing and new development projects of the port leading to integration measures. The sub-thematic areas where such measures can lead to DRR are as follows:

1. Awareness and understanding of disaster risk;
2. Disaster governance;
3. Disaster risk transfer;
4. Institutional arrangements and capacity development;
5. Budget allocations for integrating DRR into development programs;
6. Project appraisals, scrutiny of development plans, effective and detailed land-use plans, from the point of view of expected hazards;
7. Setting targets and monitoring mechanisms.

4.1 INVESTING IN DRR – STRUCTURAL MEASURES

Port sector in general implements the building code as per IS standards. Hence, engineered buildings and structures are designed and constructed taking into account various loads including seismic criterion. As such, only the older buildings which suffer degradation on account of aging related factors will require reassessment and strengthening. Damage of buildings and structures also depends upon the soil conditions e.g. settlement and topology of the area.

4.2 INVESTING IN DRR – NON-STRUCTURAL MEASURES

4.2.1 Land Use Planning

HDC land is being used for various port related activities such as harbour area, industrial area, township area, road network, water supply network, storm water drainage system, sewer system and greenbelt/green cover.

4.2.2 Capacity Building

Port takes initiative by deputing personnel to attend and undergo various trainings such as Disaster and Safety Management, Safety Audit, Dock Safety, CBRN etc. The port undertakes consultative measures with expert agencies such as IITs, Govt. Departments, Technical Universities and Private Institutions for advice in Land use planning, port development, projects implementation, environmental management and training of personnel. It also conducts awareness programme through agencies such CISF, Civil Defence, NDRF, SDRF, NDMA, DGFASLI, etc.

4.2.3 Risk Transfer Insurance

The details of such arrangements are given in chapter 11.

4.3 STRATEGIES FOR SUSTAINABLE DEVELOPMENT PRACTICES FOLLOWED IN THE PORT

Port's developmental plans are synchronized with the Coastal Zone Management and Land Use plans.

The CZMP meets the goals of the ICZM, viz

1. Maintaining the functional integrity of the coastal resource systems.
2. Reducing resource-use conflicts.
3. Maintaining the health of the environment.
4. Facilitating the progress of multi-sectoral development.

4.4 DISASTER RISK GOVERNANCE PROGRAMMES AND PRACTICES OF THE PORT

4.4.1 Environmental macro level-Coastal zone monitoring

The macro level monitoring includes following aspects.

1. Master planning of the port facilities with respect to the traffic forecast and identification of projects.
2. Environmental impact analysis, land use planning and finalisation of the location of the projects.
3. Finalisation of the Port's conceptual plan for future development.
4. The port's Integrated Management System (IMS), includes ISO-14001 Environment Management System.
5. Obtaining statutory permissions like Environmental Clearance, Consent to Establish/Operate from the MoEF & CC and State Pollution Control Board.

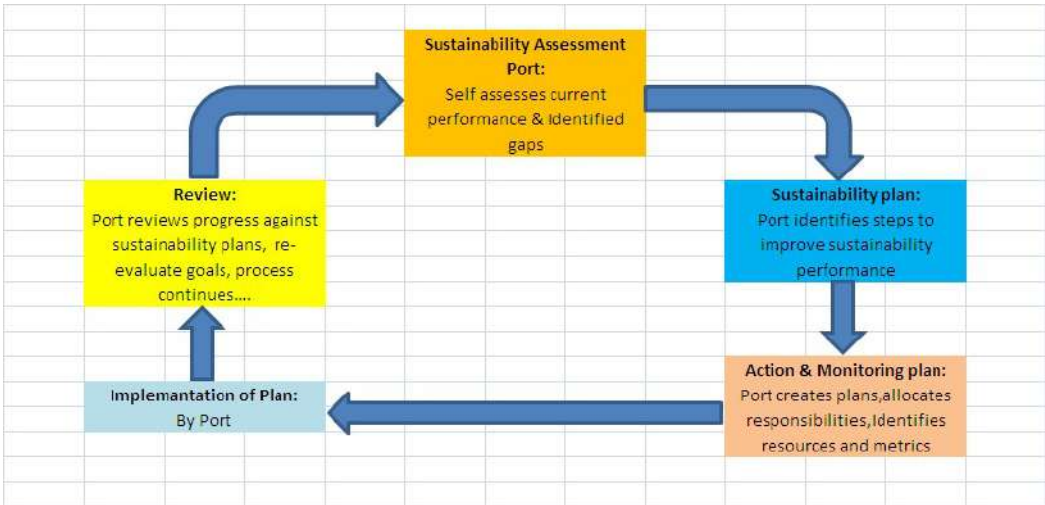
4.4.2 Micro Level Monitoring

An Environmental Cell looks after the environmental protection activities. This body undertakes various initiatives at the micro level which are as follows

1. Parks, Gardens, Nurseries constituting a Green belt have been developed.
2. Regular water sprinkling by mobile tanker for controlling air pollution caused by coal dust.
3. The level of air pollution is monitored regularly and required steps to retain the pollution level within the permissible limit taken.
4. Installation of Solar System of capacity 1 MW.
5. Drainage system and sewage treatment plant.
6. Obtaining environmental clearances for projects and monitoring of the pollutants during the execution of the project as per the approved Environmental Management Plan (EMP).

4.5 SUSTAINABILITY PLAN

The environment cell also undertakes preparation of sustainability plan at the port level and takes care of maintaining and monitoring this plan.



Consequent to development/expansion of new programme and addition of facilities it is imperative that a sustainability plan involving key issues like economic, environmental and social costs of the projects to be followed. This will help reduce disaster losses and control the risk level.

5. INCLUSIVE DRR

The port functions as a model port with design and development based on national and international standards of safety and as such the stakeholders do not include socially vulnerable groups.

The port will ensure special needs in respect of women employees and disabled employees are taken care of and they are adequately empowered to escalate their concerns and appeals. The action plans preparation will take care of evacuation measures in the event of emergencies for these employees.

6. COHERENCE OF DISASTER RISK MANAGEMENT ACROSS RESILIENT DEVELOPMENT AND CLIMATE CHANGE ACTION

In accordance with the Sendai Framework, it is necessary to address existing challenges and prepare for future ones by focusing on monitoring, assessing, and understanding disaster risk and sharing relevant information.

- The framework notes that, to cope with disasters, it is "urgent and critical ***to anticipate, plan for and reduce disaster risk***".
- It requires the ***strengthening of disaster risk governance and coordination*** across various port departments.
- It requires the full and meaningful ***participation of relevant stakeholders*** at different levels.
- It is necessary to ***invest in the economic, social, health, cultural and educational resilience*** at all levels.
- It requires ***investments in research*** and the use of technology to enhance multi-hazard Early Warning Systems (EWS), preparedness, response, recovery, rehabilitation, and reconstruction.

The port has undertaken the above in the implementation of DMP as follows

In the chapter 2 of HRVCA, the risk profile of the port has been assessed through detailed planning steps. The gap analysis for equipment's is a continuous process which the port will undertake through periodic reviews.

With regard to natural disaster, the vulnerability profiling has been prepared and areas requiring immediate actions are identified. For NAT-CHEM disasters the vulnerability areas have been identified.

In the chapter 3 of Hazard Specific Prevention and Mitigation Measures, the hazards have been identified and thematic areas of Sendai framework introduced, so that the development responsibility in each of these thematic areas is properly addressed indicating present and planned arrangement and who is responsible to address each of these.

With regard to the participation of stakeholders in the risk governance the following mechanisms are required:

- Availability of Mutual Aid Agreement for disaster situations;
- Joint planning and execution of mock drills at unit level (individual facility) and also at the level of the entire port (including non-custom bound area);

In respect of aspects relating to climate change the following issues have been identified having bearing on disaster risk reduction and resilience:

- Sea level rise – Minimum height of landside construction above Mean Sea Level (MSL) will be adequately planned for developmental activities.

- Heavy rain fall (cloudburst) and flooding – Land use planning and the detailed development thereafter will factor-in the requirements of natural slope, land topography, storm water drainage, height and width of culverts, natural drainage for ponds.
- High wind and cyclone – Implementation of SOPs for preventing damage during an event.

7. CAPACITY DEVELOPMENT AND COMMUNICATION

7.1 CAPACITY DEVELOPMENT

The capacity development covers all aspects of disaster management. The key aspects and broad thematic areas for capacity development applicable are summarized in Table 7.1. The hazard-specific capacity development needs for prevention and response are given in the plan matrix of the Chapter-3. The effort will be to follow the industry best practices especially in the area of oil spill response and chemical disaster response which affect the ports in a major way.

	Capacity Development Themes
Key Aspect	**Thematic Areas**
Prevention or mitigation for disaster risk reduction	Hazards, Risk, and Vulnerability Assessment • Safety awareness and training • Improve the awareness and preparedness of stakeholders at all levels Documenting lessons from previous disasters and ensuring their wide dissemination • Preparing DM plans, regular updating, and mock drills • Institutional arrangements, policies, legal support, and regulatory framework • Developing appropriate risk transfer instruments by collaborating with insurance companies and financial Institutions • Mainstreaming of disaster risk assessment, mapping and management into development plans and programs • Retrofitting as per relevant standards • Rapid visual surveys for safety evaluation of buildings • Training and skill development for dock operators, crane operators, truck drivers, management staff, • Promoting community-based DM taking into account specific needs, • Disaster resilience by maintaining list of nearby hospitals and health care centers • Business resilience of productive assets by strengthening the supply chains and service providers, ensuring continuity of services • Integrate disaster risk management into business models and practices Preparedness and response plans at all levels

Effective preparedness and response	Emergency response capabilities – EOCs, infrastructure, equipment upgrades and adoption of best available technologies • Strengthening of the Fire and Emergency Service through revamping, institutional reforms, and modernization • Adoption and adaptation of emerging global good practices • Early warnings, maps/ satellite data/ effective dissemination of information • Table-top exercises, simulations, and mock drills to improve operational readiness of the plans • Earmarking of Temporary shelters • Power and fuel supply management • Transportation systems and network • Logistics and supply chain management
Recovery and Build Back Better	• Port infrastructure damage assessment mechanism and award of reconstruction projects, contracting including revised specifications for resilient infrastructure • Studies on past disasters and recovery to draw useful lessons.

Table 7.1: Summary of Broad Capacity Development Themes

7.1.1 Training

Regular training should be provided to all personnel who have a role in planning and operational response to an emergency. The goal of training for emergencies is to enable the participants to understand their roles in the response organization, the tasks associated with each position and the procedures for maintaining effective communications with other response functions and individuals.

The training objectives are:

1. To familiarize personnel with the contents and manner of implementation of the Plan and its procedures,
2. To train personnel in the performance of the specific duties assigned to them in the plan and in the applicable procedures,
3. To keep personnel informed of any changes in the plan,
4. To maintain a high degree of preparedness at all levels of the emergency response organization,
5. Train new personnel who may have moved within organization.

A well-coordinated programme of training exercises includes activities of varying degrees of interaction and complexity.

The SIC is responsible for the development and maintenance of emergency capabilities of the IRT through ongoing development and rehearsal of emergency response procedures and plans. Specific inductions are to be provided for all team members and support personnel to ensure they are conversant with the roles and responsibilities outlined in this plan prior to their appointment in any capacity.

Personnel allocated to the IRT should undergo skills training over and above that received by other personnel of the port. The skill training are delivered by external service providers to national competency standards in the following areas

- First aid
- Self-Contained Breathing Apparatus
- Rescue from heights

- Rescue from confined spaces
- Fire fighting
- Rescue from water
- Handling Oil and Hazardous Material Spills.

7.1.2 Drills & Exercises

Emergency drills and integrated exercises have the following objectives.

1. To test the adequacy of the effectiveness, timing, and content of the plan and implementing procedures,
2. To ensure that the emergency organization personnel are familiar with their duties and responsibilities by demonstration,
3. Provide hands-on experience with the procedures to be implemented during emergency,
4. Maintain emergency preparedness.

The frequency of the drills should vary depending on the severity of the hazard. However, drills should be conducted at least once a year. Scenarios may be developed in such a manner as to accomplish more than one event objective.

- **Notification exercises**
  - Test communication systems, frequency, public warning system

- **Tabletop exercises**
  - To check availability of participants and check response time

- **Equipment deployment exercises**
  - Alarm systems to be tested,
  - Frequent tests of firefighting and other response equipment.

- **Incident management exercises**
  - Simulated emergencies like fire, gas leakage, oil spillage, cyclone and vessel related emergencies like grounding, collision, leakage, Pollution etc., to be conducted and monitored and feedback to be documented.
  - Evacuation practice
  - Deployment of Machineries

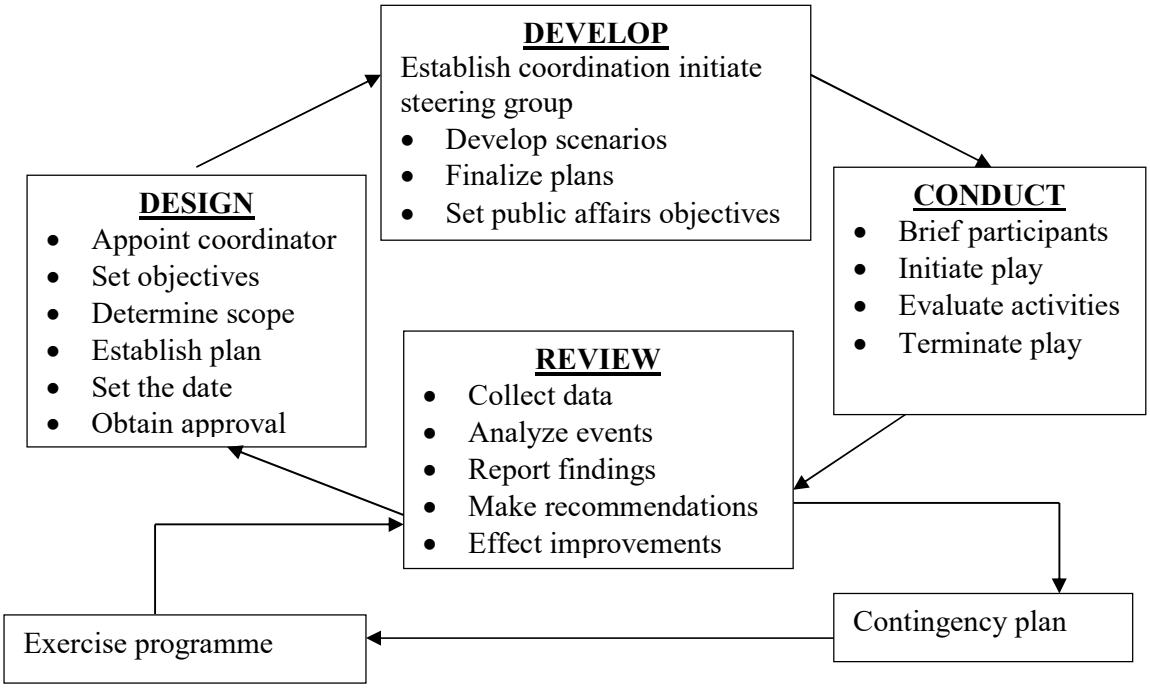


Figure 7.1: The Exercise Planning Process

The evaluation of a drill or exercise shall be submitted to CIC/SIC for review and acceptance who shall then determine the corrective actions to be taken and assign the responsibility to appropriate personnel. Thus, gap identification in terms of resources and procedures can be made and exercise plan amended accordingly.

Records of drills, exercises, evaluations, and corrective actions should be duly maintained.

The SIC shall prepare an Incident response exercise and training schedule for the forthcoming year, in consultation with the CIC and all the HODs of the Port and stakeholders.

Periodicity of important drills and exercises of the port can be found in **Appendix B.**

The CIC/SIC is responsible for ensuring that a program exists for training new staff and refreshing existing staff on the Port Business Continuity and that Managers ensure appropriate personnel complete the training.

7.2COMMUNICATION STRATEGY

Communication technology is integral part of disaster management. It plays an important role in all the four distinct phases of disaster management namely mitigation, preparedness, response and recovery. The following table provides information on the communication equipment's within the port.

Services & Authorities	Communication Network Element
Fire Service	Special fire alarm and normal communication system- VHF-TELEPHONE-WALKIE TALKIE- MOBILE
Personal and internal Medical services	Normal communication services
Fire-fighting craft and Rescue launches	UHF/VHF Radio telephones, via port authorities as reserve
Ships at Berth	Normal UHF/VHF Radio telephone link used in cargo operations. Terminal representative at tanker berth to also have own radio-SATCOM
Civil authorities Including fire services, Police and medical services	Direct telephone link with failure alarm, UHF/VHF radio telephone or public telephone system. SATCOM Cascade system to be used i.e. through department heads to subordinates
Harbour authorities, Pilots, tugs and other harbour craft	UHF/VHF Radio telephone or public telephone SATCOM
District Collector or State Secretary	UHF/VHF Radio telephone, public telephone-hot line for emergency level 2 & 3-SATCOM
Jt. Secretary-Ministry of Ports, Shipping and Waterways, New Delhi	Public telephone-hot line for emergency level 2 & 3 SATCOM

Table 7.2: Communication Network within the Port

The following table provides information on the communication equipment available with the key personnel of the port.

Key Personnel	Equipment
CMG group and IRT	VHF
Signal Station (VTMS)	VHF & SATCOM

Table 7.3: Port communication equipment

7.2.1 Communication Flowchart

Communication flowcharts between the key agencies and key personnel of the CMG/IRT for various hazards are as follows

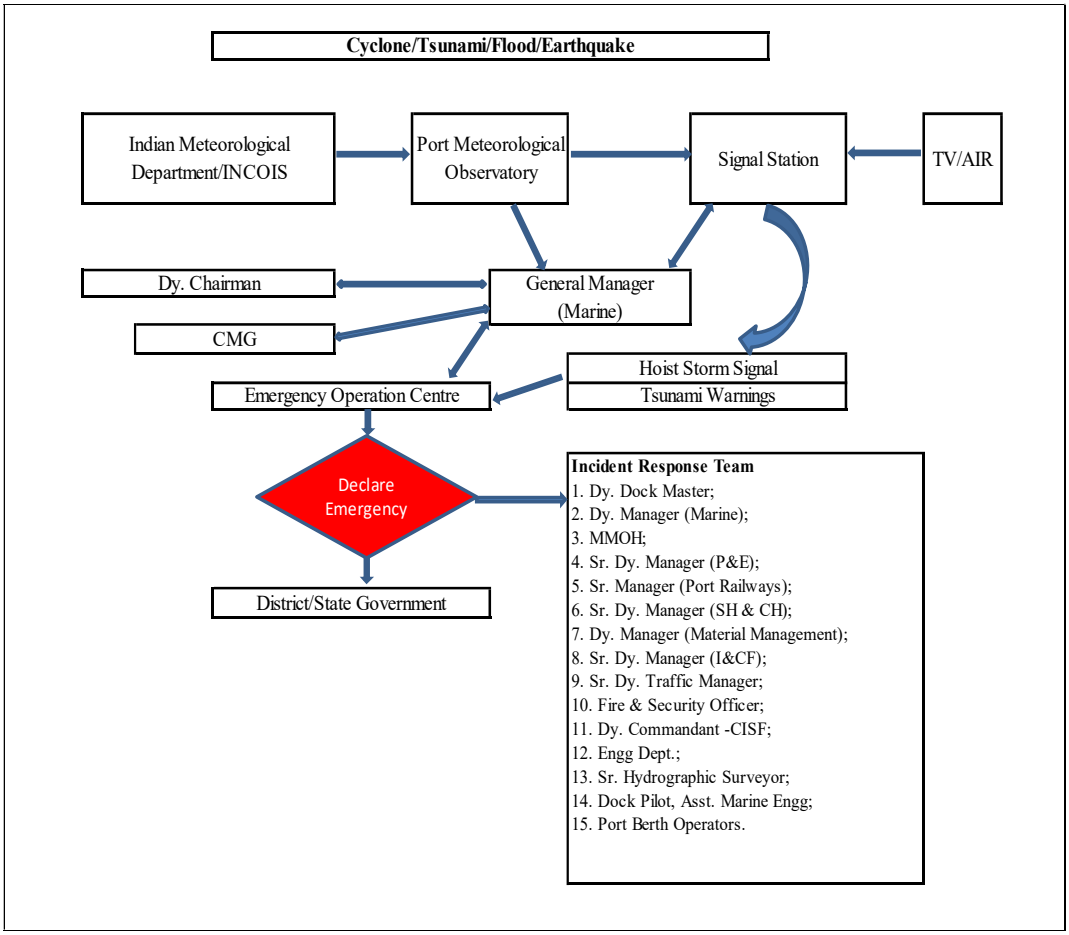


Figure 7.2: Cyclone /Tsunami/Flood/Earthquake

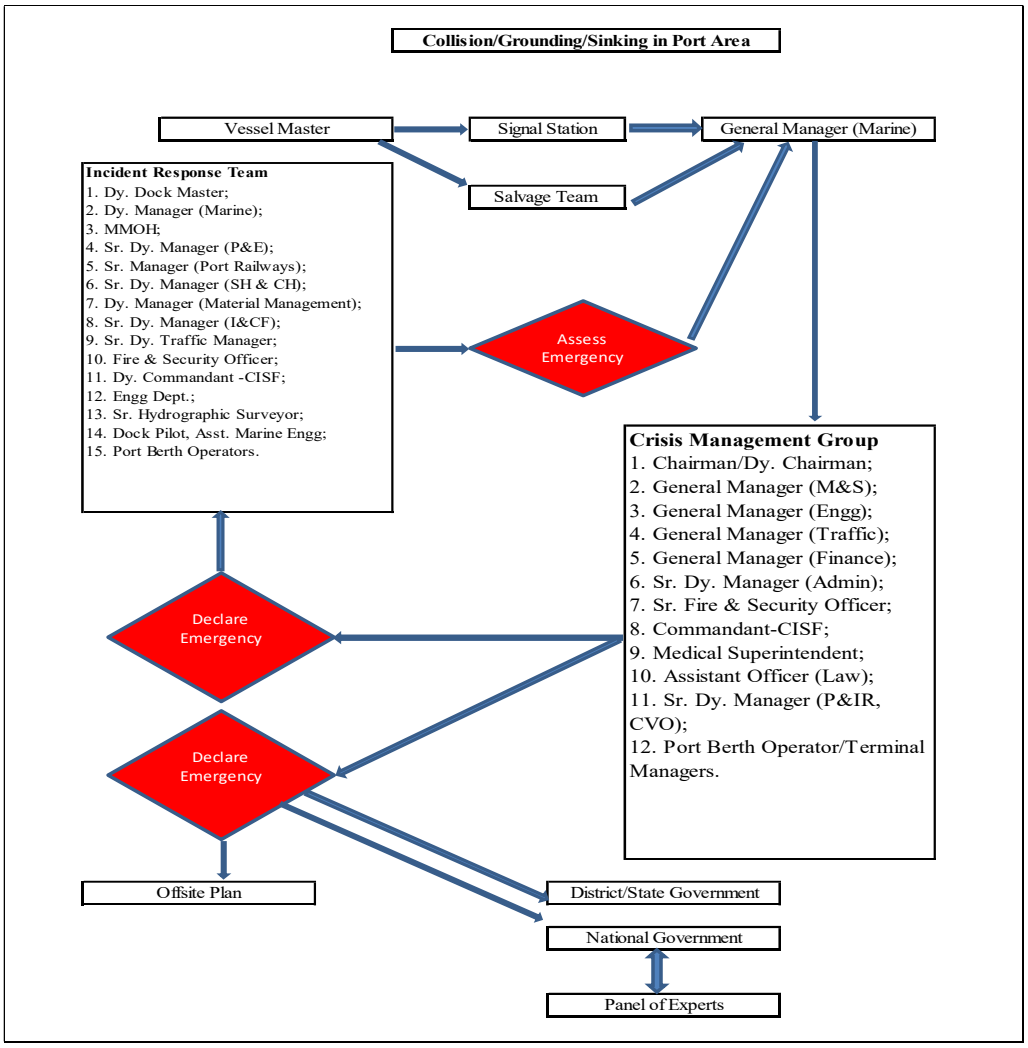


Figure 7.3: Collision/Grounding/Sinking

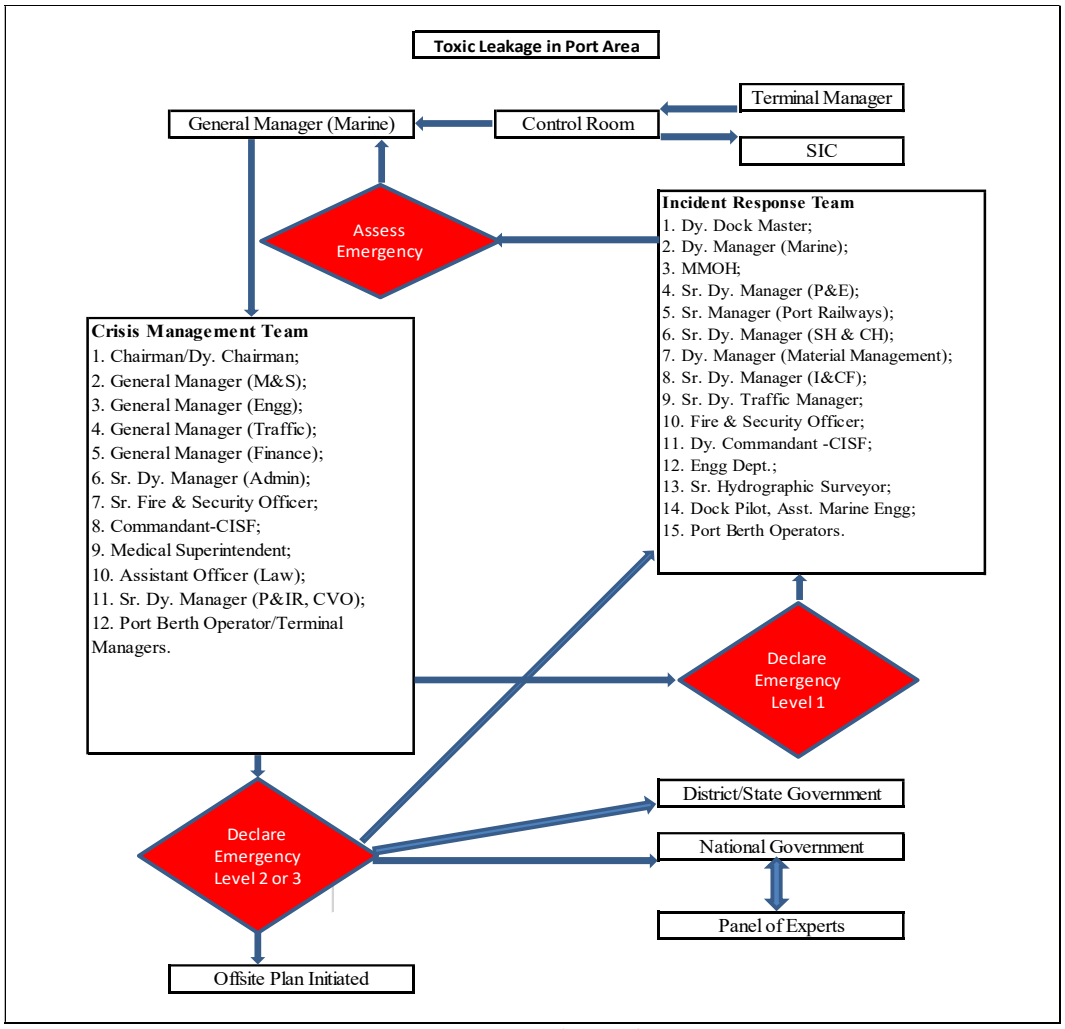


Figure 7.4: Toxic Leakage

Note: *For Level of disaster refer paragraph 9.1.2.*

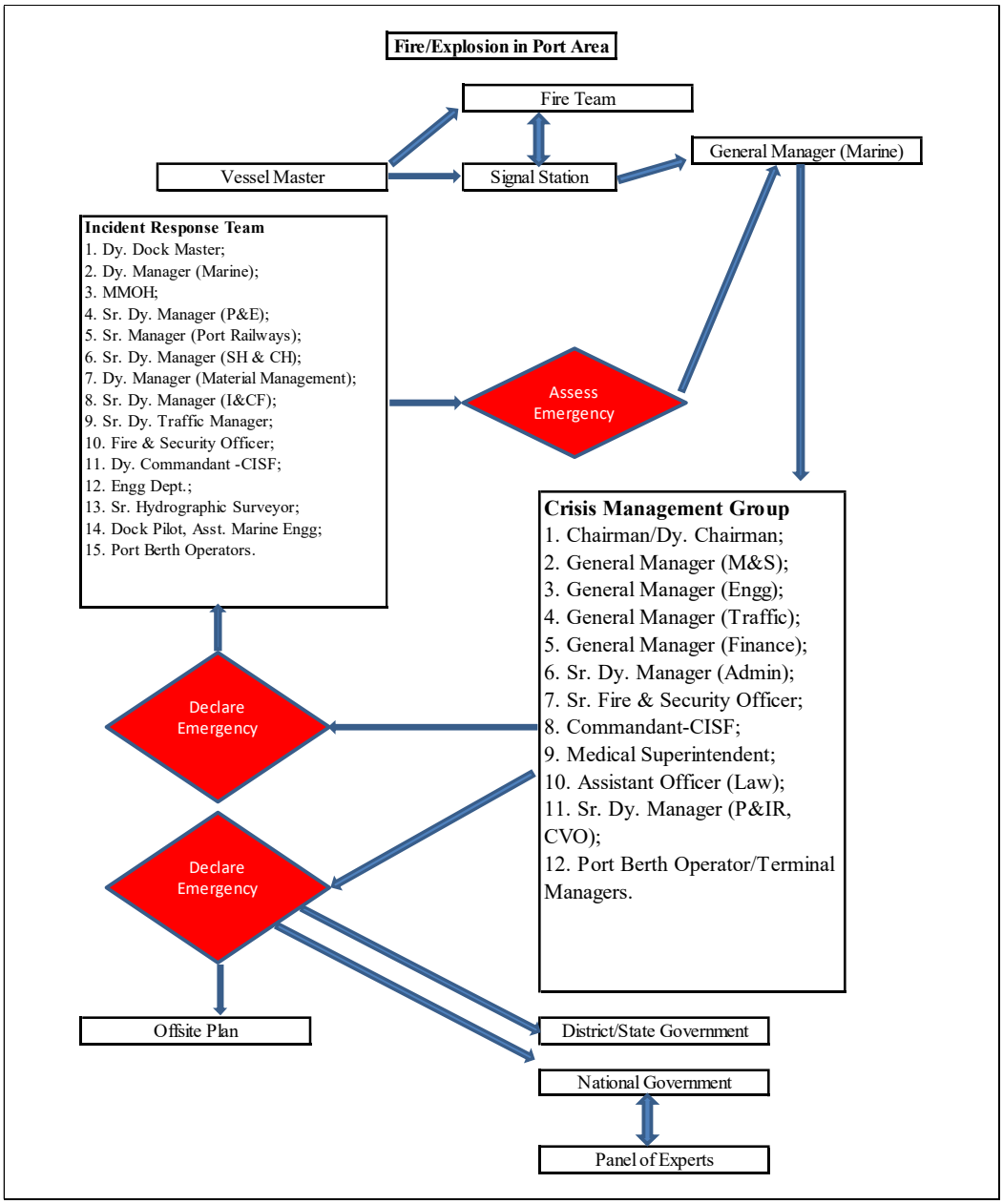


Figure 7.5: Fire/Explosion

Note: *For level of disaster refer paragraph 9.1.2.*

8. COORDINATION – HORIZONTAL AND VERTICAL LINKAGES

Dealing with a major disaster requires resources from outside the port. When the capacities of a port administration are overwhelmed, higher levels of aid assistance is required. Likewise, assets and capabilities in the industries and non-governmental organizations available around the port will have to be brought to use. There are many actions undertaken by participants in disaster management that support this goal, both pre-disaster (to reduce potential damage) and post-disaster (to recover from actual damage). For achieving this objective, the plan has a pre-established and practiced mechanism for Inter, intra and extra agency coordination.

Communication is the most important tool for effective coordination. Emergency Operation Centre (EOC) is the enabler of communication and coordination. Port Authority and stakeholders will coordinate with all heads of department at the local level, district & state level groups, CMG, Expert Groups, NGOs for effective implementation of DM Plans. Port authority should also have a link with neighbouring industries in case of disasters.

Coordination with the following external agencies would be required

- West Bengal State Disaster Management Authority (WBSDMA),
- District Disaster Management Authority (DDMA) – Purba Medinipur,
- West Bengal Disaster Rapid Action Force (WBDRAF) – Purba Medinipur,
- District Level Committee on Natural Calamity (DLCNC) - Purba Medinipur,
- WBPCB,
- State and National Crisis Group,
- Indian Coast Guards, Indian Navy,
- DG Shipping, MMD,
- DD, AIR for media briefing,
- WBSEB, PHED-WB, SBSTC,
- Regional Meteorological Centre – Haldia,
- Co-ordinate with the NGOs and aid agencies (contact nos.),
- P & I Club and their local correspondent,
- Salvage firms,
- Enlist services of GOI/GOO laboratories and expert institutions for Specialized services (contact nos.) e.g. BARC emergency response center in case of radiological emergencies, DRDO for CBRN emergencies,
- Public Health Organization.

9. PREPAREDNESS AND RESPONSE

9.1 PREPAREDNESS

9.1.1 Emergency Organization

9.1.1.1 Crisis Management Group

The Crisis Management Group consists of all HOD`s under the head of the Chairman which lays down the policies and decisions.

1. Chairman/Dy. Chairman,
2. General Manager (Marine Operation),
3. General Manager (Management & Services),
4. General Manager (Engg.),
5. General Manager (Traffic),
6. General Manager (Finance),
7. Sr. Dy. Manager (Administration),
8. Sr. Fire & Security Officer (Fire unit),
9. Commandant CISF - Security,
10. Medical Superintendent (Medical dept.),
11. Assistant Officer (Law),
12. Sr. Dy. Manager (P & IR, Dy. CVO etc.),
13. Respective Terminal Managers/Berth Operators.

9.1.1.2 Action Group (Incident Response Team)

The action group carries out the decisions made by CMG. It shall be formed at the time of crisis with Harbour Master as the head.

1. Dy. Dock Master,
2. Asst. Dock Master,
3. MMOH,
4. Dy. Manager (Marine),
5. Signal Station,
6. Sr. Dy. Manager (Plant & Equipment),
7. Dy. Manager (Port Railways),
8. Sr. Dy. Manager (Shipping & Cargo handling),
9. Sr. Dy. Manager (P & IR),
10. Dy. Manager (Materials Management),
11. Sr. Dy. Manager (Infrastructure & Civic Facilities),
12. Sr. Hydrographic Surveyor,
13. Fire & Security Officer (Fire unit),
14. Sr. Dy. Traffic Manager,
15. Dy. Comdt. CISF - Security,
16. Medical officer,
17. Engineering Departments,
18. Electrical and Mechanical dept.,
19. Dock Pilot, Asst. Marine Engineers,
20. Respective Terminal/Berth Operator,
21. In-charge - Pollution Response Cell

Refer **Figure 1.6** and **Figure 1.7** for Onsite and Offsite Emergency Organization Chart respectively.

9.1.2 Level of Disasters

L - Defines the different levels of disasters in order to facilitate the responses and assistances to ports.

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

L1 – specifies disaster that can be managed at Port level; however, the neighboring industries and district will remain in the state of readiness.

L2 – disaster situations are those, which require assistance and active participation of the port, the neighboring industries and district/State.

L3 – disaster situation is in case of large-scale disaster where the state and district authorities have been overwhelmed and require assistance from the Central Government for rescue, relief, and other response and recovery measures. In most cases, the scale and intensity of the disaster as determined by the concerned technical agency like IMD, INCOIS etc. are sufficient for the declaration of L3 disaster.

9.1.3 Roles and Responsibilities of Berth Operators and Port Authority

Role	Berth Operators	Port Authority
Prevention	•Prepare, revise, test and exercise own facility EAP/ERDMP. •Train own staff.	• Prepare DM Plan, •Conduct emergency exercises, •Guideline to encourage all Port Facility Operators to have Emergency Action Plans.
During Response	Undertake following: •First Aid, •Advise staff, •Contain (if possible), •Evacuation (as appropriate), •Partial or Full Shutdown (as appropriate), •Security. When external emergency services arrive: •Provide specialist advise/liaison, •Media Advise as required, •Advise Port, Security, and Dy. Dock Master (SIC), MMOH, DY. MMOH as required, •Advice neighbouring facilities as required.	•Monitor •Make Strategic decisions regarding: o Shipping movements o Threats to Port facility operators and effects on their business operations •Advice and assist affected Port facility Operators on matters where qualified to do so. •Escalate response level by obtaining assistance from Local Crisis Groups.

Recovery and reconstruction	•Advice and assistance to own staff in resuming operations. • Implement respective BCPs.	•Assist Port facility operators &/or shipping to resume operations. •Establish continuity of port business.

Table 9.1: Roles and Responsibilities of Berth Operators and Port Authority

9.1.4 Roles and Responsibility key personnel

CHECKLIST -1		**CHIEF EMERGENCY CONTROLLER (CEC)**	
Phase		**Action**	**Time**
Mobilization /Activation	1	Obtain details of incident and of any mitigative actions taken from CIC.	
	2	Communicate and coordinate with	
		a. Local, District, State and National Authorities	
		b. Crisis Management Group (CMG)	
		c. Chief Incident Controller (CIC)	
		d. Media Liaison officer	
		e. D.G. Shipping	
Establishing Control	3	Nominate alternate person if any functionary is not available.	
	4	Establish radio or telephone contact with CIC and CMG.	
Planning	5	Advice and provide support to CIC on	
		a. Propriety of response level	
		b. Location of EOC	
		c. Additional Human Resource, materials, equipment and information.	
		d. Authorizes the release of required funds for the necessary arrangements for evacuation, transportation, food & supplies.	
	6	Advice CIC on activation of DMP.	
Ongoing Response	7	Monitor the situation and activate Off Site Plan, if necessary.	
	8	To issue Media briefings when required.	
Response Termination	9	Terminating response advice given to CIC if conditions are met.	
	10	Receive incident reports from CIC/ nominated alternate person.	
	11	Advise on further course of action in consultation with CIC/ nominated alternate person.	

END CEC CHECKLIST

CHECKLIST -2		GENERAL MANAGER (MARINE OPERATION) CHIEF INCIDENT CONTROLLER (CIC)	
Phase		**Action**	**Time**
Mobilization / Activation	1	Obtain details of incident and of any mitigative actions taken.	
	2	Start recording of events in the Personal Log.	
	3	Communicate and coordinate with	
		a. Chairman/Dy. Chairman	
		b. IRT and CMG	
		c. CISF	
		d. Local Authorities and Neighboring industries, District, State and National Authorities	
		e. Respective Berth Operators	
		f. Relevant external agencies for Natural Disasters.	
Establishing Control	4	Assess the Incident and authorize any immediate action by SIC (Raising appropriate alarm) and on-site staff as required.	
	5	Direct the shutting down, evacuation and other operations of the port.	
	6	Proceed to the EOC and Conduct briefing meeting.	
	7	Convene the IRT (as required).	
	8	Establish radio or telephone contact with Local, District, State and National Authorities.	
Evaluation	9	Determine resources at risk and the level of disaster.	
	10	Evaluate the assessment of the incident, in consultation with the SIC.	
Planning	11	Arrange for monitoring of the event/incident.	
	12	Convene planning meeting.	
	13	Instruct Procurement Officer to make a list of required needs: Personnel, equipment, transport etc. Authorize acquisition.	
Ongoing Response	14	Implement response actions as per OSCP and DMP.	
	15	Continue to monitor incident situation.	
	16	Monitor the response by scheduling and undertaking regular briefings/debriefings of IRT.	
	17	Amend the Action Plan as required.	
	18	Ensure that IRT is supplied with necessary personal needs such as PPE, food etc.	
	19	Arrange for shift/rotation of IRT members.	
	20	Monitor OH&S performance.	
	21	Monitor casualties, traffic movements, and waste volumes.	
	22	Terminate response if conditions are met.	

Response Termination	23	Advise the SIC and inform CEC.	
	24	Ensure that all IRT members, combat and support agencies are informed of termination of response.	
	25	Monitor to ensure safe and complete demobilization.	
	26	Debrief CMG.	
	27	Attend debriefs with Chairman.	
	28	Ensure the resume of normal operations of the port.	
	29	Ensure that all records are collated and stored.	

END CIC CHECKLIST

CHECKLIST -3		**DY. DOCK MASTER SITE INCIDENT CONTROLLER (SIC)**	
Phase		**Action**	**Time**
Mobilization /Activation	1	Obtain details of incident and of any mitigative actions taken.	
	2	Start recording of events in the Personal Log.	
	3	Initiate	
		a. DMP, OSCP as required	
	4	Communicate and coordinate with	
		a. CIC	
		b. IRT	
		c. CMG	
		d. Master of the vessel	
		e. Terminal and Berth/Jetty Operators	
		f. Functional Heads of the Port	
Establishing Control	5	Assess the level of incident, nature, location, severity, casualties and resource requirement.	
	6	Conduct initial briefing.	
	7	Authorize any immediate action required by on site staff and contract agencies.	
	8	Establish radio or telephone contact with CIC and CMG.	
Planning	9	Arrange for	
		a. Deployment of Pollution and Fire-extinguishing response equipment.	
		b. Tugs, mooring boats and pilots for the un berthing of vessels.	
		c. Ensure evacuation of personnel to assembly areas.	
	10	Assist Procurement Officer to compile a list of needs: Personnel, equipment, transport etc.	
Ongoing	11	Implement response actions as per OSCP and DMP.	

Response	12	Continue to monitor incident situation. Assess incident/disaster management at site, nature, severity, casualties and resource requirement.	
	13	Monitor the response as per CIC schedule and undertake regular briefings/debriefings of IRT.	
	14	Coordinate Search and Rescue operations. Arrange evacuation of workers.	
	15	If necessary, call for additional resources.	
	16	Arrange relief for IRT members & Monitor OH&S performance.	
	17	Monitor waste volumes, if any.	
Response Termination	18	Terminate response if conditions are met on permission of CIC.	
	19	Ensure that all IRT members, Contract Agencies and CIC are informed of termination of response.	
	20	Monitor to ensure safe and complete demobilization.	
	21	Ensure that all records are collated and stored.	

END DDM CHECKLIST

CHECKLIST -4		**MANAGER - MARINE OPERATION HALDIA**	
Phase		**Action**	**Time**
Mobilization / Activation	1	Communicate and coordinate with	
		a. CIC	
		b. SIC	
		c. Port Control Room	
		d. Dock Pilot and Marine Engineers	
		e. Sr. Hydrographic Surveyor	
		f. Salvage Companies	
		g. Master of the vessel	
		h. Meteorological department	
Initial Action	2	Ensure telephone operator / signal room communicate with IRT team.	
	3	Ensure arrangement of tugs.	
	4	Recommend to minimize the impact of accident on the environment. Develop strategies to control the hazardous spills.	
	5	Determine the level of contamination in co-ordination with WBPCB of the site as a result of pollution incident.	
Ongoing Response	6	Coordinate with SIC and provide necessary information to conduct the actual cleanup work.	
Response Termination	7	Terminate response on instructions of CIC/SIC.	
	8	Ensure that all records are collated and stored.	

END MMOH CHECKLIST

CHECKLIST -5		FIRE & SECURITY OFFICER	
Phase		**Action**	**Time**
Mobilization / Activation	1	Obtain details of spill/fire and of any mitigative actions taken.	
	2	Start recording of events in the Personal Log.	
	3	Communicate and coordinate with	
		a. SIC	
		b. CIC	
		c. Port Control room	
		d. Terminal and Berth/Jetty Operators	
		e. CISF	
	4	Activate Port Fire Station.	
Establishing Control	5	Lead Fire Fighting team to the incident location.	
	6	Establish radio or telephone contact with SIC.	
Initial Actions	7	Announce Fire Incident Point on PA System.	
	8	Be updated about wind direction.	
	9	Consult with SIC and Arrange for	
		a. • Fire Extinguishers • Maintain sufficient water pressure in fire hydrant system.	
		b. External fire tender, materials and mutual aid required.	
		c. Search and Rescue of injured persons to medical centers	
		d. In consultation with SIC assist in evacuation of workers to assembly areas.	
	10	Assist SIC to compile a list of needs: personnel, equipment, transport etc.	
Response Actions	11	Implement response actions as per SIC/CIC instructions.	
	12	If necessary, call for additional resources.	
Response Termination	13	Terminate response if conditions are met on consultation with SIC.	
	14	Ensure safe return of response personnel.	
	15	Ensure that all records are collated and stored.	

END FSO CHECKLIST

CHECKLIST -6		GENERAL MANAGER (ENGG.)		
Phase		**Action**		**Time**
Mobilization / Activation	1	Start recording of events in the Personal Log.		
	2	Communicate and coordinate with		
		a.	CIC	
		b.	SIC	
		c.	Iron Ore Handling Plant, Coal Handling Plant, Port Electrical Dept., Workshop.	
		d.	Maintenance Department	
		e.	Engineering Department	
		f.	Material Management Department	
		g.	Port Railways	
Establishing Control	3	Depute engineers on-site.		
	4	Establish radio or telephone contact with CIC and SIC.		
Initial Action	5	Maintain sufficient stock of required equipment/materials.		
	6	Coordinate with CIC, SIC, CISF, Fire officer & Procurement officer.		
	7	Ensure water supply to the hydrants.		
Ongoing Response	8	Provide necessary advice and supports.		
	9	Arrange for Bulldozers, mobile cranes, forklifts or any other specialized equipment.		
	10	Mobilize cargo handling equipment's.		
Response Termination	11	Terminate response if conditions are met on permission of CIC/SIC.		
	12	Ensure that all records are collated and stored.		

END GME CHECKLIST

CHECKLIST -7		GENERAL MANAGER (TRAFFIC)		
Phase		**Action**		**Time**
Mobilization / Activation	1	Start recording of events in the Personal Log.		
	2	Communicate and coordinate with		
		a.	CIC	
		b.	SIC	
		c.	Terminal and Berth/Jetty Operators	
Establishing Control	3	Prepares vessels to vacate from berth.		
	4	Establish radio or telephone contact with CIC and SIC.		
Initial Action	5	Prepare consolidated list of dangerous goods including tankers in port and provide details to SIC.		
	6	Arranges to protect cargo in vicinity from damage.		
	7	Provide necessary advice and supports.		
	8	Coordinate with ship owners/agents/C & F agents/stevedores.		

Response Termination	9	Terminate response if conditions are met on permission of CIC/SIC.	
	10	Ensure that all records are collated and stored.	

END GM (T) CHECKLIST

CHECKLIST -8		**SR. DY. MANAGER (INFRA & CIVIC FACILITIES)**	
Phase		**Action**	**Time**
Mobilization / Activation	1	Start recording of events in the Personal Log.	
	2	Communicate and coordinate with	
		a. CIC	
		b. SIC	
		c. Management & Services department	
		d. Engineering Department	
		e. Material Management Department	
		f. Maintenance department	
	3	Depute engineers on-site.	
Establishing Control	4	Establish radio or telephone contact with CIC and SIC.	
Initial Action	5	Arrange sand bags, Diesel pumps, sufficient quantities of bleaching powder etc., for the event of Cyclone/flood. Plans/strategy, as contemplated, to be forwarded to higher levels.	
	6	Will look after fenders, sea wall, transit shed doors, roofs etc.	
	7	Identify local contractors and keep them as standby to meet emergency requirements such as man power, equipment etc.	
	8	Render and Monitor assistance for extricating trapped personnel by cutting structures etc.	
	9	Instruct the contractors to carry out urgency civil works if required.	
	10	Coordinate with CIC, SIC, CISF, Fire Officer & Procurement officer.	
Ongoing Response	11	Provide necessary advice and support.	
	12	In case of fire and especially if the fire involves toxic/flammable materials, contain the run off fire water and other water from the damaged units.	
	13	Cooperate with IRT to conduct the actual cleanup work during and after the emergency.	
	14	Inform West Bengal pollution control board and other environmental agencies about the incident for necessary guidance.	
Response Termination	15	Terminate response if conditions are met on permission of CIC/SIC.	

	16	Ensure that all records are collated and stored.	

END SDM (I&CF) CHECKLIST

CHECKLIST -9		**SR. DY. MANAGER (PLANT & EQUIPMENT)**	
Phase		**Action**	**Time**
Mobilization / Activation	1	Communicate and coordinate with	
		a. CIC	
		b. SIC	
		c. Engineering Department	
		d. Management & Services department	
		e. Material Management Department.	
Initial Action	2	Gather necessary information.	
Ongoing Response	3	Implements elaborate plans for providing continuity of emergency supplies and services such as, electric power, emergency lighting etc.	
	4	Recommend the appropriate procedures to isolate damaged units without introducing new hazards and provide resources both in terms of personnel and equipment to accomplish this.	
	5	Provide the necessary utilities during the emergency, isolating or recommending emergency isolation procedures to prevent utility distribution to damaged parts of the facility. If required, activate back up emergency generators, pumps, welding services and underwater diving.	
	6	Render and monitor assistance for extricating trapped personnel by cutting structures, wires etc.	
	7	Remain alert on duty for any electrical isolation of equipment.	
	8	During cyclone/flood arrange for the sand bags.	
	9	Assess damages and provide technical assistance to determine the operability of damaged units. Keep in touch with the state electricity board.	
Response Termination	10	Assist in accident investigation.	
	11	Terminate response if conditions are met on permission of CIC/SIC.	
	12	Ensure that all records are collated and stored.	

END SDM (P&E) CHECKLIST

CHECKLIST-10		DOCK PILOT	
Phase		**Action**	**Time**
Mobilization / Activation	1	Upon callout, report to CIC/SIC.	
	2	Start recording of events in the Personal Log.	
	3	Attend Initial Briefing.	
Assessment	4	Assist SIC/ Dock Master / Asst. Dock Master to obtain and collate available data regarding:	
		a. Weather.	
		b. Tides, currents.	
		c. Latest update on action taken.	
Planning	5	Determine field response equipment/ labor/ transport requirements and provide to CIC.	
Ongoing Response	6	Direct and coordinate marine response activities.	
	7	Prepare all tugs/crafts for mobilization at the earliest.	
	8	Prepare directive for marine response teams.	
	9	Ensure that field response teams receive required	
		a. Information i.e. Briefings/Inductions/Weather.	
		b. Personal protective equipment (PPE).	
		c. Essential supplies (e.g. food, first aid etc.).	
		d. Weather conditions.	
		e. Monitoring of response activities.	
	10	Coordinate dispersant operations when permitted.	
	11	Seek for necessary means for aerial observation, containment and recovery actions and vessel dispersant spraying operations.	
	12	Inform in-charge of pollution response cell of anticipated waste quantity and type.	
Response Termination	13	Advise for termination of response operation.	
	14	Ensure safe return of response personnel.	
	15	Ensure that all equipment is cleaned and returned to stores.	
	16	Attend debriefing.	
	17	Ensure that all records are collated and stored.	

END DP CHECKLIST

CHECKLIST-11		COMMANDANT - CISF (SECURITY)	
Phase		**Action**	**Time**
Mobilization / Activation	1	Obtain details of incident and of any mitigative actions taken.	
	2	Start recording of pertinent facts and figures in the Personal Log.	
	3	Communicate and coordinate with	
		a. CIC	

		b.	SIC	
		c.	Police Authorities	
Establishing Control	4		Authorize any immediate action required by on site staff.	
	5		Establish a special task force for the rescue operation.	
	6		Establish radio and telephone contact with CIC and SIC	
Initial Action	7		Obtain necessary instructions from SIC.	
Ongoing Response	8		Control entry of unauthorized persons.	
	9		Facilitate entry of authorized persons, agencies.	
	10		Facilitate entry of emergency vehicles such as ambulance etc.	
	11		Assist in Search and Rescue operation.	
	12		Ensures that residents within port area are notified about disaster and instructions to evacuate if necessary.	
Response Termination	13		Carry out a reconnaissance of the evacuated area before declaring the same as evacuated.	
	14		Terminate response if conditions are met on permission of CIC or SIC.	
	15		Ensure that all records are collated and stored.	

END CISF-S CHECKLIST

CHECKLIST -12	**MEDICAL SUPERINTENDENT**			
Phase		**Action**		**Time**
Mobilization / Activation	1		Start recording of events in the Personal Log.	
	2		Communicate and coordinate with	
		a.	CIC	
		b.	SIC	
		c.	ICLO, Nearby Hospitals and Health care professionals.	
		d.	Port Control Room.	
		e.	CISF	
Establishing Control	3		Activate Hospital Emergency Action Plan and depute doctors on-site to give first aid to the injured.	
	4		Establish radio or telephone contact with CIC and SIC and understand the emergency situation.	
	5		Advise CIC/SIC on industrial hygiene and make sure that the frontline personnel are not exposed to unacceptable levels of toxic substances.	
	6		Inform hospitals of the situation in case of a toxic release and apprise them of the antidotes necessary for the treatment	

	7	Coordinate with ICLO. Along with the District Administration and health care professionals, ICLO will facilitate infection control programme in the event of a natural disaster.	
Initial Action	8	Maintain sufficient stock of medicines, antidotes, oxygen, stretchers etc. and arrange for ambulance.	
	9	Suggest and provide an antidote in the event of toxic release	
	10	Coordinate with nearby hospitals and doctors.	
Ongoing Response	11	Provide necessary advice and supports for appropriate treatment of the injured persons.	
Response Termination	12	Terminate response if conditions are met on permission of CIC/SIC.	
	13	Ensure that all records are collated and stored.	

END MS CHECKLIST

CHECKLIST -13		**BERTH OPERATOR(S)**	
Phase		**Action**	**Time**
Mobilization / Activation	1	Start recording of events in the Personal Log.	
	2	Communicate and coordinate with	
		a. CIC	
		b. SIC	
		c. Ship owners / Agents / C & F agents / stevedores.	
		d. Terminal Managers	
Establishing Control	3	Prepares vessels to vacate from berth.	
	4	Establish radio or telephone contact with CIC and SIC.	
Initial Action	5	Prepare consolidated list of dangerous goods including tankers in port.	
	6	Arranges to protect cargo in vicinity from damage.	
	7	Arranges to segregate and shift cargo in sheds.	
Ongoing Response	8	Coordinate with ship owners/agents/C&F agents/stevedores.	
	9	Provide necessary advice and supports.	
Response Termination	10	Terminate response if conditions are met on permission of CIC/SIC.	
	11	Ensure that all records are collated and stored.	

END BO CHECKLIST

CHECKLIST -14		**SECRETARY**	
Phase		**Action**	**Time**
Mobilization / Activation	1	Communicate and coordinate with	
		a. CEC	
		b. Media (preparing brief)	

		c.	Administration Department	
		d.	Material Management Department	
Initial Action	2		Arranges for food, water and accommodation	
	3		Arranges for transport	
	4		Arranges to communicate with relatives of employees	
Response Termination	5		Liaises with media under guidelines provided by the CEC.	

END SEC CHECKLIST

CHECKLIST -15		**SR. DY. MANAGER (P&IR)**		
Phase		**Action**		**Time**
Mobilization / Activation	1	Communicate and coordinate with		
		a.	CEC	
		b.	CIC	
Initial Action	2	Gather information		
Ongoing Response	3	To assist in issuing notice under Major Port Trust Act, Indian Ports Act, Major Port Prevention and Control of Pollution Rules etc. to the defaulters.		
Response Termination	4	Arrange for settlement of related claims		
	5	Liaises with media under guidelines provided by the CEC.		

END SDM (P&IR) CHECKLIST

9.2 EARLY WARNING/ ALERT SYSTEM

9.2.1 Receiving and managing alerts

Information of the occurrence of incidents in and around HDC area may come from a variety of sources. On receipt of information designated personnel must carry out investigation to confirm the incident and gather as many details and as quickly as possible:

- Prepare an incident report.
- Immediately forward the report to and inform the GM (Marine) / Dy. Dock Master.

The information so collected shall be maintained by making hourly log entry in a register.

9.2.2 Activation of Emergency Operation Centre (EOC) and initial resource coordination

9.2.2.1 Establishing the EOC

9.2.2.1.1 Location

The EOC will be located in the Port Control room (Signal Station) or Port Office building (Jawahar Tower) as directed by the Chairman/Dy. Chairman.
For small scale or short duration responses, the local EOC will be used inside the port. For larger scale responses, where external help is needed the main office area or as directed by the Chairman/ Dy. Chairman, will be utilized along with local EOC.

9.2.2.1.2 Muster Point

IRT personnel will muster at the nominated EOC unless otherwise directed by the SIC.

9.2.2.1.3 First Person On-Site

The person who arrives first at the EOC premises will commence preparation for the meeting.

9.2.2.1.4 Responsibility

The designated CIC/SIC will mobilize IRT members.

9.2.2.1.5 Resource mobilization

The CIC/SIC will ensure mobilization of sufficient equipment and personnel resources required to manage the response.

9.2.2.1.6 Direction, control and coordination – Function coordination amongst IRT

The overall responsibility of the Emergency management lies with the GM (Marine), HDC. He assumes the responsibility of CIC on receipt of the information of an impending emergency.
Some of the critical functions are:

- Activation of the EOC,
- An ongoing emergency assessment, including upgrading or downgrading of the emergency alarm level,
- Notification of outside governmental agencies,
- The decision to ask for outside help and resources,
- The decision to evacuate people,

- Decisions involving the safety of offsite vulnerable points (e.g. recommendations to evacuate or take shelter, in the case of a toxic vapour release).

PROCEDURE-A		**ESTABLISHING THE EMERGENCY OPERATION CENTRE (EOC)**	
Task		**Action**	**Status**
1.0		Obtain and/or assign EOC equipment.	
1.1		**Communications**	
	a	Telephone lines. (1 Hot line linking Dy. Commissioner of the district)	
	b	Fax lines.	
	c	Radio frequency (as required).	
1.2		Information Display.	
	a	Set of forms (minimum of 5 sets).	
	b	Regional Maps and Charts:	
		i Nautical charts.	
		ii Topographic maps	
		iii Pipeline layout map	
	c	Overhead projector (in nominated briefing room).	
	d	Whiteboards.	
1.3		Copy(s) of the DMP and OSCP.	
1.4		Computer and Printer.	
1.5		Stationary: Markers, Pens, Pencils and A4 white paper.	
1.6		Tables and chairs	
1.7		Order and obtain any items needed (1.1-1.6)	
1.8		Advise reception to direct incoming calls to the EOC.	

Table 9.2: Procedure for Establishing EOC

9.2.3 Competent Agencies

Disaster	**Agencies**
Earthquakes	IMD
Floods	Central Water Commission (CWC)
Cyclones	IMD, Regional Specialized Meteorological Centre (RSMC) – Kolkata
Tsunami and Storm Surge	INCOIS

Table 9.3: Competent agencies for issuing warnings

These agencies shall be responsible for keeping track of developments in respect of specific hazards assigned to them and inform the designated authorities/agencies at National, State and District levels about the impending disasters. All these agencies have developed guidelines for early warning of disasters.

9.2.3.1 Cyclone

Indian Meteorological Department (IMD) has a developed detailed procedure for Four Stage Warning of Cyclone

1. **Pre-Cyclone Watch**: Pre-cyclone watch is an early warning issued about 72 hrs. in advance of the commencement of bad weather. This is issued by the IMD Headquarters to all designated authorities including the Cabinet Secretary and other senior officers of Govt. of India and the Chief Secretaries of concerned Maritime States, media and all Cyclone Warning Centers (CWS) of IMD.

2. **Cyclone Alert**: Cyclone Alert is issued to all designated authorities/Agencies as far as possible, 48 hours before the expected commencement of adverse weather.

3. **Cyclone Warning**: Cyclone warning are issued to all designated Authorities/Agencies including the Chief Secretaries of the maritime States and the District Magistrates/Collectors of the coastal districts (Purba Medinipur) and the immediate interior districts expected to be affected by the cyclone. Cyclone Warning is also issued to the designated railway officials and defense personnel. After initial warning, cyclone warning is issued to above officials twice a day by high priority telegrams based on 0830 IST and 1730 IST charts till the weather improves.

4. **Post Landfall Outlook**: Post landfall outlook is issued at least 12 hours in advance of the landfall by concerned CWCs. On the basis of this outlook, the concerned Meteorological Centre will also issue cyclone warnings for the interior areas.

9.2.3.1.1 Cyclone Warning Dissemination System (CWDS)

Cyclone Warning Dissemination System (CWDS) receivers have been established in vulnerable coastal areas using INSAT/METSAT. The system is being used extensively on operational basis during cyclone. The cyclone warning message is originated from Regional Metrological Centre (RMC) Haldia, West Bengal whenever a storm is observed.

In addition, Cyclone Warning is disseminated through the following means:

a. Police Wireless network
b. Warnings through All India Radio (AIR) Bulletins
c. Television
d. Press Bulletins
e. Aviation Warning
f. Telephone and Fax
g. Telex
h. Telegrams.

9.2.3.2 Tsunami

In the aftermath of the Indian Ocean Tsunami of 26 December 2004, the Ministry of Earth Sciences has set up an Indian Tsunami Early Warning Center at the Indian National Centre for Ocean Information Services (INCOIS) Hyderabad. The Center

provides advance warnings to the port on Tsunamis likely to affect the port area and the adjoining coastline in general.

Tsunami Warning (RED) contains information about the earthquake and a tsunami evaluation message indicating that tsunami is expected. 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.

Tsunami Alert (ORANGE) contains information about the earthquake and a tsunami evaluation message indicating that tsunami is expected. 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 at various coastal locations.

Tsunami Watch (YELLOW) contains information about the earthquake and a tsunami evaluation message indicating that tsunami is expected. 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 at various coastal locations.

Tsunami cancellation (GREEN) 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 cancelled 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.

Tsunami All Clear (GREEN) bulletin indicates that the 'Tsunami Threat' is passed and no more dangerous waves are expected.

9.2.3.3 Flood

Central Water Commission (CWC) has developed a network of flood forecasting stations and issues Daily Flood Bulletins to all designated Authorities/Agencies of the Central Government and State Governments/ district Administration during the South East Monsoon season for all the major river basins in the following categories:

Category IV:
Low Flood (Water level between Warning Level and Danger Level)
Category III:
Moderate Flood (Water Level below 0.50m. less than HFL and above Danger Level)
Category II:
High Flood (Water Level less than Highest Flood Level but still within 0.50m. of the HFL)
Category I:
Unprecedented Flood (Water Level equal and above Highest Flood Level (HFL))

9.2.4 PUBLIC WARNING

The capabilities and processes the Port has in place for information collection and disseminating warning messages to the stakeholders and all the personnel as to the nature of the hazard, the timing, and the recommended or required protective/preventive actions which are to be implemented by the action group are described in the following sections.

9.2.4.1 Message content

The message needs to be announced at least in local language which may be for example Evacuate, Assemble etc.

9.2.4.2 Public Warning System

The various types of warnings through hooters/sirens with indication locally and in control room, depending on the location of emergency as specified below:

- **Siren for declaring Emergency**

  1. On receipt of the information about the Emergency, the control station will authorize CISF at Gate to actuate the Emergency Siren as follows: -
     - Siren to be sounded continuously for 10 Seconds with an interval of 5 seconds for one minute.

- **Siren declaring All Clear and returning to the work**

  1. On receipt of the information from the General Manager (Marine) or in his absence Dy. Dock Master the port control room will authorize CISF at Gate to actuate the Siren as follows:
     - Continuous ringing of siren for 1 minutes

9.3HAZARD SPECIFIC RESPONSE PLAN

Following potential accidental scenarios have been identified in accordance with the risk assessment for the port. The action flowchart and action plan for each scenario has been prepared in accordance with the Incident Response System, NDMA.

S1: Scenario 1
Part A

1. **Fire due to leakage of LPG/POL/Chemical from pipeline /loading arm /hose at Oil Jetty (OJ-1, OJ-2 & OJ-3) – on ship or ashore.**

2. **Precautions:** MSDS, SOP of berth operator, berthing and un-berthing procedure and Periodic inspection and maintenance of pipelines.

3. **Impact Zone:** Refer Consequence Assessment - **Appendix E**.
   Consequence analysis indicates that the LPG leak from transfer pipeline would cover approx. 1200 meters for Vapor cloud explosion (VCE) scenario.

4. **Resources required:** Organizational setup enumerated in Figure S1.2 and material and equipment resources as given in **Appendix B** (refer to equipment list of Oil jetties).

Figure S1.1: Action Flow Chart

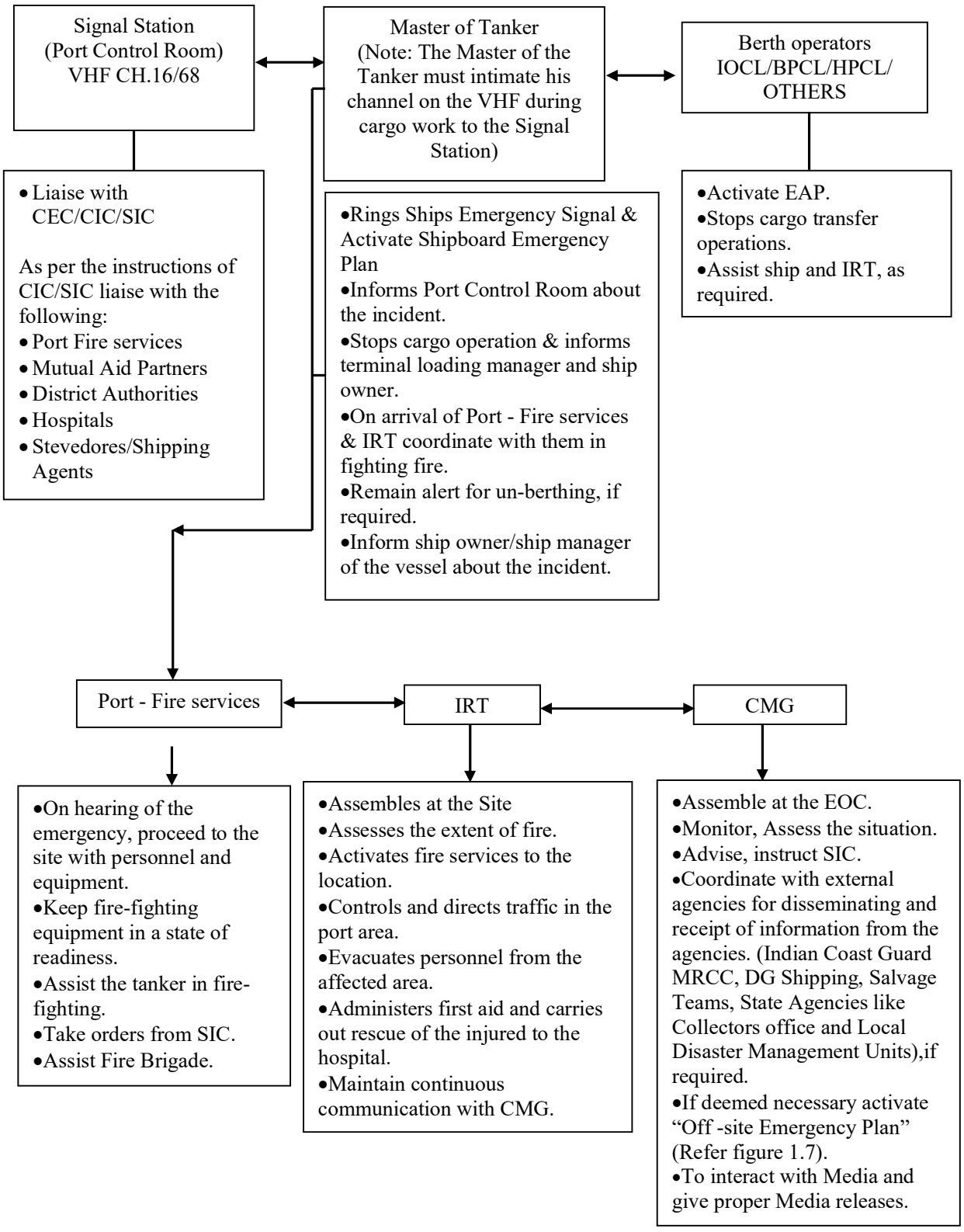
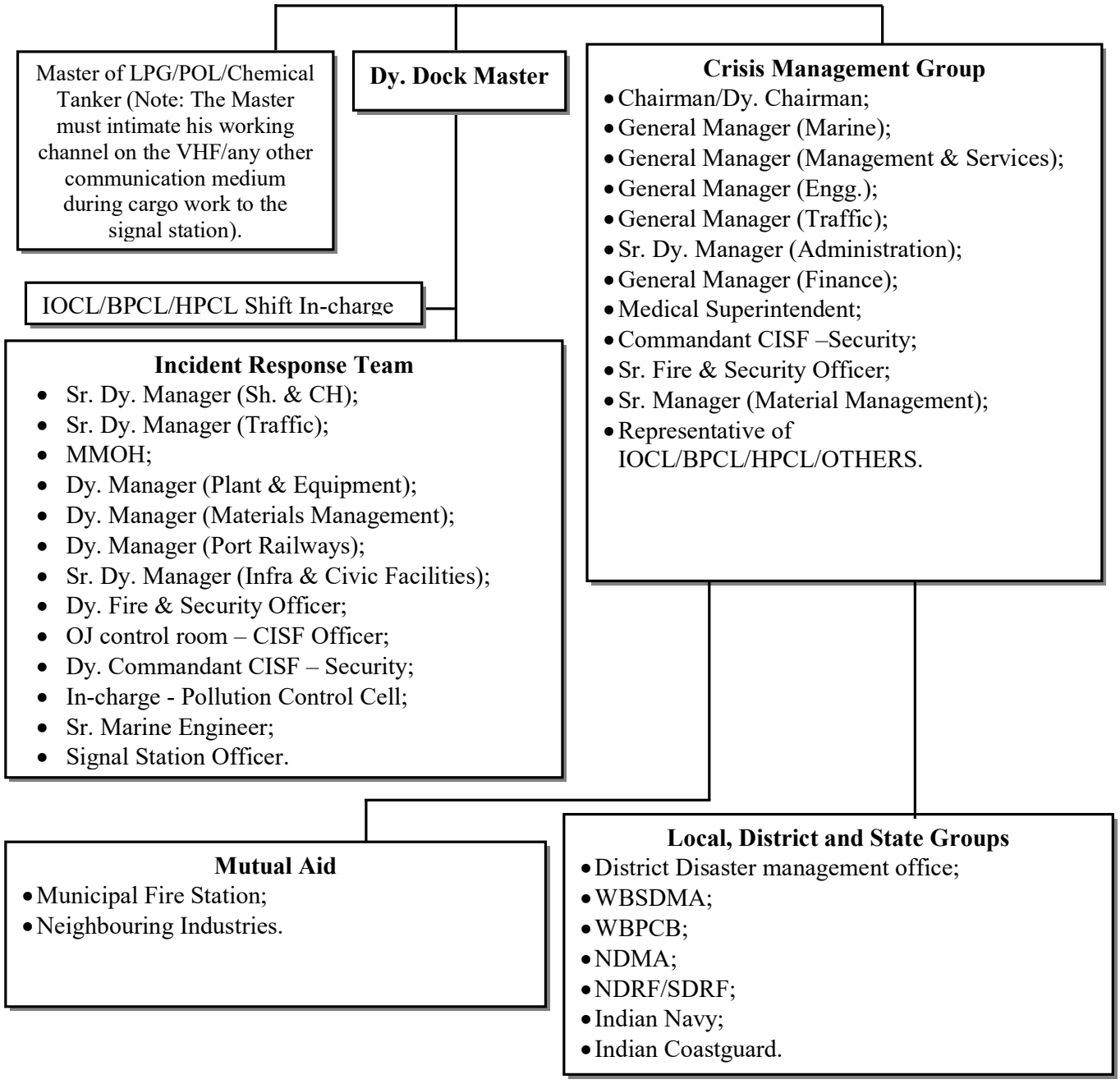


Figure S1.2: Action group



Part B: Action Plan

The vessel upon berthing, berth operator will follow standard procedures. However, in a less likely scenario a leak from the pipeline system may occur at the jetty or from the jetty along the route to the terminal (within the port area) leading to self-detection by vessel personnel or by the terminal automatic alarm system. Further in a more unlikely situation due to a possible ignition the leakage might catch fire and leading to explosion. The following action will be required;

1. The Master of the Ship (Alternate: Chief Officer)

Response Action	Contact
a. Should raise ships emergency alarm and activate ship board emergency action plan.	
b. Stop LPG/POL/Chemical transfer operation (as per SOP of the ship).	
c. Berth Operator, Vessel in the vicinity and Port should be informed of any incident on the ship without delay.	• Berth Operator • Port Control Room
d. Personnel to remain stand by to disconnect unloading arm / hoses.	
e. Shall be responsible for fighting the fire with ships own resources as well as with the available support from IRT.	
f. Also, to remain prepared to un-berth the ship to the safe area (high sea).	
g. The siren should be continued till the ship is taken to a safe location as per CIC instructions.	

2. The berth operator tasked with LPG/POL/Chemical cargo transfer operations at the Jetty should

Response Action	Contact
a. Activate Jetty EAP and inform Port.	Port Control Room
b. Shut off isolation valve on LPG/POL/Chemical pipeline at the berth (action as per SOP of the terminal).	
c. Area should be cordoned off.	
d. Pour foam/dry chemical powder on LPG/POL/Chemical spillage to reduce rate of vaporization as per MSDS.	
e. Assist IRT and provide all necessary equipment.	
f. He will direct operation staff. Coordinate with the ship in-charge/C&F agents/stevedores.	

3. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. Assess the level of disaster and activate the DMP.	
b. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	
c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation and accordingly inform to the Chairman / Dy. Chairman.	• Chairman • Dy. Chairman
e. Assess the condition of site and of potential affected area and take decision on evacuation in consultation with SIC.	• SIC
f. Be in constant touch with District and Local Administration for rescue and relief operation.	
g. Terminate the response and debrief before allowing normal operation.	

4. The Port Control Room

Response Action	Contact
a. Gather information related to the weather conditions. Monitor the wind directions and accordingly convey the message to CIC/SIC and Port Fire dept.	• CIC • SIC • Port Fire dept.
b. Liaise with Master of the Vessel/Pilot.	• Master of the Vessel • Pilot
c. Listening watch to be maintained on VHF channel 16/68.	
d. Notify to CIC, SIC and the vessels moving into, through and inside the port. Keep CIC/SIC informed of all the messages received by telephone, VHF sets or by messenger.	• CIC • SIC
e. Notify the other Authorities and stakeholders within Port as per instructions of CIC/SIC.	• Coastguard • Stakeholders
f. Notify the information to the owner of the vessel as per the instruction of CIC/SIC/ Master of the Vessel.	

5. The Fire-fighting personnel should

Response Action	Contact
a. Raise Alarm (siren)	
b. Start the pumps as per the requirement	
c. Use water sprays and portable nozzles to maintain curtain.	
d. Open the valves of the monitors and direct the jet on the seat of fire.	

e. Ensures availability of the fire tenders and fire-fighting tugs.	
f. In case of fire onboard assist Master in fighting fire as per Masters Instructions.	
g. Ensure all the ignition sources in the vicinity are extinguished if fire has not occurred.	
h. If the fire is under control and extinguished, give all clear signal.	

6. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the Master of the Tanker and berth Operator.	Asst. Dock Master
		Conduct initial Briefing.	
		Report the situation to the CIC/CMG and assist CIC in assessment of the incident.	
		Alert vessels within the vicinity.	
		Assess the condition of site and of potential affected area and take decision on evacuation in consultation with CIC.	
		Extend all necessary help to the Master of the ship to fight the fire.	
		Instruct the Port Fire dept. to keep the fire-fighting installation and tenders in a state of readiness & activate if required.	
		Instruct Pilot(s) to keep tugs ready for fire-fighting.	
		Coordinate with all functional heads to take actions.	
Asst. Dock Master	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC /SIC.	Dock Pilot
		Responsible for organizing tugs, mooring boats and pilots for combating the fire and rescue.	
		Hire additional crafts as necessary.	

		Maintain Log of events.	
MMOH	Pollution Control Coordinator	Determine the level of contamination of the site as a result of incident. Ensure clean- up work during and after the emergency as quick as possible. Inform WBPCB and other environmental agencies and take necessary guidance.	Dy. MMOH
IOCL/BPCL/ HPCL/Others - Berth Operator – Manager	Cargo Work	Shall be responsible of shutting down of cargo operation & coordinating with Port and rendering necessary assistance to the SIC by providing additional fire - fighting & emergency equipment as required.	Alternate Officer
Dy. Fire & Security Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC. Lead the fire-fighting team and mobilize fire tenders, men & fire-fighting equipment to the scene & extend all necessary support to the Master of the vessel/Berth Operator for fire- fighting. Assist CISF in evacuation of workers to the assembly points. Inform SIC for arrangement of any additional equipment as required.	Shift supervisor
Dy. Commandant-CISF	Security and Evacuation	Shall take orders from the SIC. Cordon off the area. Controls & Directs gate security and traffic in the area. Shall facilitate evacuation, transport, first aid and rescue of personnel from the scene at the time of emergency. Control the entry of unauthorized persons and vehicles. Check for entry of emergency vehicles. Liaise with the Police authorities. Responsible the head count of the personnel.	Asst. Commandant - CISF
Sr. Dy. Manager	Traffic Coordinator	Shall take orders from SIC. Prepare vessels to vacate berth as	Dy. Manager

(Traffic)		per instructions. Arranges to protect the cargo from any damages from the incident. Submits consolidated list of dangerous goods in port. Coordinates with shipowners/ agents/C & F agents/stevedores and with labour officer to arrange and ensure evacuation.	
Sr. Dy. Manager (Civil)	Civil Coordinator	Instruct the workers to carry out urgent civil works as required. Shall mobilize and dispatch sufficient number of vehicles to the site of emergency.	Dy. Manager
Sr. Dy. Manager (Engg.)	E & M Coordinator	Shall be responsible for uninterrupted electrical supply to vital equipment and utility at the berth. Shall remain alert on duty for any electrical isolation of equipment during emergency.	Dy. Manager
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first aid team with ambulance as required. Setup casualty receiving center and arrange for first aid. Make arrangements for transportation and treatment of injured persons. Check updated list of Blood group of each employee available. Shall coordinate with the local hospitals.	Alternate Officer

S2: Scenario 2
Part A:

1. **Toxic gas (Liquid Ammonia) leak from pipeline / loading arm at Oil Jetty - 1 during operation – on Ship or Ashore**

2. **Precautions:** MSDS**,** SOP of terminal, berthing and un-berthing procedures and Periodic inspection and maintenance of pipelines.
   Stay upwind and wear positive-pressure breathing apparatus and full protective clothing, as necessary.

3. **Impact Zone:** Consequence analysis indicates that the Ammonia leak from transfer pipeline would cover distance of 7.6 KM for toxic dispersion with IDLH level of 300 ppm.

4. **Resources required:** Organizational setup enumerated in Figure S2.2 and major material and equipment resources as given in **Appendix B** (refer to equipment list of OJ-1).
   Important: Trained medical personnel and fire fighters as ammonia is toxic.

Figure S2.1: Action Flow Chart

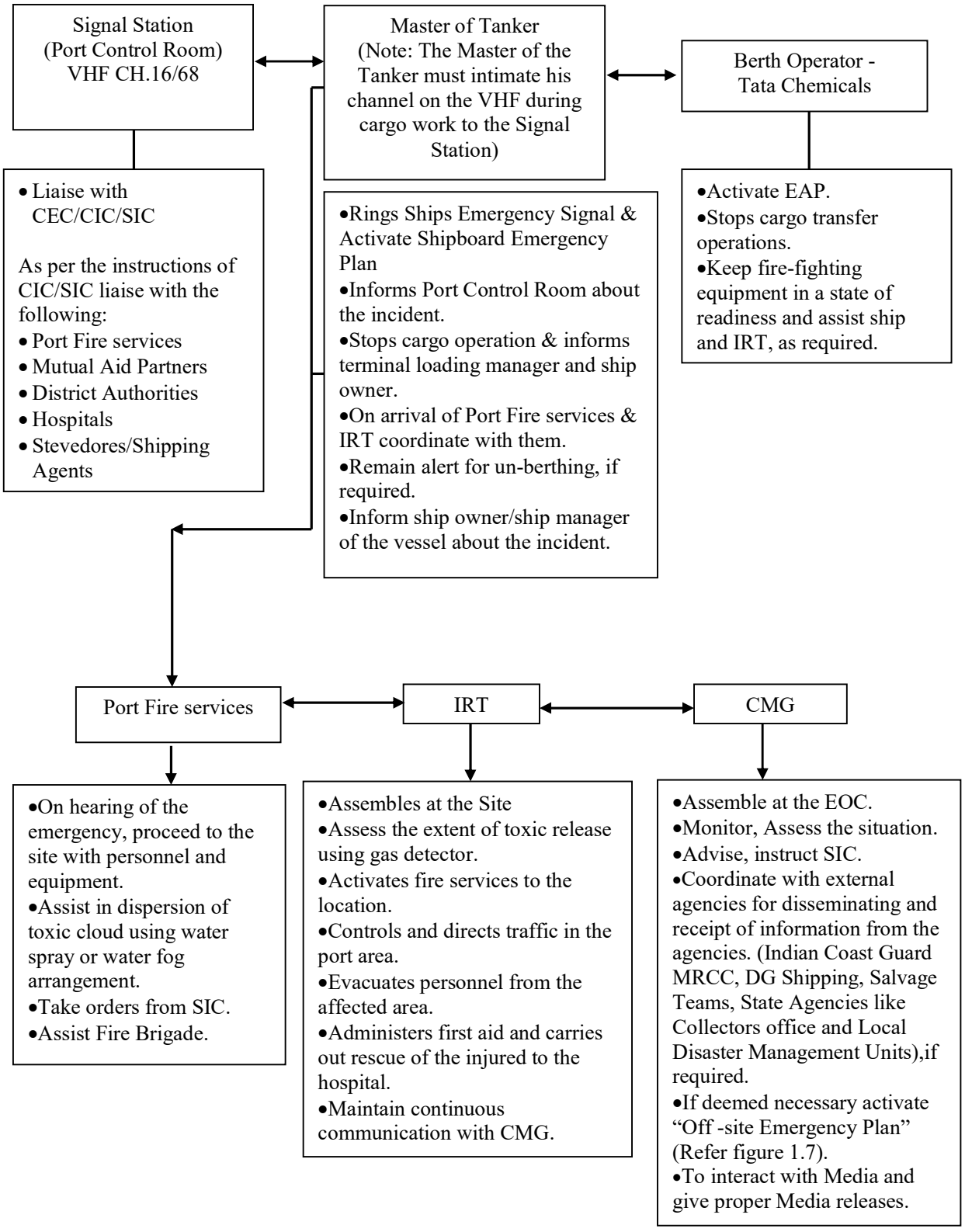
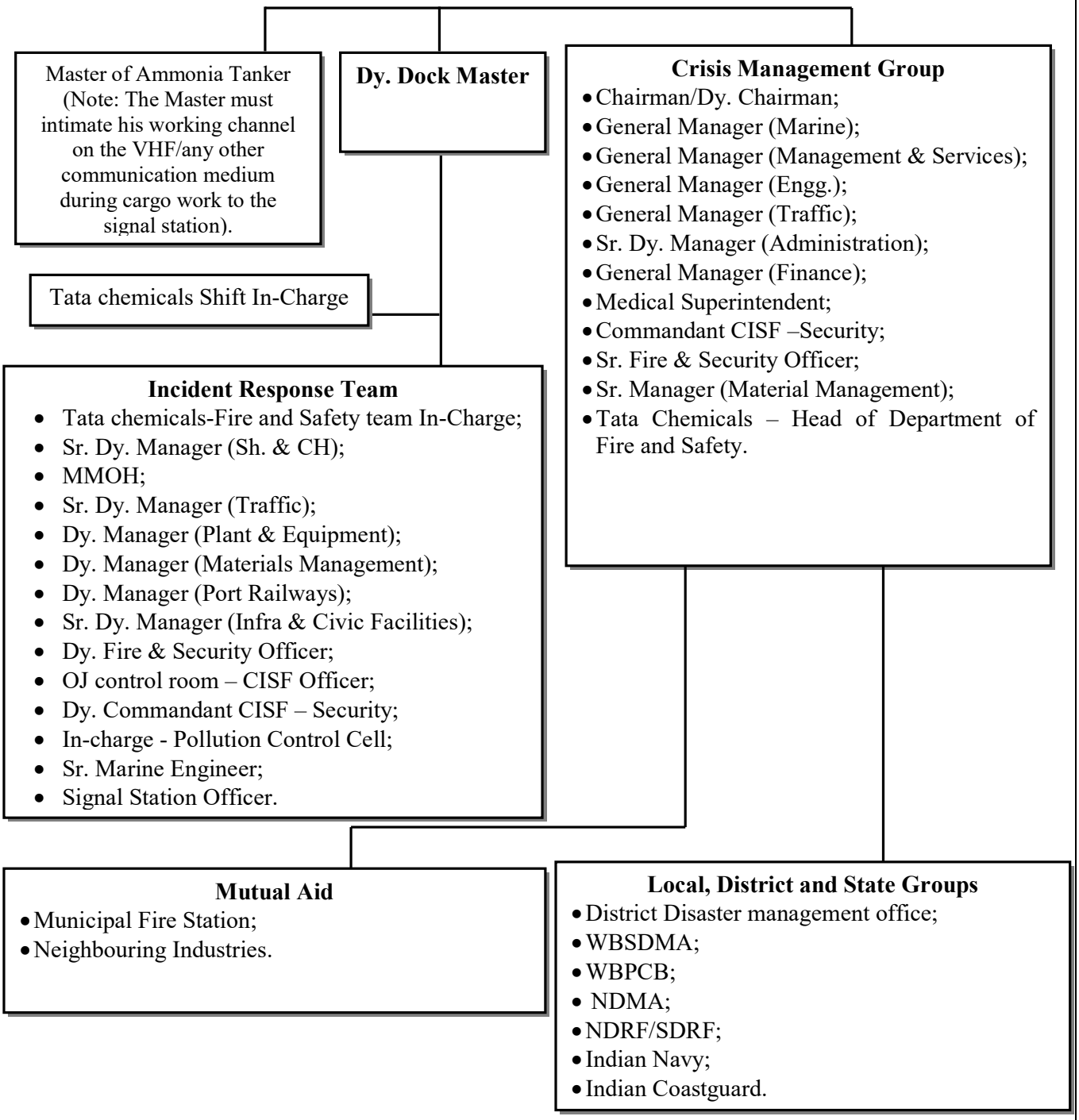


Figure S2.2: Action group



Part B: Action Plan

The vessel upon berthing, berth operator will follow standard procedures. However, in a less likely scenario a leak from the pipeline system may occur at the jetty or from the jetty along the route to the terminal (within the port area) leading to self-detection by personnel or by the terminal automatic alarm system. The following action will be required.

Spill handling: Evacuate and restrict person's not wearing protective equipment from area of spill or leak until cleanup is complete. Remove all ignition sources. Stop the flow of gas if it can be done safely. Stay upwind; keep out of low areas. Wear positive pressure breathing apparatus and full protective clothing.

1. The Master of the Ship (Alternate: Chief Officer)

Response Action	Contact
a. Should raise ships emergency alarm and activate ship board emergency action plan.	
b. Stop Ammonia transfer operation (as per SOP of the ship).	
c. Berth Operator, Vessel in the vicinity and Port should be informed of any incident on the ship without delay.	• Berth Operator • Port Control Room • Vessel in the vicinity
d. Personnel to remain stand by to disconnect metal arms;	
e. Shall be responsible to arrest the leak and for fighting the fire with ships own resources as well as with the available support from IRT.	
f. Also, to remain prepared to un-berth the ship to the safe area (high sea).	
g. The siren should be continued till the ship is taken to a safe location as per CIC instructions.	

2. The berth operator tasked with Ammonia cargo operations at the Jetty should

Take personal precautions, protective equipment and follow emergency procedures. Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. Environmental precautions: Prevent further leakage or spillage if safe to do so.

Contain spillage, and then collect with an electrically protected vacuum cleaner (vehicle mounted in some cases) or by wet-brushing and place in container for disposal.

Response Action	Contact
a. Activate EAP and inform port.	• Port Control Room

b. Shut off isolation valve on ammonia pipeline at the jetty (action as per SOP of the berth operator).	
c. Area should be cordoned off.	
d. Assist IRT and provide all necessary equipment.	
e. He will direct operation staff. Coordinate with the ship in-charge/C&F agents/stevedores.	

3. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. Assess the level of disaster and activate the DMP.	
b. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	
c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Consult with Chairman / Dy. Chairman and decide on clearing of ships in close proximity to the incident location or to sail the ammonia tanker to the higher seas and evacuating the people from the likely affected zone.	
f. Assess and take decision on evacuation in consultation with SIC.	• SIC
g. Be in constant touch with District and Local Administration for rescue and relief operation.	
h. Terminate the response and debrief before allowing normal operation.	

4. The Port Control Room

Response Action	Contact
a. Gather information related to the weather conditions. Monitor the wind directions and accordingly convey the message to Master of the vessel, CIC/SIC and Port Fire dept.	• Master of the vessel • CIC/SIC • Port Fire dept.
b. Liaise with Master of the Vessel/Pilot.	• Master of the Vessel • Pilot
c. Listening watch to be maintained on VHF channel 16/68.	
d. Notify to CIC, SIC and the vessels moving into, through and inside the port. Keep CIC/SIC informed of all the messages received by telephone, VHF sets or by messenger.	• CIC • SIC
e. Notify the other Authorities and stakeholders within Port	• Navy

as per instructions of CIC/SIC.	• Coastguard • Stakeholders
f. Notify the information to the owner of the vessel as per the instruction of CIC/SIC/ Master of the Vessel.	

5. The Fire-fighting Personnel should

Response Action	Contact
a. Raise Alarm (siren).	
b. Start the pumps as per the requirement.	
c. Use water sprays and portable nozzles to maintain curtain and dilution.	
d. Open the valves of the monitors and direct the jet on the seat of fire, in case of fire.	
e. Inform fire officers to arrange for fire-fighting tug and Pilot to arrange for tugs, as required.	• Port Fire dept. • Pilot
f. In case of leakage/fire onboard assist Master in arresting the leak/diluting the vapour/ fighting fire as per Masters Instructions.	
g. Make use of portable DCP, CO_2, Foam extinguisher (alcohol-resistant foam) from upwind position.	
h. Announce in mobile van with PA system in the effecting zones to evacuate the zone. Ensure complete evacuation and report to the EOC.	
i. Ensure all the ignition sources in the vicinity is extinguished if fire has not occurred.	
j. If the situation is under control, give all clear signals.	

6. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the Master of the Tanker and Berth operator.	Asst. Dock Master
		Conduct initial briefing.	
		Report the situation to the CIC/CMG and assist CIC in assessment of the incident.	
		Alert vessels within the vicinity.	
		Shall assess and decide on the evacuation of the personnel considering the direction of wind and dispersion and will instruct CISF-Security to carry out the	

		evacuation in a safe manner.	
		He will extend all necessary help to the Master of the ship to fight the fire.	
		Instruct the Port Fire dept. to keep the fire-fighting installation and tenders in a state of readiness & activate if required to fight fire or for disperse the vapour cloud.	
		Instruct Pilots to keep tugs ready for fire-fighting.	
		Coordinate with all functional heads to take actions.	
Asst. Dock Master	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC /SIC.	Dock Pilot
		Responsible for organizing tugs, mooring boats and Pilots for combating the fire and rescue.	
		Hire additional crafts as necessary.	
		Maintain Log of events.	
MMOH	Pollution Control Coordinator	Inform WBPCB and other environmental agencies and take necessary guidance.	Dy. MMOH
		Ensure clean- up work during and after the emergency as quick as possible.	
		Coordinate with SIC and WBPCB and other agencies.	
Berth Operator (Tata Chemicals) – Manager	Cargo Work	Shall be responsible of shutting down of cargo operation & coordinating with Port and rendering necessary assistance to the SIC by providing additional emergency equipment as required.	Alternate Officer
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift Supervisor
		Lead the fire-fighting team and mobilize fire tenders, men & fire-fighting equipment to the scene & extend all necessary support to the Master of the vessel/Terminal Manager/Shift In- Charge for fire-fighting or vapor cloud dispersion.	

		Assist CISF-Security in evacuation of workers to the assembly points. Inform SIC for arrangement of any additional equipment as required.	
Dy. Commandant-CISF	Security and Evacuation	Shall take orders from the SIC. Cordon off the area. Controls & directs gate security and traffic in the area. Shall facilitate evacuation, transport, first aid and rescue of personnel from the scene at the time of emergency. Control the entry of unauthorized persons and vehicles. Check for entry of emergency vehicles. Liaise with the Police authorities. Responsible for the head count of the personnel.	Asst. Commandant-CISF
Sr. Dy. Manager (Traffic)	Cargo Storage, Shed and Labour Coordinator	Shall take orders from SIC. Submits consolidated list of dangerous goods in port.	Dy. Manager
Sr. Dy. Manager (Civil)	Civil Coordinator	Ensure responsible actions for containing the run off fire water and other water from the damaged units. Shall mobilize and dispatch sufficient number of vehicles to the site of emergency. Shall be responsible to carry out urgent civil works as required.	Dy. Manager
Sr. Dy. Manager (Engg.)	E & M Coordinator	Shall be responsible for uninterrupted electrical supply to vital equipment and utility at the berth. Shall remain alert on duty for any electrical isolation of equipment during emergency.	Dy. Manager
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first aid team with ambulance as required. Setup casualty receiving center and arrange for first aid.	Alternate Officer

		Make arrangements for transportation and treatment of injured persons.	
		Check updated list of Blood group of each employee available.	
		Shall coordinate with the local hospitals.	

S3: Scenario 3
Part A

1. Fire/Explosion - Rupture/leakage of POL/Chemical from Pipeline / Hose at multipurpose berth no. 2, 3, 4 at Impound Basin - within port limit.

2. **Precautions:** MSDS, SOP of berth operator, Periodic inspection and maintenance of pipelines.

3. **Impact Zone:** Refer Consequence Assessment - **Appendix E**.
   Consequence analysis indicates that the Benzene leak from transfer pipeline would cover approx. 280 meters for Vapor cloud explosion (VCE) scenario.

4. **Resources required:** Organizational setup enumerated in Figure S3.2 and major material and equipment resources as given in **Appendix B (refer to equipment list)**.

Figure S3.1: Action Flow Chart

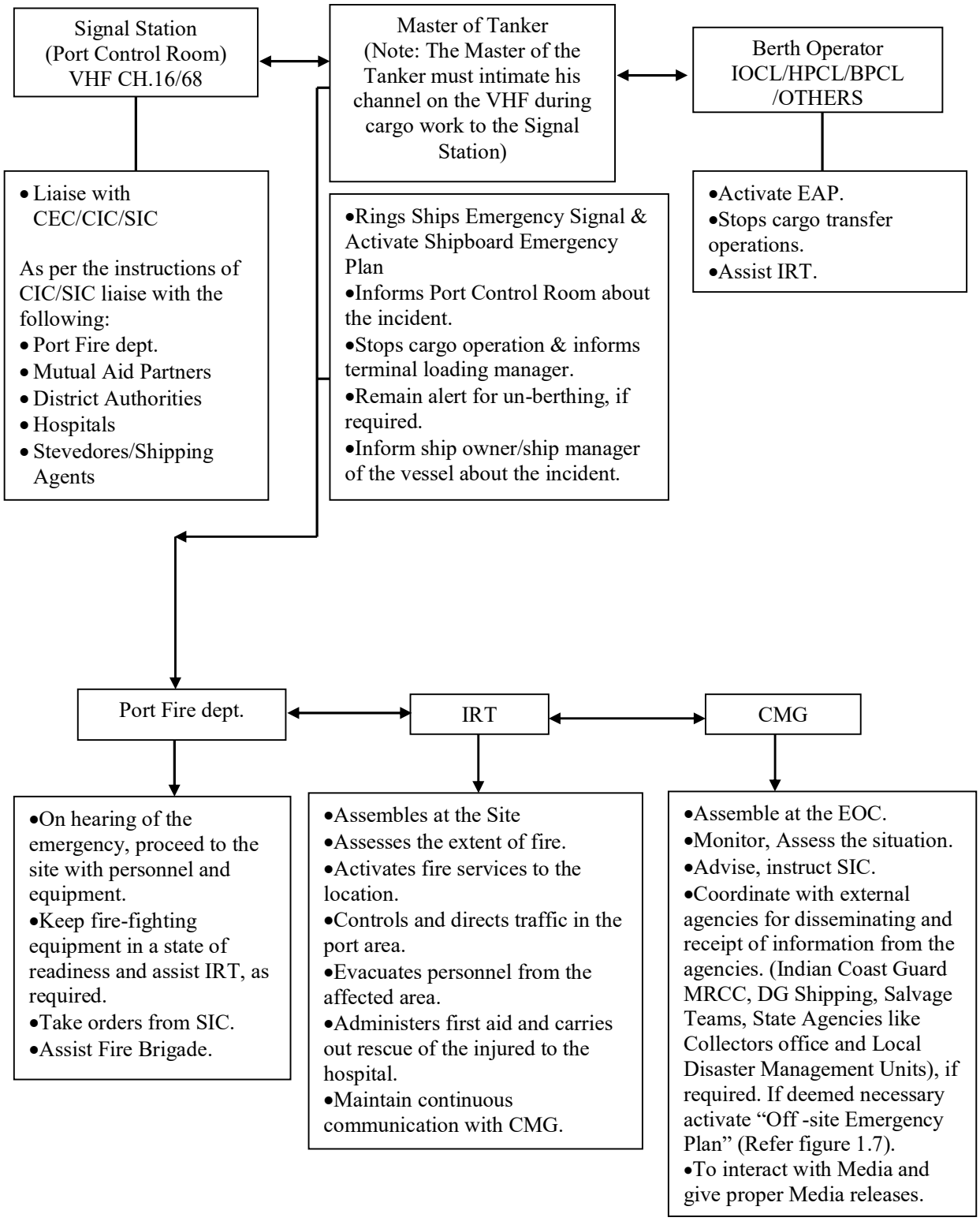
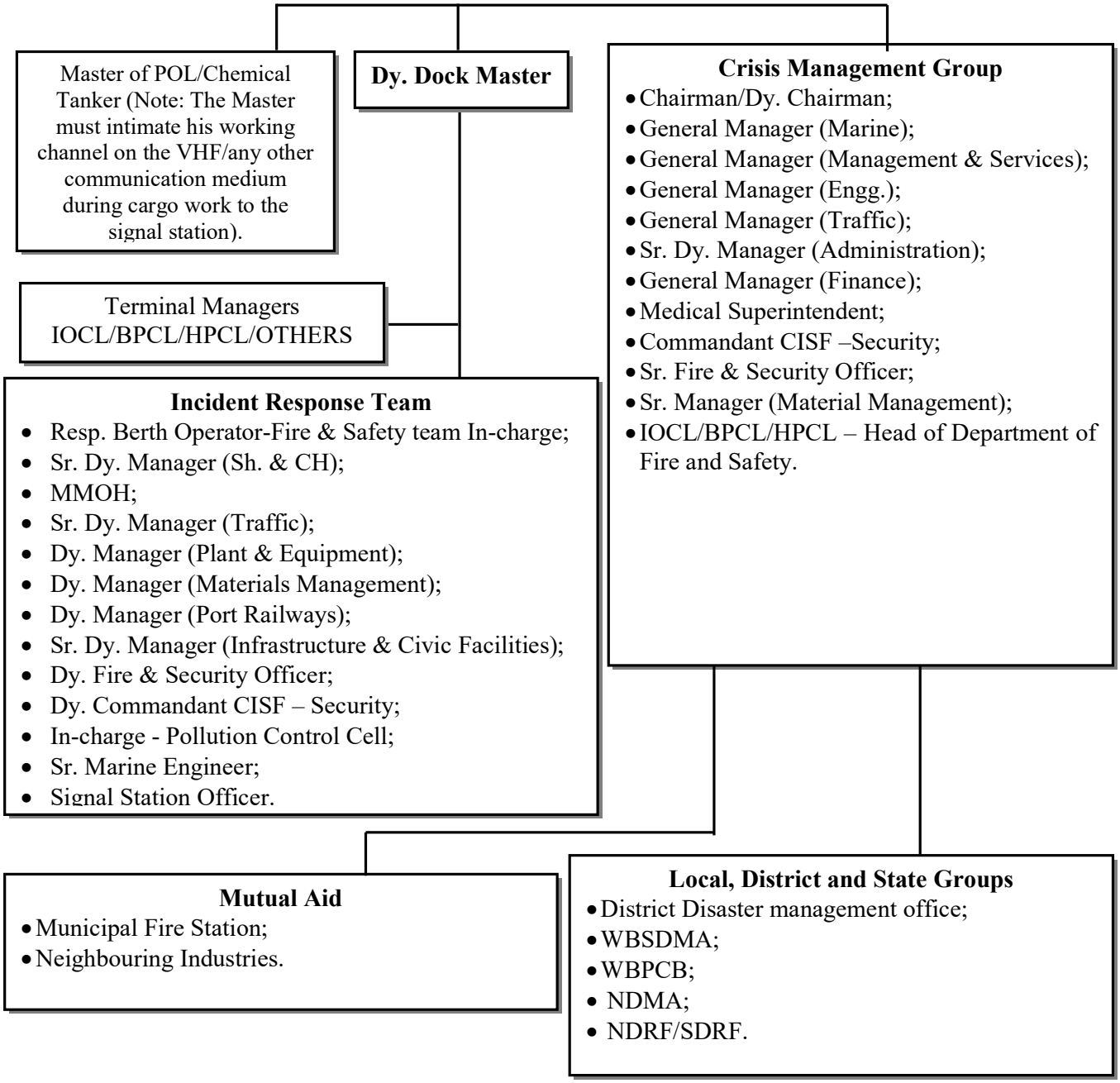


Figure S3.2: Action group



Part B: Action Plan

The vessel upon berthing, berth operator will follow standard procedures. However, in a less likely scenario a leak/rupture of the pipeline system may occur anywhere from the jetty along the route to the terminal (within the port limit) leading to self-detection by vessel personnel or by the terminal automatic alarm system or by maintenance personnel. Further in a more unlikely situation due to a possible ignition the leakage might catch fire and leading to explosion. The following action will be required

1. The Master of the Ship (Alternate: Chief Officer)

Response Action	Contact
a. On receipt of the information on fire incident should raise ships emergency alarm and activate ship board emergency action plan, if required.	
b. Stop POL/Chemical transfer operation (as per SOP of the ship).	
c. Terminal, Vessel in the vicinity and Port should be informed of any incident without delay.	• Terminal • Port Control Room
d. Personnel to remain stand by to disconnect hoses.	
e. Also, to remain prepared to un-berth the ship to the safe area (high sea).	
f. The siren should be continued till the ship is taken to a safe location as per CIC instructions.	

2. The berth operator tasked with POL/Chemical cargo operations at the berth should

Response Action	Contact
a. Activate EAP and inform Port.	• Port Control Room
b. Shut off isolation valve on POL/Chemical pipeline at the berth (action as per SOP of the terminal).	
c. Incident area should be identified and should be cordoned off.	
d. Pour foam/dry chemical powder on POL/Chemical spillage to reduce rate of vaporization.	
e. Assist IRT and provide all necessary equipment.	
f. He will direct operation staff. Coordinate with the ship in-charge/C&F agents/stevedores.	

3. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. Assess the level of disaster and activate the DMP.	
b. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	
c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Assess the condition of site and of potential affected area and take decision on evacuation in consultation with SIC.	• SIC
f. Be in constant touch with District and Local Administration for rescue and relief operation.	
g. Terminate the response and debrief before allowing normal operation.	

4. The Port Control Room

Response Action	Contact
a. Gather information related to the weather conditions. Monitor the wind directions and accordingly convey the message to CIC/SIC and Port Fire dept.	• CIC • SIC • Port Fire dept.
b. Notify the information to the terminal as per the instruction of CIC/SIC.	• Terminal
c. Liaise with Master of the Vessel/Pilot, if the incident happens during transfer of product.	• Master of the Vessel • Pilot
d. Listening watch to be maintained on VHF channel 16/68.	
e. Notify to CIC, SIC and the vessels moving into, through and inside the port. Keep CIC/SIC informed of all the messages received by telephone, VHF sets or by messenger.	• CIC • SIC
f. Notify the other Authorities and stakeholders within Port as per instructions of CIC/SIC.	• Coastguard • Stakeholders

5. The Fire-fighting personnel should

Response Action	Contact
a. Raise Alarm (siren)	
b. Start the pumps as per the requirement or make use of fire water tenders.	
c. Use water sprays and portable nozzles to maintain curtain.	
d. Open the valves of the monitors and direct the jet on the seat of fire.	
e. Ensures availability of the fire tenders and fire-fighting tugs.	
f. In case of fire onboard assist Master in fighting fire as per Masters Instructions.	
g. Ensure all the ignition sources in the vicinity are extinguished if fire has not occurred.	
h. If the fire is under control and extinguished, give all clear signal.	

6. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the Master of the Tanker, and Berth Operators.	Asst. Dock Master
		Conduct initial Briefing.	
		Report the situation to the CIC/CMG and assist CIC in assessment of the incident.	
		Alert vessels within the vicinity.	
		Assess the condition of site and of potential affected area and take decision on evacuation in consultation with CIC.	
		Instruct the Port Fire dept. to keep the fire-fighting installation and tenders in a state of readiness & activate if required.	
		Instruct Pilot(s) to keep tugs ready for fire-fighting.	
		Coordinate with all functional heads to take actions.	

Asst. Dock Master	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC /SIC.	Dock Pilot
		Responsible for organizing tugs, mooring boats and pilots for combating the fire and rescue.	
		Hire additional crafts as necessary.	
		Maintain Log of events.	
MMOH	Pollution Control Coordinator	Determine the level of contamination of the site as a result of incident.	Dy. MMOH
		Ensure clean- up work during and after the emergency as quick as possible.	
		Inform WBPCB and other environmental agencies and take necessary guidance.	
IOCL/BPCL/ HPCL/OTHER Berth Operator – Manager	Cargo Work	Shall be responsible of shutting down of cargo operation & coordinating with Port, Port Fire dept., CISF-Security and rendering necessary assistance to the SIC by providing additional fire- fighting & emergency equipment as required.	Alternate Officer
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift Supervisor
		Lead the fire-fighting team and mobilize fire tenders, men & fire-fighting equipment to the scene & extend all necessary support to the Master of the vessel/Terminal Manager/Shift In-Charge for fire-fighting.	
		Assist CISF in evacuation of workers to the assembly points.	
		Inform SIC for arrangement of any additional equipment as required.	
Dy. Commandant-CISF	Security and Evacuation	Shall take orders from the SIC.	Asst. Commandant-
		Cordon off the area.	
		Controls & Directs gate security and traffic in the area.	

		Shall facilitate evacuation, transport, first aid and rescue of personnel from the scene at the time of emergency.	CISF
		Control the entry of unauthorized persons and vehicles.	
		Check for entry of emergency vehicles.	
		Liaise with the Police authorities.	
		Responsible for the head count of the personnel.	
Sr. Dy. Manager (Traffic)	Traffic Coordinator	Shall take orders from SIC and assist Shift In-Charge.	Dy. Manager
		Prepare vessels to vacate berth as per instructions.	
		Arranges to protect the cargo from the any damages from the incident.	
		Submits consolidated list of dangerous goods in port.	
		Coordinates with shipowners/ agents/C & F agents/stevedores and with labour officer to arrange and ensure evacuation.	
Sr. Dy. Manager (Civil)	Civil Coordinator	Instruct the workers to carry out urgent civil works as required.	Dy. Manager
		Shall mobilize and dispatch sufficient number of vehicles to the site of emergency.	
Sr. Dy. Manager (Engg.)	E & M Coordinator	Shall be responsible for uninterrupted electrical supply to vital equipment and utility.	Dy. Manager
		Shall remain alert on duty for any electrical isolation of equipment during emergency.	
Medical Officer	First Aid and Medical Coordinator	Setup casualty receiving center and arrange for first aid.	Alternate Officer
		Make arrangements for transportation and treatment of injured persons.	
		Check updated list of Blood group of each employee available.	
		Shall coordinate with the local hospitals.	

S4: Scenario 4
Part A

1. **Corrosive Acid - Leakage (Phosphoric/ Sulphuric acid) from pipeline / hose at Multipurpose Berth at Impound Basin Dock during operation – on Ship or Ashore.**

2. **Precautions:** MSDS, HAZMAT kit, SOP of berth operator berthing and un-berthing procedures and Periodic inspection and maintenance of pipelines.

3. **Impact Zone:** Respective Berth.

4. **Resources required:** Organizational setup enumerated in Figure S4.2 and major material and equipment resources as given in **Appendix B.**

Figure S4.1: Action Flow Chart

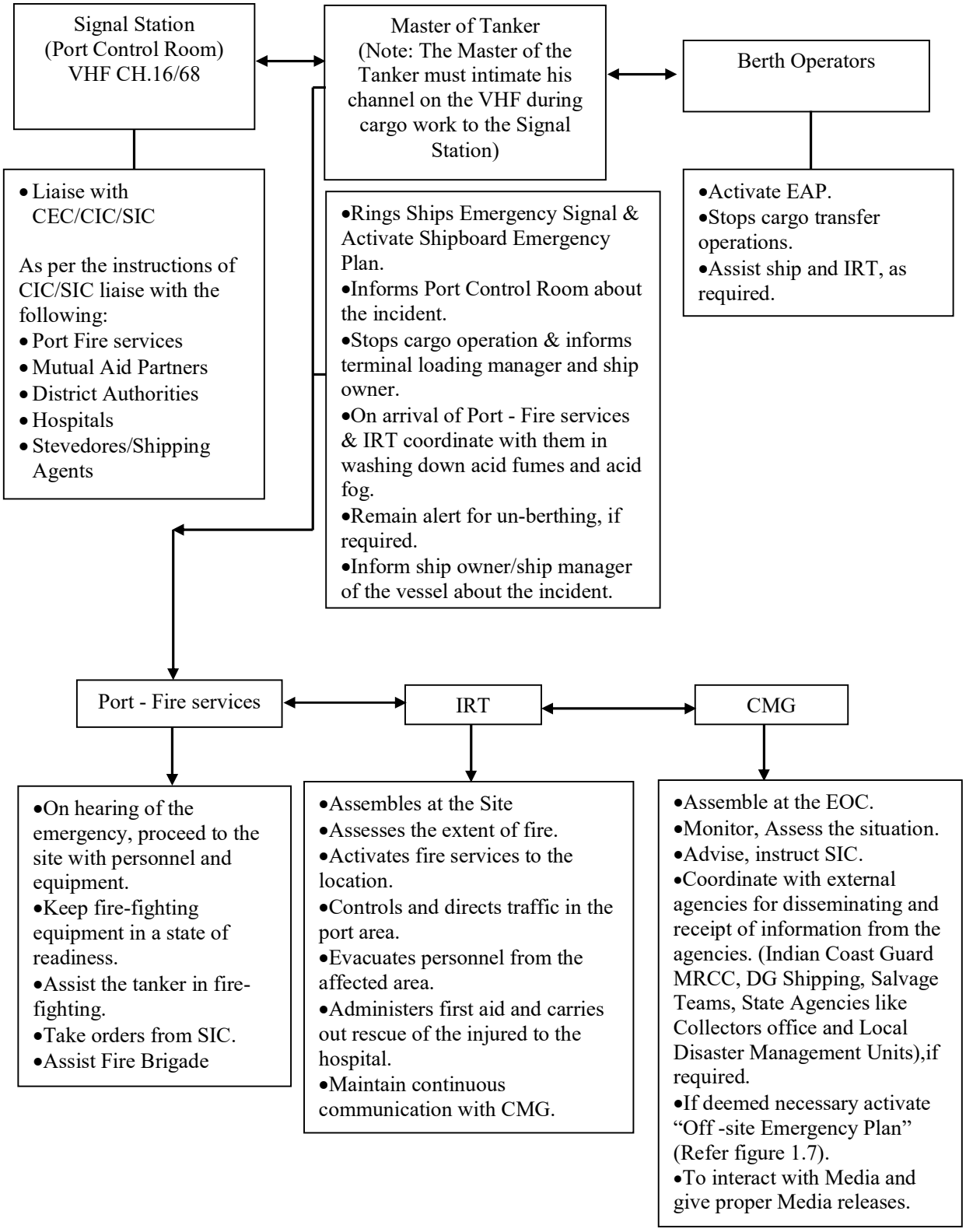
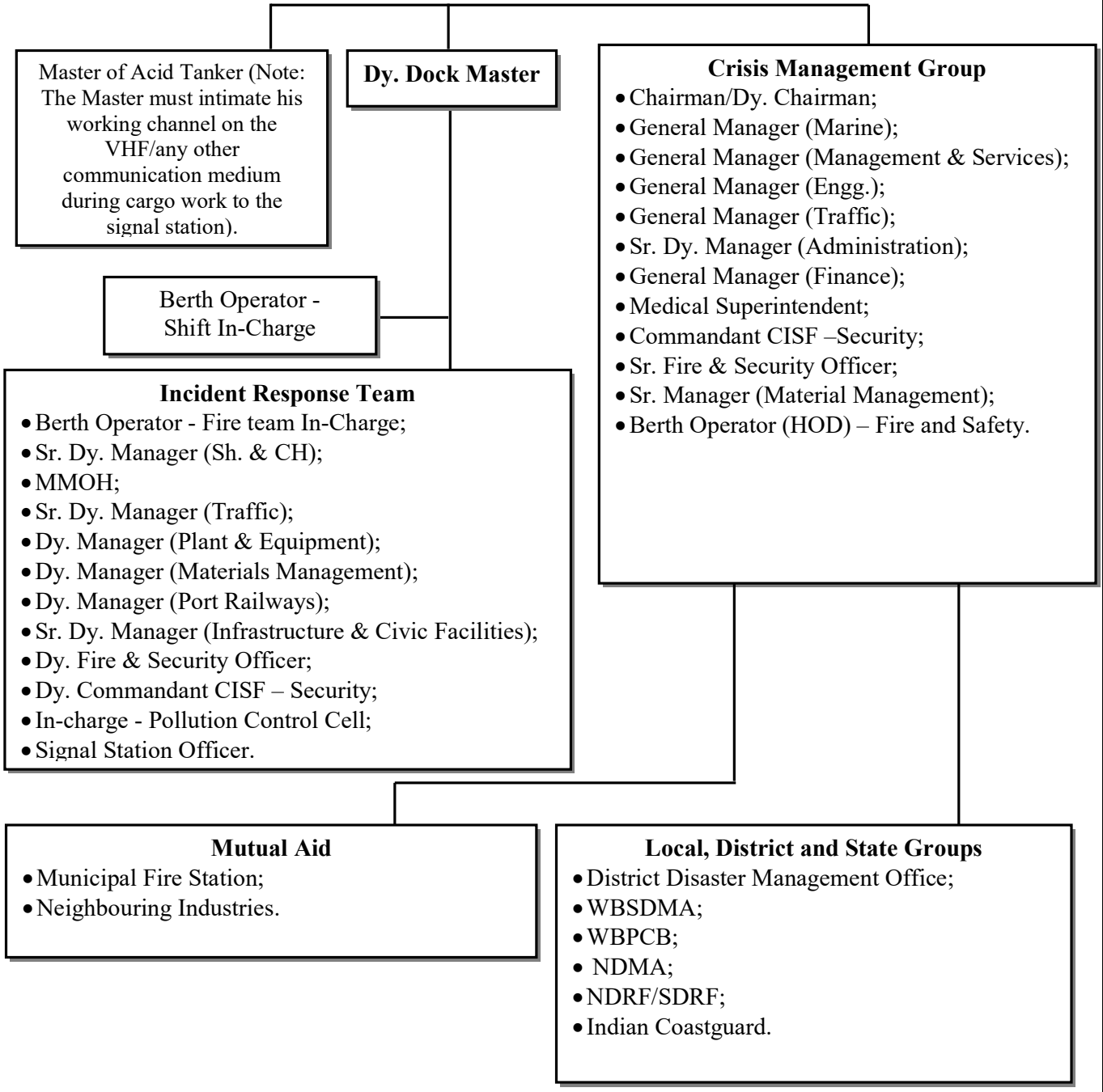


Figure S4.2: Action group



Part B: Action Plan

The vessel upon berthing, berth operator will follow standard procedures. However, in a less likely scenario a leak from the pipeline system may occur at the jetty leading to detection by vessel personnel or by the terminal alarm system. The following action will be required.

1. The Master of the Ship (Alternate: Chief Officer)

Response Action	Contact
a. Should raise ships emergency alarm and activate ship board emergency action plan.	
b. Stop transfer operation (as per SOP of the ship).	
c. Berth Operator, Vessel in the vicinity and Port should be informed of any incident on the ship without delay.	• Berth Operator • Vessel in the vicinity • Port Control Room
d. Personnel to remain stand by to disconnect hoses;	
e. Shall be responsible to arrest the leak with ships own resources as well as with the available support from IRT.	
f. Also, to remain prepared to un-berth the ship to the safe area (high sea).	
g. The siren should be continued till the ship is taken to a safe location as per CIC instructions.	

2. The berth operator tasked with cargo operations at the berth should

Response Action	Contact
a. Activate EAP and inform Port.	• Port Control Room
b. Shut off isolation valve on pipeline at the berth (action as per SOP).	
c. Area should be cordoned off.	
d. Assist IRT and provide all necessary equipment.	
e. Responsible for diluting and neutralizing the acids and disposal of the neutralized liquids down the drain.	
f. He will direct operation staff. Coordinate with the ship in-charge/C&F agents/stevedores.	

3. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. Assess the level of disaster and activate the DMP.	
b. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	

c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation and accordingly inform the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Decide on clearing of ships in close proximity to the incident location or to sail the tanker to the higher seas and evacuating the people from the likely affected zone.	
f. Assess the condition of site and take decision on evacuation in consultation with SIC.	• SIC
g. Be in constant touch with District and Local Administration for rescue and relief operation.	
h. Terminate the response and debrief before allowing normal operation.	

4. The Port Control Room

Response Action	Contact
a. Gather information related to the vessel type, cargo quantity and position.	
b. Gather information related to the weather conditions. Monitor the wind directions and accordingly convey the message to Master of the vessel, SIC and Port Fire dept.	• Master of the vessel • SIC • Port Fire dept.
c. Liaise with Master of the Vessel/Pilot.	• Master of the Vessel • Pilot
d. Listening watch to be maintained on VHF channel 16/68.	
e. Notify to CIC, SIC and the vessels moving into, through and inside the port. Keep CIC/SIC informed of all the messages received by telephone, VHF sets or by messenger.	• CIC • SIC
f. Notify the other Authorities and stakeholders within Port as per instructions of CIC/SIC.	• Coastguard • Stakeholders
g. Notify the information to the owner of the vessel as per the instruction of CIC/SIC/ Master of the Vessel.	

5. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the Master of the Tanker, Berth Operator.	Asst. Dock Master
		Conduct initial briefing.	
		Report the situation to the CIC/CMG and assist CIC in assessment of the incident.	
		Assess the condition of site and take decision on evacuation in consultation with CIC.	
		Alert vessels within the vicinity.	
		Extend all necessary help to the Master of the ship.	
		Instruct the Port Fire dept. to keep the fixed fire-fighting installation in a state of readiness & activate if required.	
		Instruct Pilot(s) to keep tugs ready for fire-fighting.	
		Coordinate with all functional heads to take actions.	
Asst. Dock Master	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC /SIC.	Dock Pilot
		Responsible for organizing tugs for rescue.	
		Hire additional crafts as necessary.	
		Maintain Log of events.	
MMOH	Pollution Control Coordinator	Inform WBPCB and other environmental agencies and take necessary guidance.	Dy. MMOH
		Ensure clean- up work during and after the emergency as quick as possible.	
		Coordinate with SIC and WBPCB and agencies.	

Master of the tanker	In Charge of fire-fighting operation on board vessel	Coordinate with action group leader and will be responsible for shutting down all cargo operation on board in coordination with Berth Operator.	Chief Officer of Tanker
		Shall un-berth the vessel as per the instruction of SIC, if required.	
Berth Operator - Manager	Cargo Work	Shall be responsible of shutting down of cargo operation & coordinating with Port and rendering necessary assistance to the SIC by providing additional emergency equipment as required.	Alternate Officer
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift Supervisor
		Lead the fire-fighting team and mobilize fire tenders, men & fire-fighting equipment to the scene & extend all necessary support to the Master of the vessel/Berth Operator.	
		Assist CISF-Security in evacuation of workers to the assembly points.	
		Inform SIC for arrangement of any additional equipment as required.	
Dy. Commandant-CISF	Security and Evacuation	Shall take orders from the SIC.	Asst. Commandant-CISF
		Cordon off the area.	
		Controls & directs gate security and traffic in the area.	
		Shall facilitate evacuation, transport, first aid and rescue of personnel from the scene at the time of emergency.	
		Control the entry of unauthorized persons and vehicles.	
		Check for entry of emergency vehicles. Liaise with the State Police.	
		Responsible the head count of the personnel.	
Sr. Dy. Manager (Traffic)	Traffic Coordinator	Shall take orders from SIC.	Dy. Manager
		Prepare vessels to vacate berth as per instructions.	
		Coordinates with shipowners/ agents/C & F agents/stevedores and with labour officer to arrange	

		and ensure evacuation.	
Sr. Dy. Manager (Civil)	Civil Coordinator	Shall mobilize and dispatch sufficient number of vehicles to the site of emergency. Shall be responsible to carry out urgent civil works as required.	Dy. Manager
Sr. Dy. Manager (Engg.)	E & M Coordinator	Shall be responsible for uninterrupted electrical supply to vital equipment and utility at the berth. Shall remain alert on duty for any electrical isolation of equipment during emergency.	Dy. Manager
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first aid team with ambulance as required. Setup casualty receiving center and arrange for first aid. Make arrangements for transportation (ambulance) and treatment of injured persons. Check updated list of Blood group of each employee available. Shall coordinate with the local hospitals.	Alternate Officer

S5: Scenario 5
Part A

1. **Fire /leakage due to Crane Accidents (Container drop/crane fall) at container berth/yard – secondary event.**

2. **Precautions:** Trained personnel for operation of crane, SOP of the container terminal, HAZMAT training and MSDS.

3. **Impact Zone:** Incident location and surrounding area.

4. **Resources required:** Organizational setup enumerated in Figure S5.2 and major material and equipment resources as given in **Appendix B** (refer to equipment list of HICT).

Figure S5.1: Action Flow Chart

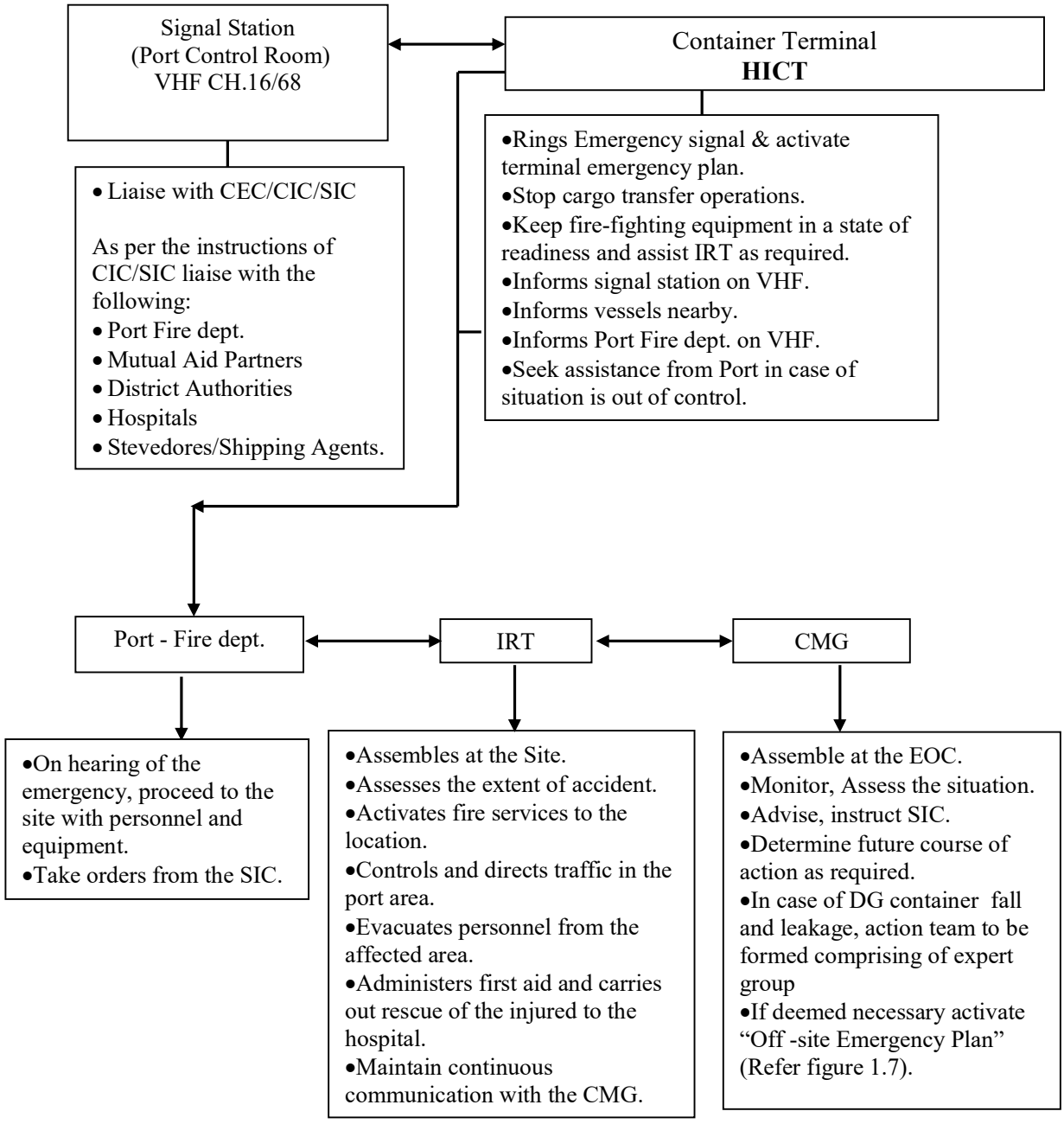
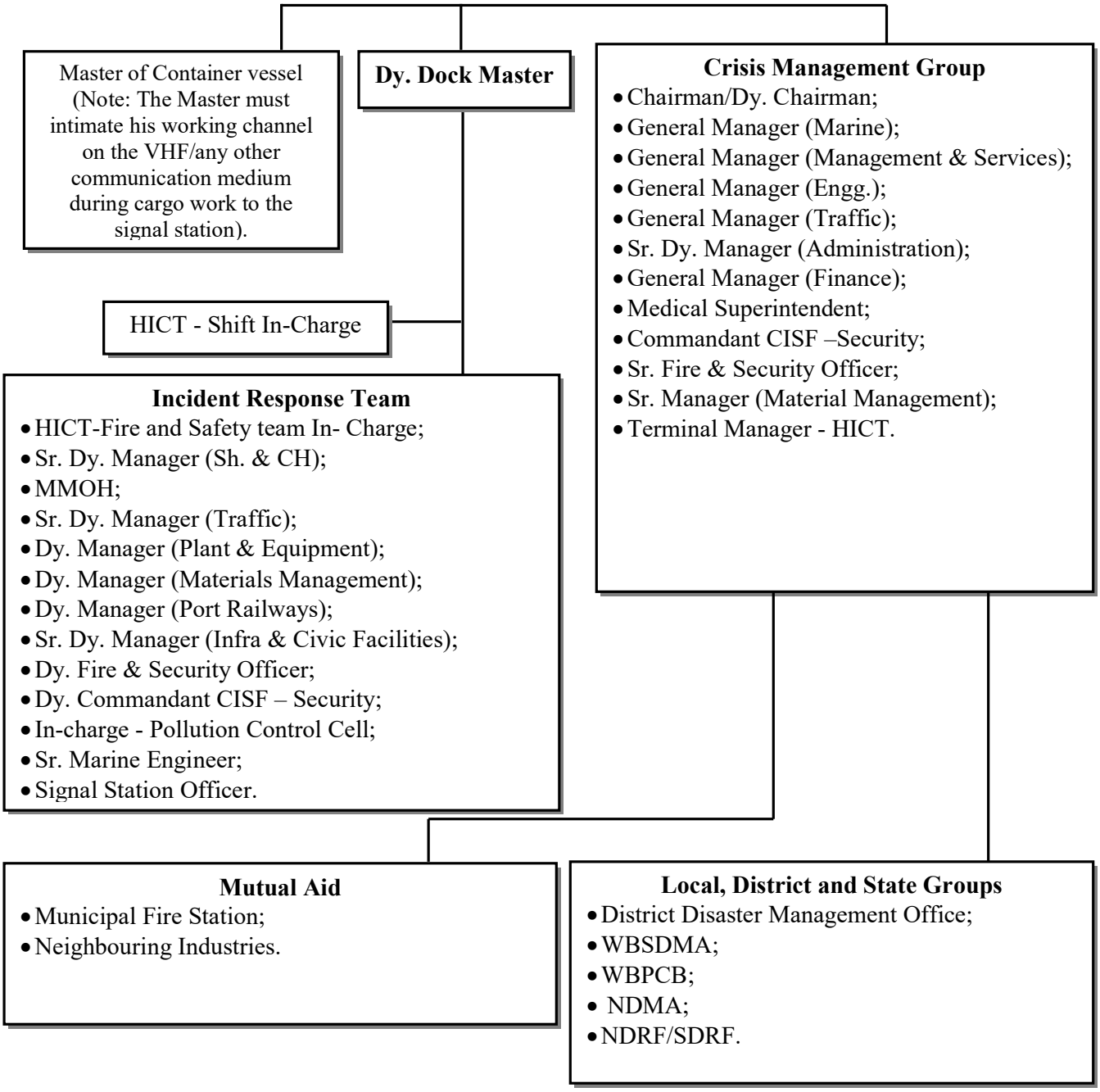


Figure S5.2: Action group



Part B: Action Plan

1. The crane operator

a. Should raise emergency alarm and inform Terminal Manager and Port Control Room.

2. The terminal person should

Response Action	Contact
a. Activate EAP and inform Port and ask for assistance.	• Port Control Room
b. Area should be cordoned off.	
c. Stop transfer operations.	
d. Manage Truck movements.	
e. Assist IRT and Master of the Ship and provide all necessary equipment.	
f. He will direct operation staff.	
g. Interview operator and witnesses.	
h. Contact expert agency in case of DG container fire/explosion.	

3. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	
b. He will give instructions to SIC & arrange for external aid as necessary.	• SIC
c. Provide assistance to the Terminal.	

4. The Port Control Room

Response Action	Contact
a. Gather information regarding the incident and accordingly convey the message to CIC/SIC and Port Fire dept.	• CIC • SIC • Port Fire dept.
b. Liaise with HICT and Master of the vessel/pilot.	• HICT • Master of the Vessel
c. Listening watch to be maintained on VHF channel 16/68.	
d. Keep CIC/SIC informed of all the messages received by telephone, VHF sets or by messenger.	• CIC • SIC
e. Notify the other Authorities and stakeholders within Port as per instructions of CIC/SIC.	• Coastguard • Stakeholders

5. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the crane operator/terminal manager and coordinate actions.	Asst. Dock Master
		Assess and report the situation to the CIC/CMG (if required).	
		Alert vessels/trucks within the vicinity.	
		Instruct the Port Fire dept. to keep the fire-fighting installation in a state of readiness & activate if required.	
Asst. Dock Master	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC/SIC.	Dock Pilot
		Shall prepare vessels to vacate from berth (if required).	
		Responsible for organizing tugs for rescue. Instruct Pilots.	
		Hire additional crafts as necessary.	
		Maintain Log of events.	
MMOH	Pollution Control Coordinator	Inform WBPCB and other environmental agencies and take necessary guidance.	Dy. MMOH
		Ensure clean- up work during and after the emergency as quick as possible.	
		Coordinate with SIC and WBPCB and agencies.	
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift supervisor
		Mobilize fire tenders, men & fire-fighting equipment to the scene & extend all necessary support in case of fire.	
		Assist the terminal manager and CISF-Security in evacuation.	
Dy. Commandant-	Security and Evacuation	Controls & directs traffic in the area.	Asst.

CISF		Shall supervise evacuation of personnel from the scene at the time of emergency.	Commandant - CISF
Sr. Dy. Manager (Civil)	Civil Coordinator	Assist terminal, if required on emergency basis.	Dy. Manager
Sr. Dy. Manager (Engg.)	E & M Coordinator	Assist terminal, if required on emergency basis.	Dy. Manager
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize backup assistance by keeping first aid team with ambulance as required.	Alternate Officer
Sr. Dy. Manager (Traffic)	Traffic Coordinator	Shall mobilize and dispatch sufficient number of vehicles to the site of emergency. Coordinates with SIC and Terminal manager.	Dy. Manager
Duty Pilot	In-Charge of Pilotage	Shall be ready on site for providing any assistance.	Standby Pilot

S6: Scenario 6
Part A:

1. **Fire in coal stackyard.**

2. **Precautions:** Fixed fire-fighting system, Sprinkler system.

3. **Impact Zone:** Incident Location and vicinity area.

4. **Resources required:** Organizational setup enumerated in Figure S6.2 and major material and equipment resources as given in **Appendix B.**

Figure S6.1: Action Flow Chart

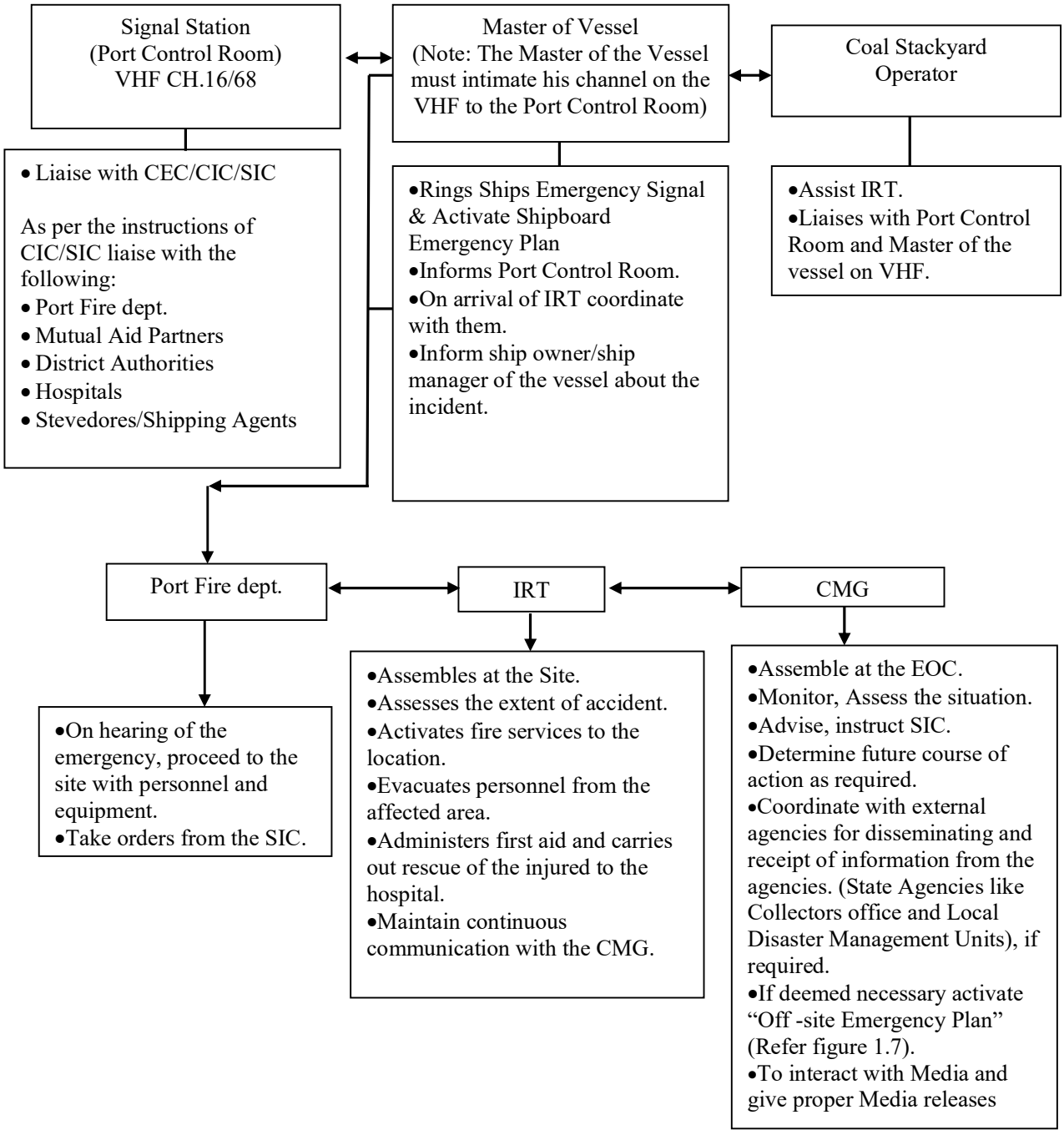
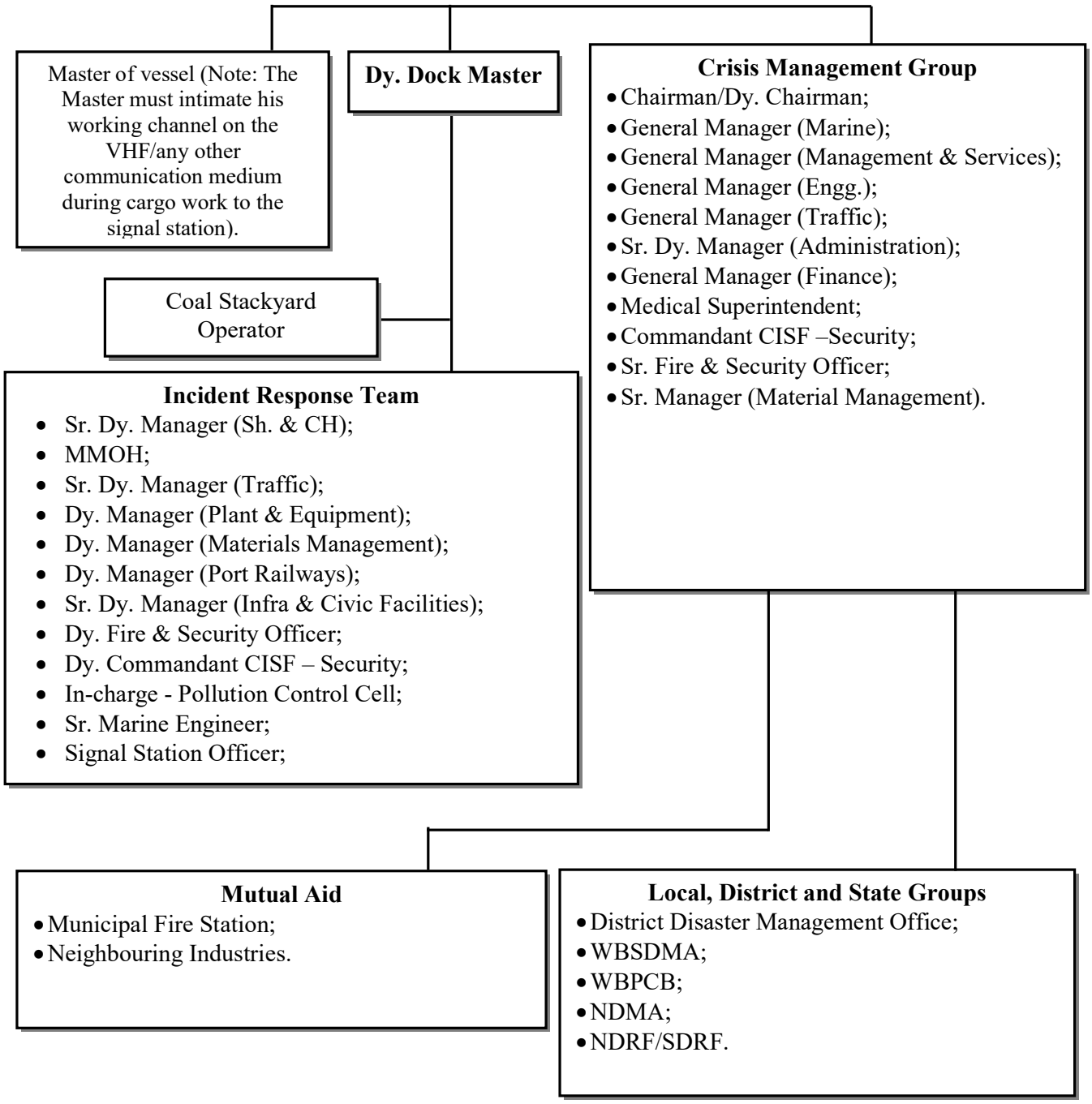


Figure S6.2: Action group



Part B: Action Plan

1. Port Control Room should

Response Action	Contact
a. Gather information related to the coal stack yard fire and time of incident.	
b. Notify to CIC, SIC and the vessels moving into or inside the port through a general alert.	• CIC • SIC
c. Gather information about the wind speed and directions and notify CIC/SIC.	

2. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. Assess the level of disaster and activate the DMP.	
b. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	
c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Decide on clearing of ships in close proximity to the incident location.	
f. Be in constant touch with District and Local Administration for rescue and relief operation.	
g. Terminate the response and debrief before allowing normal operation.	

3. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the coal stackyard operator.	Asst. Dock Master
		Assess and report the situation to the CIC/CMG (if required).	
		Alert vessels within the vicinity.	
		Extend all necessary help to the operator.	
		Instruct Pilots to keep tugs ready.	
		He will coordinate with all	

		functional heads to take actions.	
Asst. Dock Master	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC/SIC.	Dock Pilot
		Shall prepare vessels to vacate from berth (if required).	
		Responsible for organizing tugs, and Pilots.	
		Assist SIC and maintain Log of events.	
MMOH	Pollution Control Coordinator	Determine the level of contamination (e.g. PM level) of the site as a result of incident.	Dy. MMOH
		Ensure clean- up work during and after the emergency as quick as possible.	
		Coordinate with SIC and WBPCB and agencies.	
Coal Stack yard Operator	Cargo Work	Provide assistance to port IRT.	Alternate Officer
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift Supervisor
		Mobilize fire tenders, men & fire-fighting equipment to the scene & extend all necessary support to extinguish of fire.	
		Assist the coal stack yard operator and CISF-Security in evacuation, if required.	
Dy. Commandant-CISF	Security and Evacuation	Controls & directs traffic in the area.	Asst. Commandant-CISF
		Shall supervise evacuation of personnel from the scene at the time of emergency.	
Sr. Dy. Manager (Civil)	Civil Coordinator	Liaise with SIC.	Dy. Manager
Sr. Dy. Manager (Engg.)	E & M Coordinator	Arrange for specialized equipment if required as per the instruction of the SIC.	Dy. Manager
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first aid team with ambulance as required.	Alternate Officer

Sr. Dy. Manager (Traffic)	Cargo Storage, Shed and Labour Coordinator	Coordinates with Coal stack yard operator.	Dy. Manager
		Shall mobilize and dispatch sufficient number of vehicles to the site of emergency.	

S7: Scenario 7
Part A:

1. **Fire in the conveyor system carrying coal.**

2. **Precautions:** Fixed fire-fighting system, Portable fire extinguishers.

3. **Impact Zone:** Conveyor system (within the port limit area) and adjoining area.

4. **Resources required:** Organizational setup enumerated in Figure S7.2 and major material and equipment resources as given in **Appendix B.**

Figure S7.1: Action Flow Chart

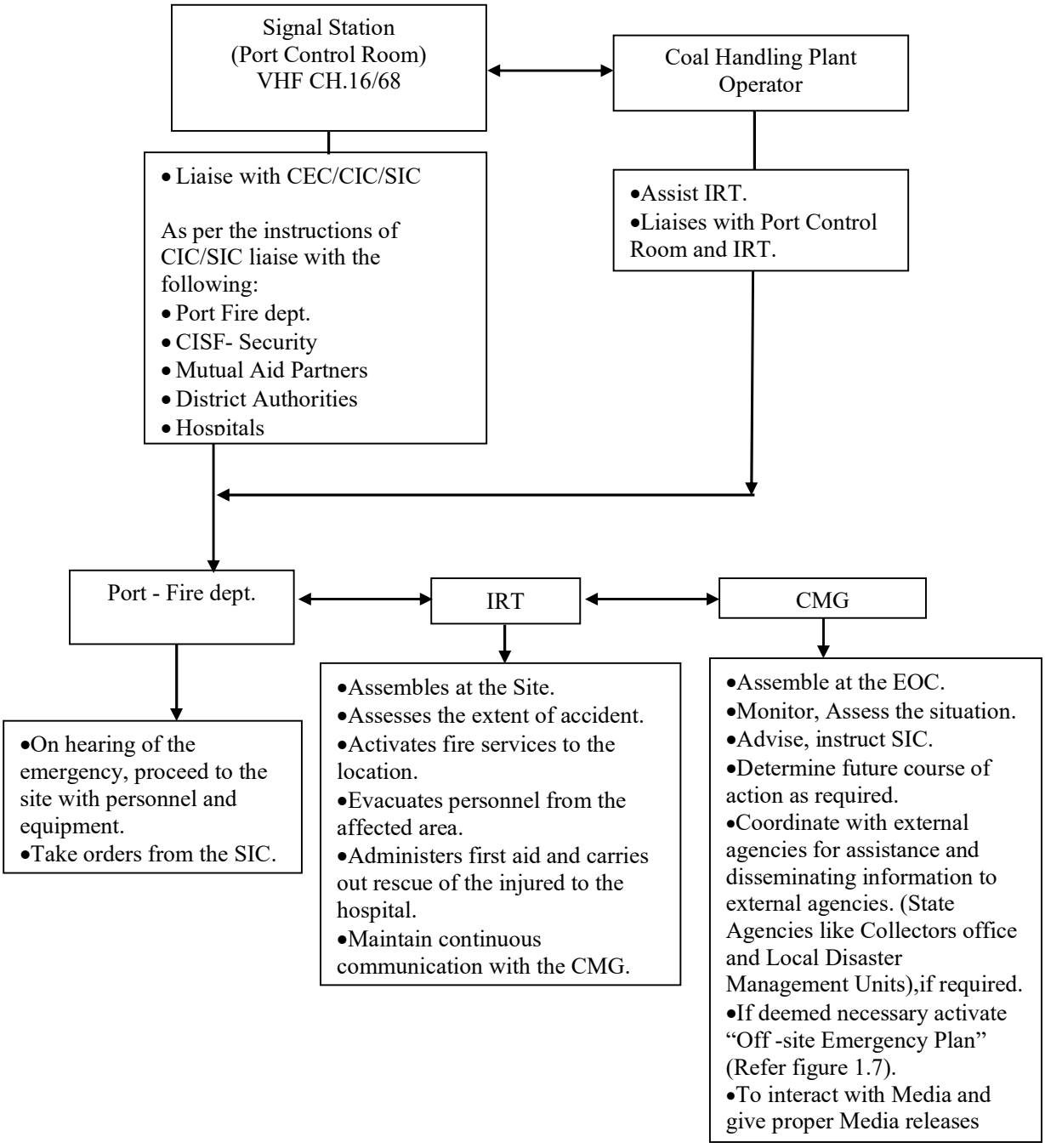
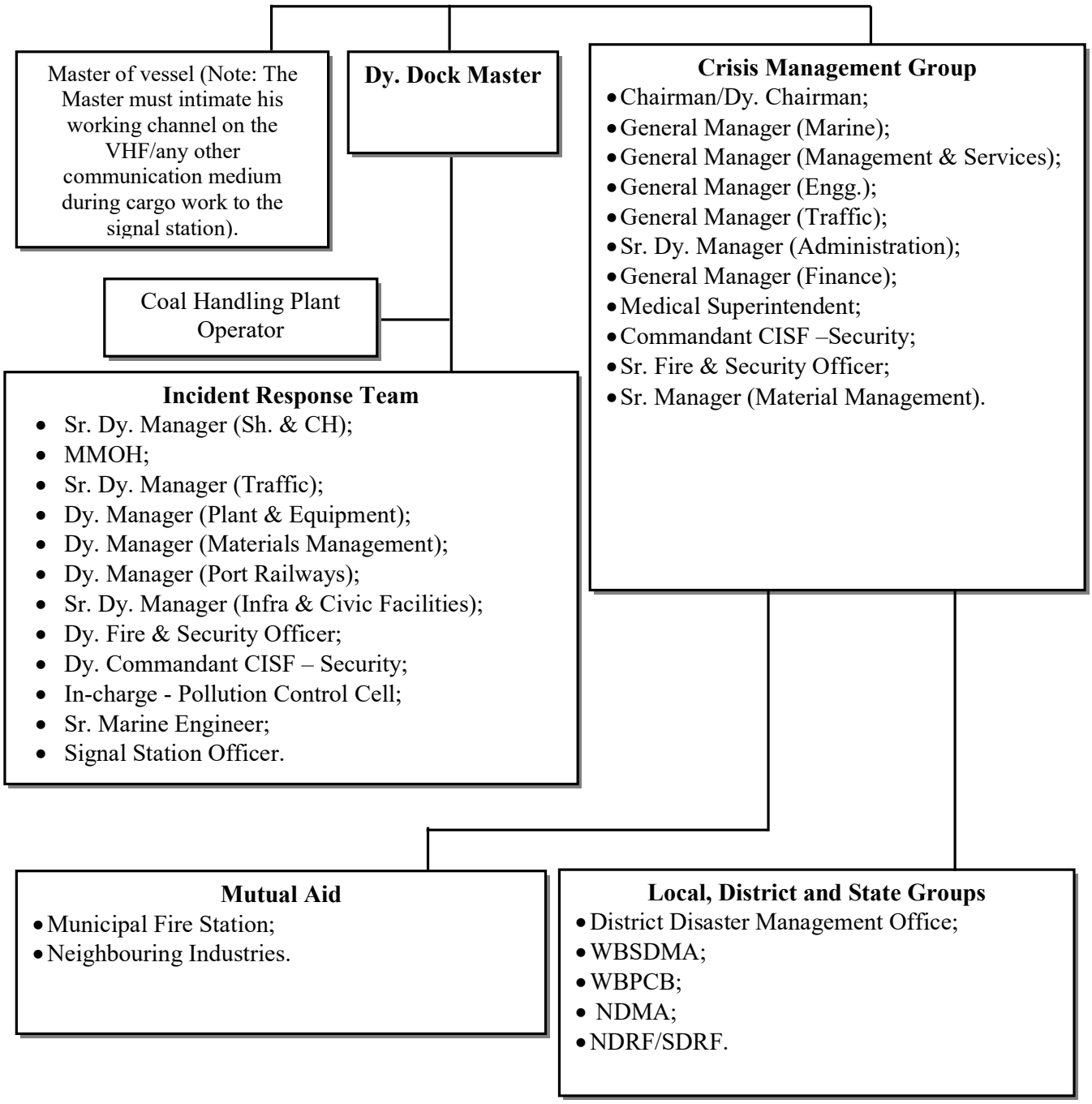


Figure S7.2: Action group



Part B: Action Plan

1. Port Control Room should

Response Action	Contact
a. Gather information related to the incident.	• Coal handling plant operator
b. Notify to CIC and SIC.	• CIC • SIC
c. Gather information about the wind speed and directions and notify CIC/SIC and Port Fire dept.	• CIC • SIC • Port Fire dept.

2. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. Assess the level of disaster and activate the DMP.	• Coal handling plant operator
b. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	
c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation and accordingly inform the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Be in constant touch with District and Local Administration for rescue and relief operation.	
f. Terminate the response and debrief before allowing normal operation.	

3. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the coal handling plant operator.	Asst. Dock Master
		Assess and report the situation to the CIC/CMG (if required).	
		Extend all necessary help to the operator.	
		He will coordinate with all functional heads to take actions.	

Asst. Dock Master	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC/SIC.	Dock Pilot
		Assist SIC and maintain Log of events.	
MMOH	Pollution Control Coordinator	Determine the level of contamination (PM level) of the site as a result of incident.	Dy. MMOH
		Ensure clean- up work during and after the emergency as quick as possible.	
		Coordinate with SIC and WBPCB and agencies.	
Coal Handling Plant Operator	Cargo Work	Provide assistance to SIC.	Alternate Officer
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift Supervisor
		Mobilize fire tenders, men & fire-fighting equipment to the scene & extend all necessary support to extinguish of fire.	
Dy. Commandant-CISF	Security and Evacuation	Controls & directs traffic in the area.	Asst. Commandant-CISF
		Shall supervise evacuation of personnel from the scene at the time of emergency.	
Sr. Dy. Manager (Civil)	Civil Coordinator	Liaise with SIC.	Dy. Manager
Sr. Dy. Manager (Engg.)	E & M Coordinator	Arrange for specialized equipment if required as per the instruction of the SIC.	Dy. Manager
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first aid team with ambulance as required.	Alternate Officer
Sr. Dy. Manager (Traffic)	Cargo Storage, Shed and Labour Coordinator	Coordinates with coal handling plant operator.	Dy. Manager
		Shall mobilize and dispatch sufficient number of vehicles to the site of emergency.	

S8: Scenario 8
Part A:

1. **Fire in the rail tank wagons carrying POL within port area.**

2. **Precautions:** Port fire tender, portable fire extinguishers.

3. **Impact Zone:** Rail rake tracks and surrounding area.

4. **Resources required:** Organizational setup enumerated in Figure S8.2 and major material and equipment resources as given in **Appendix B.**

Figure S8.1: Action Flow Chart

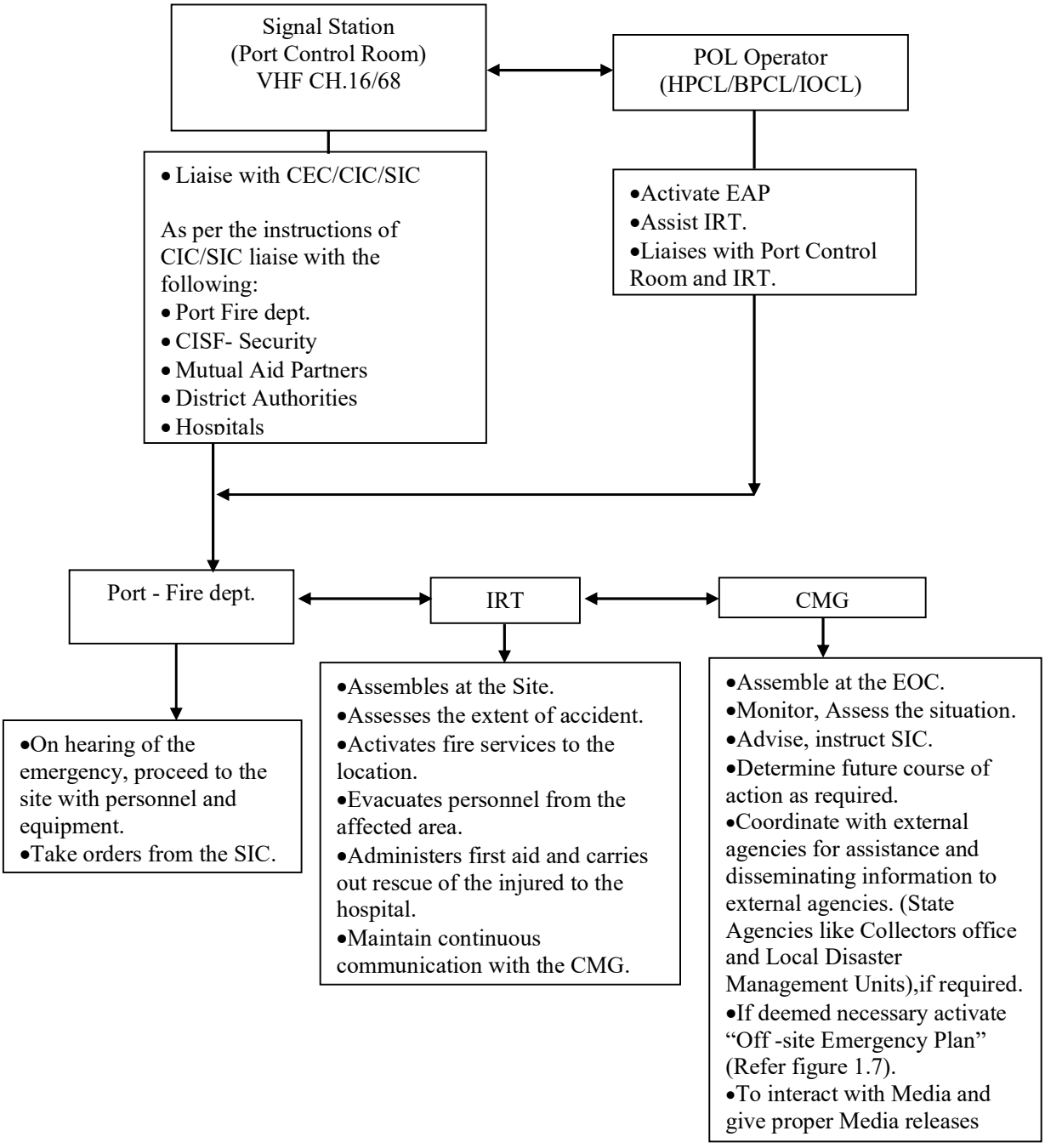
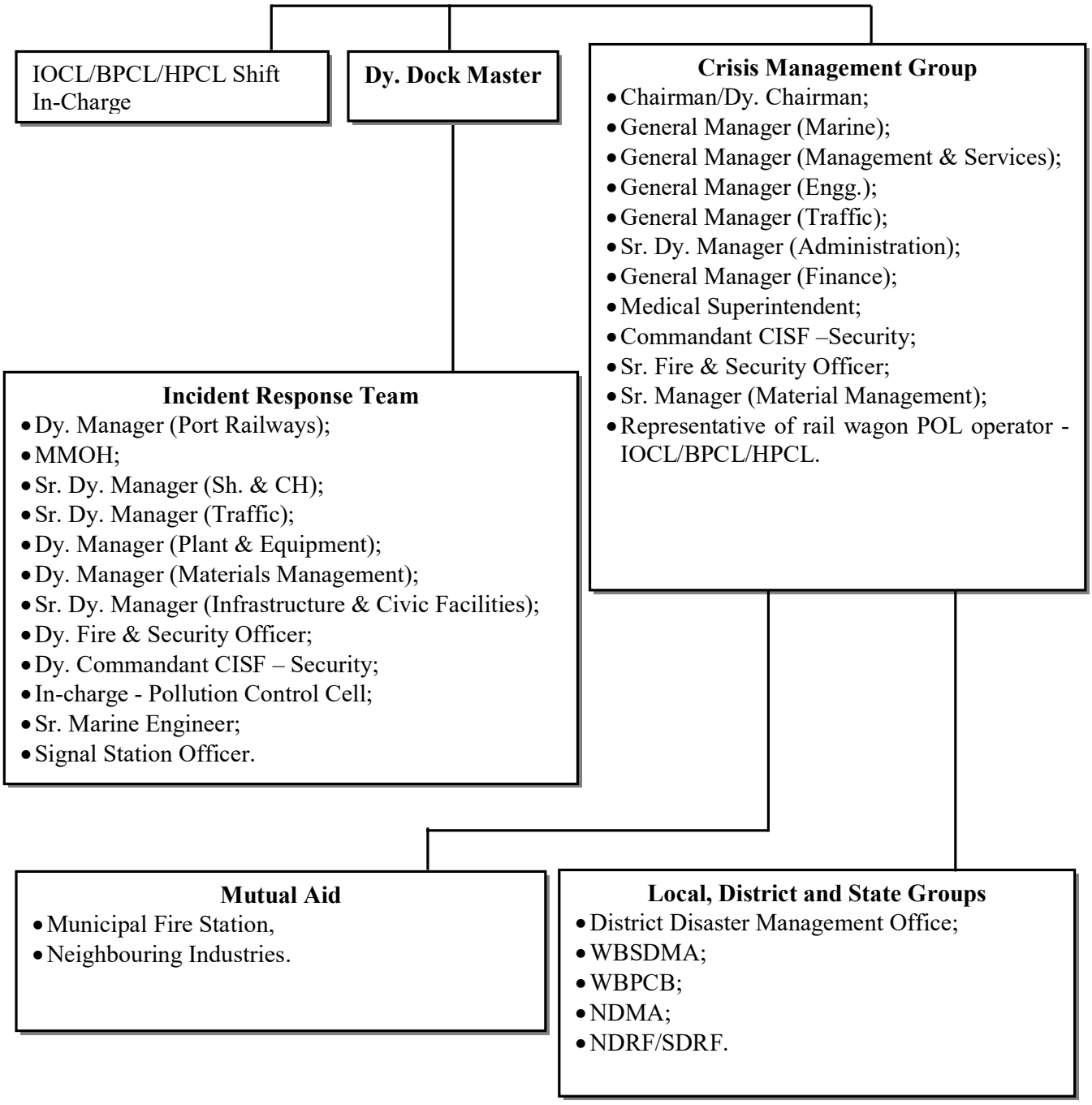


Figure S8.2: Action group



Part B: Action Plan

4. Port Control Room should

Response Action	Contact
a. Gather information related to the incident.	• POL operator
b. Notify to CIC and SIC.	• CIC • SIC
c. Gather information about the wind speed and directions and notify CIC/SIC and Port Fire dept.	• CIC • SIC • Port Fire dept.

5. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
d. Assess the level of disaster and activate the DMP.	• POL operator
e. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	
f. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
g. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
h. Be in constant touch with District and Local Administration for rescue and relief operation.	
i. Terminate the response and debrief before allowing normal operation.	

6. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the terminal manager.	Asst. Dock Master
		Assess and report the situation to the CIC/CMG (if required).	
		Extend all necessary help to the operator.	
		He will coordinate with all functional heads to take actions.	
Asst. Dock Master	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC/SIC.	Dock Pilot

		Assist SIC and maintain Log of events.	
MMOH	Pollution Control Coordinator	Determine the level of contamination of the site as a result of incident.	Dy. MMOH
		Ensure clean- up work during and after the emergency as quick as possible.	
		Coordinate with SIC and WBPCB and agencies.	
POL Operator	Cargo Work	Provide assistance to SIC.	Alternate Officer
Dy. Manager (Port Railway)		Isolation of tank wagon and provide necessary instruction for extinguishment of fire.	Alternate Officer
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift Supervisor
		Mobilize fire tenders, men & fire-fighting equipment to the scene & extend all necessary support to extinguish of fire.	
		Assist the CISF-Security in evacuation.	
Dy. Commandant-CISF	Security and Evacuation	Controls & directs traffic in the area.	Asst. Commandant-CISF
		Shall supervise evacuation of personnel from the scene at the time of emergency.	
Sr. Dy. Manager (Civil)	Civil Coordinator	Liaise with SIC.	Dy. Manager
Sr. Dy. Manager (Engg.)	E & M Coordinator	Arrange for specialized equipment if required as per the instruction of the SIC.	Dy. Manager
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first aid team with ambulance as required.	Alternate Officer
Sr. Dy. Manager (Traffic)	Cargo Storage, Shed and Labour Coordinator	Coordinates with rail wagon POL Operator-Terminal manager.	Dy. Manager
		Shall mobilize and dispatch sufficient number of vehicles to the site of emergency.	

S9: Scenario 9
Part A

1. **Ship Grounding/Collision within port limit.**

2. **Precautions:** Navigational Aid, Designated Pilots, Continuous monitoring and communication with the Port Control Centre and Pilot.

3. **Impact Zone:** Navigational Channel, Impound Dock Basin and Anchorage area.

4. **Resources required:** Organizational setup enumerated in Figure S9.2 and major material and equipment resources as given in **Appendix B**.

Figure S9.1: Action Flow Chart

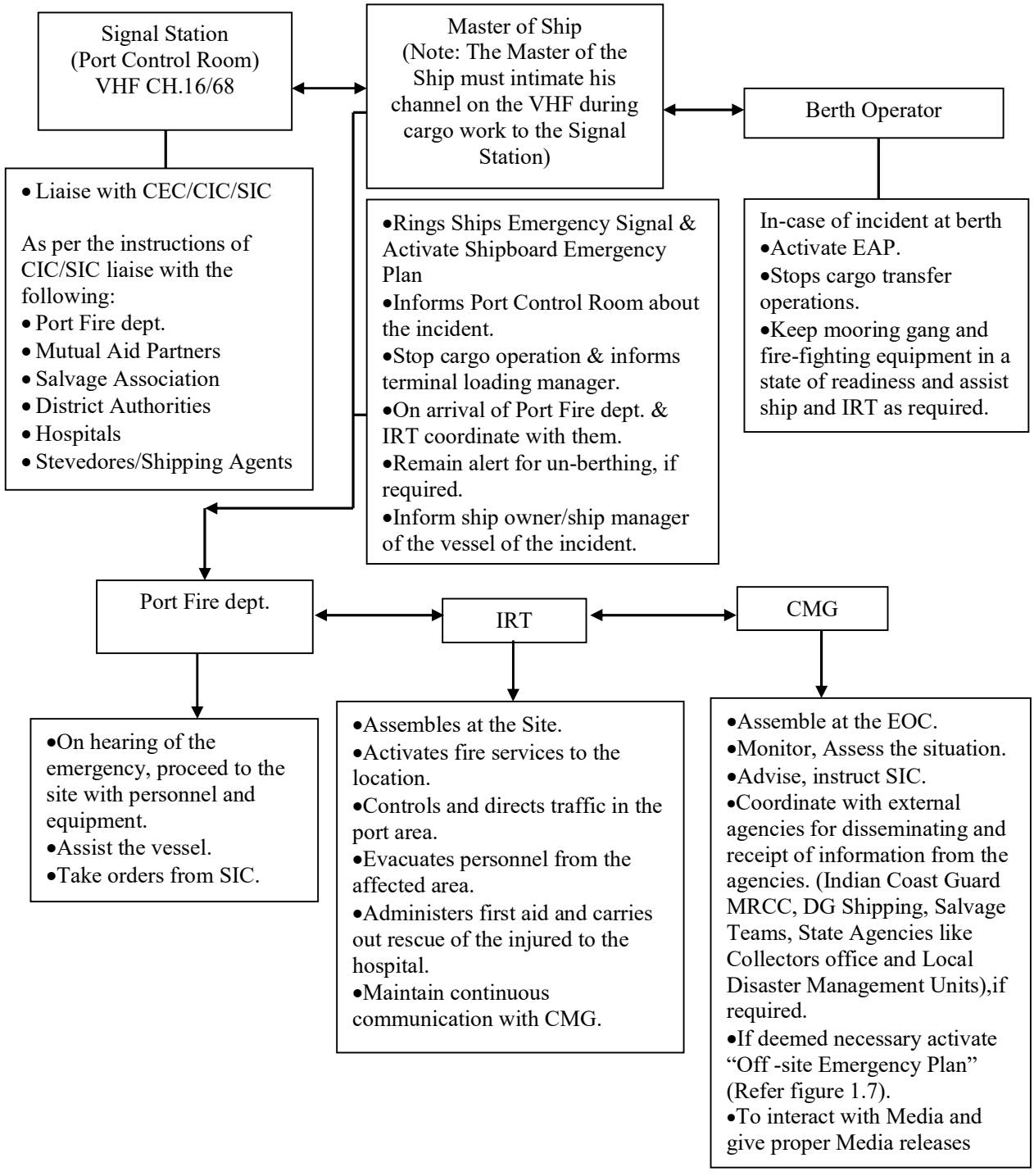
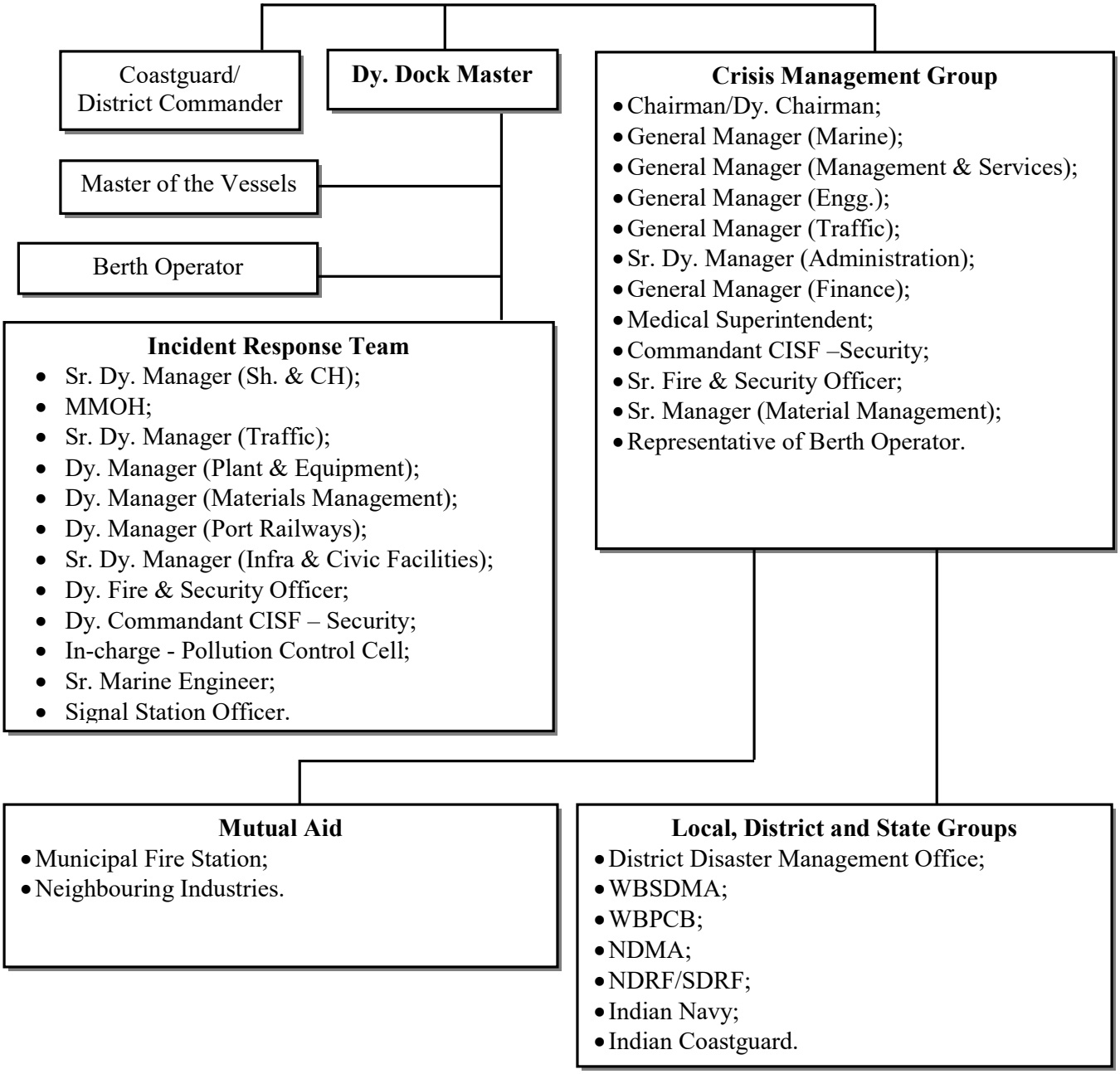


Figure S9.2: Action group



Part B: Action Plan

1. The Masters of the Vessels (Alternate: Chief Officers)

Response Action	Contact
a. Should raise ships emergency alarm and activate ship board emergency action plan including evacuation of the personnel.	
b. Vessel in the vicinity, Berth operator and Port should be informed of any incident without delay.	• Berth operator • Vessel in the vicinity • Port Control Room
c. Shut down transfer operation (if at berth).	
d. Take appropriate damage control measures in case of flooding including leak stoppage and pumping out, vessel list correction etc.	
e. Estimate the extent of under water damage, sounding of tanks and actions for the refloating of the vessel.	
f. Shall be responsible for fighting the fire (in case of fire) with vessels own resources as well as with the available support from IRT.	

2. Port Control Room

Response Action	Contact
a. Liaise with Master of the Vessel/Pilot and gather the information about the type of vessels involved in the incident, cargo and location of the incident and convey the message to CIC/SIC.	• Master of the vessel • Pilot • CIC • SIC
b. Gather information related to the weather conditions. Monitor the wind directions and accordingly convey the message to CIC/SIC and Port Fire dept.	• CIC • SIC • Port Fire dept.
c. Listening watch to be maintained on VHF channel 16/68.	
d. Notify to CIC, SIC and the vessels moving into, through and inside the port. Keep CIC/SIC informed of all the messages received by telephone, VHF sets or by messenger.	• CIC • SIC
e. Notify the other Authorities and stakeholders within Port as per instructions of CIC/SIC.	• Indian Navy • Coastguard • Stakeholders
f. Notify the information to the owner of the vessel as per the instruction of CIC/SIC/ Master of the Vessel.	

3. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. Assess the level of disaster and activate the DMP and OSCP.	
b. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	
c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Decide on clearing of ships in close proximity to the incident location.	
f. Be in constant touch with District and Local Administration for rescue and relief operation.	
g. Terminate the response and debrief before allowing normal operation.	

4. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During emergency, he shall proceed to the affected location (if vessel is in impound dock basin/ riverine jetty area), communicate & collect all necessary information's from the Master of the ship.	Asst. Dock Master
		Report the situation to the CIC/CMG.	
		In case of fire on board the vessel after collision or contact he will extend all necessary help to the Master of the ship.	
		Instruct Pilots to keep tugs ready for fire-fighting.	
		Alert other vessels within the vicinity.	
		Ascertain oil pollution- leak source, if any.	
		Obtain information regarding stability and hull stress of the vessel.	

		If vessels have blocked or a possibility of blocking the channel, in co-ordination with the Master, the vessel shall be taken to berth / anchorage.	
		In case of grounding, make arrangements through Marine Engineers/Pilots to proceed to the spot and to take soundings, plot them in a chart and to ascertain the location of grounding damage on the hull.	
		Depending on the way the vessel is grounded and the available high tide on the day, all advance preparations should be made to commence the towing operation at least two hours before the high water or as advised by CIC/SIC.	
		Inform MOEF and WBPCB approved parties for safe disposal and providing reception facilities for Oil/Sludge. Also, inform Salvage association.	
Asst. Dock Master	Port Control Room Coordinator	Shall be ready for taking the instructions from CIC/SIC and communicate to evacuate / move / shift the vessel from the area.	Dock Pilot
		If possible, accompany SIC to inspect the vessel.	
		Plot exact location of the incident in coordination with the hydrographic surveyor.	
		Responsible for organizing tugs for rescue. Instruct pilots.	
		Hire additional crafts as necessary.	
MMOH	Marine Pollution Control Coordinator	Supervise and direct personnel to follow the instructions given by SIC. Inform WBPCB.	Dy. MMOH
		Report to SIC and seek advice.	
		Lead the response team and support personnel in combating the disaster by deploying booms and other equipment.	
		Hire the barges for collecting the spilled oil and coordinate with the parties involved in the safe	

		disposal of the oil/sludge.	
		Coordinate with the party involved in disposal of the Oil/sludge in a safe manner.	
		Maintain records of the claims.	
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift supervisor
		Mobilize fire tenders, men & firefighting equipment to the scene & extend all necessary support to the master of the vessel for firefighting.	
Dy. Commandant-CISF	Security and Evacuation	Shall take orders from the SIC.	Asst. Commandant-CISF
		Cordon off the area.	
		Controls & directs gate security and traffic in the area.	
		Shall facilitate evacuation, transport, first aid and rescue of personnel from the scene at the time of emergency.	
		Control the entry of unauthorized persons and vehicles.	
		Check for entry of emergency vehicles.	
		Liaise with the Police authorities.	
		Responsible the head count of the personnel.	
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first-aid team with ambulance as required.	Alternate Officer
Sr. Dy. Manager (Civil)	Civil Coordinator	Instruct the contractors to carry out urgent civil works as required.	Dy. Manager
Sr. Dy. Manager (Traffic)	Traffic Coordinator	Coordinates with ship owners/agents/stevedores.	Dy. Manager

S10: Scenario 10
Part A

1. **Blockage of Navigational Channel due to Grounding/sinking of vessel (Wreckage).**

Note: *It is assumed in this case all actions to rescue safely the vessel in approach channel have not been successful and the vessel has touched bottom in the approach channel.*

2. **Precautions:** Navigational Aid, Designated Pilots, Continuous monitoring and communication with the Port Control Room.

3. **Impact Zone:** Navigational Channel.

4. **Resources required:** Organizational setup enumerated in Figure S10.2 and major material and equipment resources as given in **Appendix B**.

5. ***Note:*** *Under the Indian Ports Act, 1908, if a ship is wrecked, stranded or sunk within the port limits, the Conservator of the Port or in the absence of such an office, the Harbour master may give notice to the owner of the vessel "to raise, remove or destroy the vessel within such period as may be specified in the notice and to furnish such adequate security to the satisfaction of the conservator to ensure that the vessel shall be raised, removed or destroyed within the said period". If the owner does not comply and act upon the notice, the conservator may raise, remove or destroy the property and claim the compensation from the owner. Mostly, the salvage activity will be done by private salvors in agreement with the Port Trust. Within the port limits, the capacity of the party to carry out salvage, the methods used to raise or remove or destroy the vessel is subjected to the expert opinion of the deputy conservator of the port. Normally, the court will not interfere with these technical decisions.*

Figure S10.1: Action Flow Chart

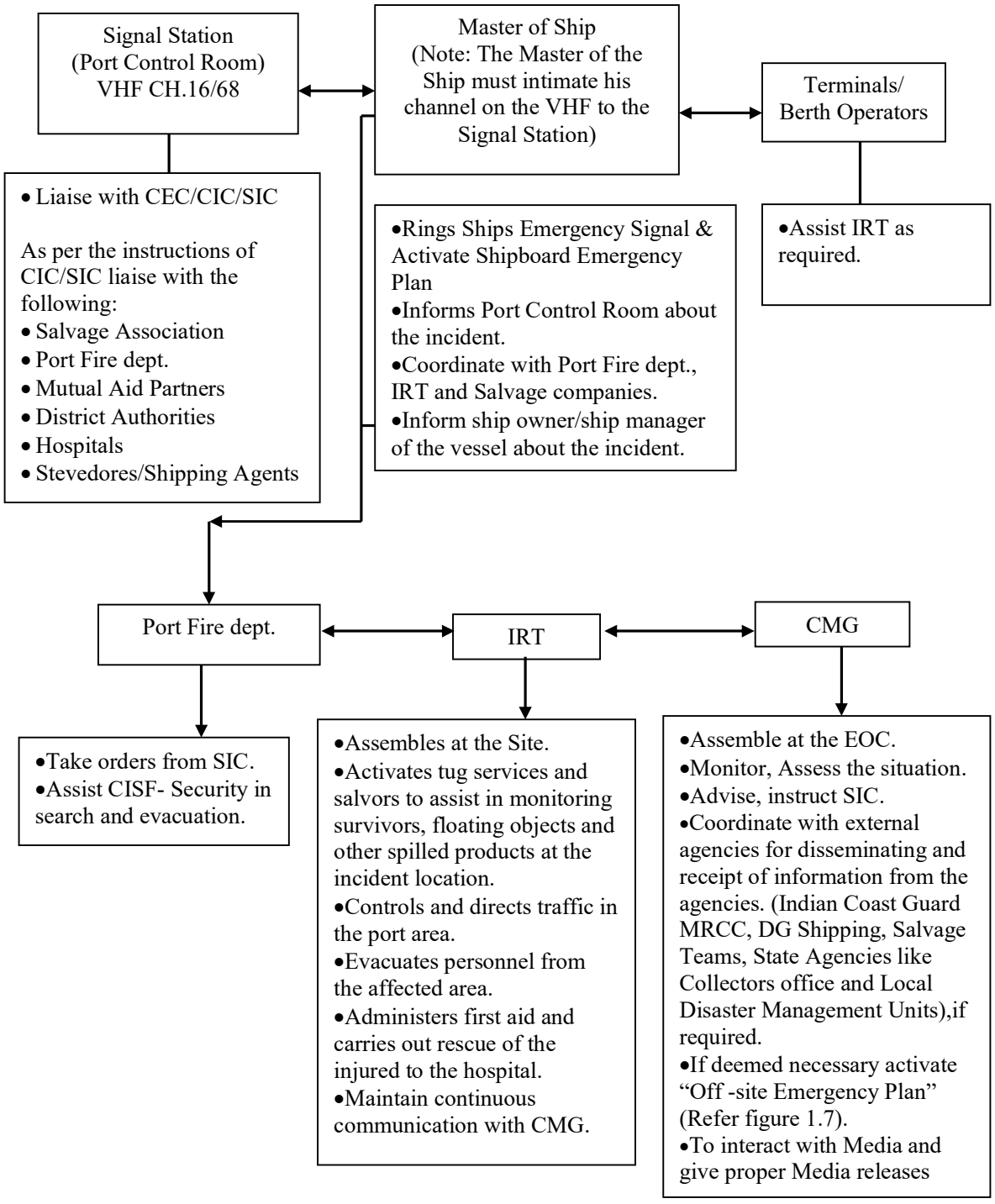
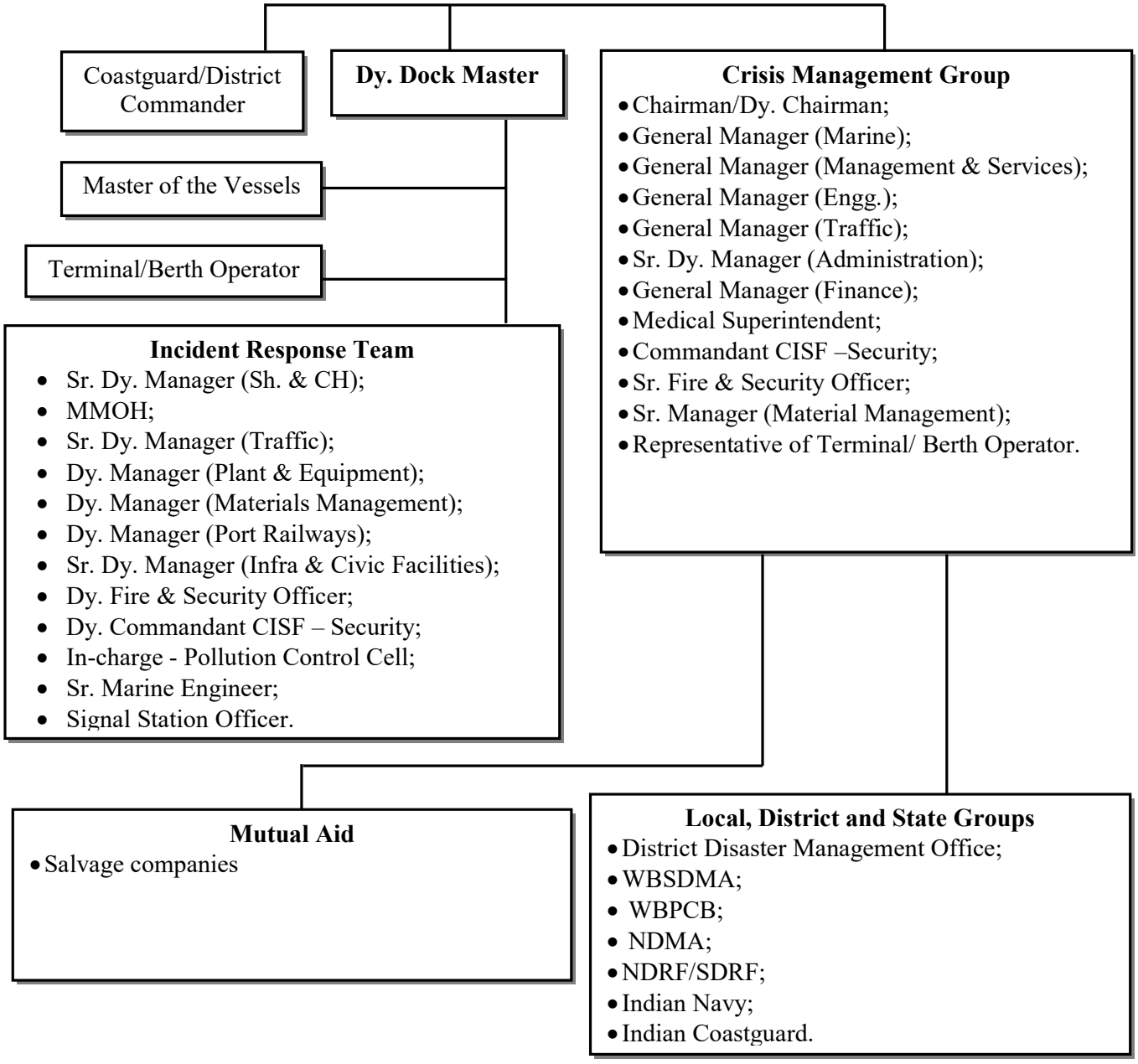


Figure S10.2: Action Group



Part B: Action Plan

1. The Master of the Vessel (Alternate: Chief Officer)

Response Action	Contact
a. Having raised the alarm, the Master will be responsible for taking all immediate steps to safeguard his ship. As soon as possible he is to establish the extent of grounding and damage to the vessel. He is to ascertain whether the hull has been breached and likely risk of pollution and flooding.	
b. The Master will provide the Port Authority with details of the incident as quickly as possible and will make regular and frequent reports on the progress of the incident. This is to include position of grounding, damage sustained, pollution or risk of pollution, draft of the vessel prior to grounding and soundings at grounding area, cargo on board and location, and any further information that may be at hand.	• Port Control Room

2. Port Control Room should

Response Action	Contact
a. Gather information related to the vessel type, position and time of incident.	
b. Liaise with Master of the Vessel/Pilot.	• Master of the vessel • Pilot
c. Notify to CIC, SIC and the vessels moving into, through and near the casualty and inside the port.	• CIC • SIC • Navy • Coastguard
d. Notify the information to the owner of the vessel.	

3. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	
b. Assess the level of disaster.	
c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Provide instructions to launch rescue craft to be sent to scene of emergency. If required they will bring necessary personnel and equipment to site.	• Pilot

f. **Oil Pollution:** He will be responsible to activate the Port OSCP on receipt and assessment of the information gathered. He will instruct the IRT and Master of Vessel about the precautionary measures and necessary actions to limit the extent of pollution.	• Coastguard
g. **Evacuation:** Assessment of condition of site of potential affected area and decision taken for evacuation should be taken in consultation with SIC and Master of Vessel.	
h. **Salvage and or floating of the vessel** will be controlled by either the CIC or person assigned by him. All operations will have to be sanctioned by the CIC before implementation.	• Salvage Company
i. Coordinate with external agencies/authorities.	• Indian Navy • Coastguard
j. Be in constant touch with District and Local Administration for rescue and relief operation.	
k. CIC, once the DMP is activated and underway will ensure that, at frequent intervals, issue, through Radio and via the telephone and Media, situation reports and information updates.	
l. **Press Liaison** A press office will be set up and regular briefings organized and promulgated. The GM (Marine) and representatives from each emergency service will attend as circumstances permit to brief media concerns. Where necessary, the P.R. teams from Port will be alerted to ensure fullest briefings on all aspects of the emergency.	
m. Terminate the response and debrief before allowing normal operation.	

NOTES ON SALVAGE:

- *If required inform a reputable Salvage Company;*
- *Thoughts should be given to adding ballast to secure vessel in bad weather;*
- *Secure topside openings;*
- *Topside survey;*
- *Underwater survey with a diver noting all damage on plan of vessel;*
- *Information on the seabed using diver and soundings;*
- *Based on survey, draft, stability, condition of vessel openings, cargo, fuel, water etc.;*
- *Other removable weights;*
- *Refloating plan must be agreed taking into consideration, draft, stability, a clear passage off (may have to dredge a channel); safety of personnel, fire, pollution (may have to remove bunkers and cargo);*
- *Availability of tugs, bunkering vessels, divers, salvage companies;*

- *CIC in control of salvage, Salvor in command, all plans approved by CIC.*

4. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency, proceed to the affected location & communicate & collect all necessary information's from the Master of the ship.	Asst. Dock Master
		Discuss with the Master or owner for refloating or salvaging of the vessel. Endeavour to obtain from owners/agents a General Arrangement Plan of the vessel and, if appropriate the Cargo Plan.	
		Gather information from Port Control Room regarding position and time.	
		He will report the situation to the CIC/CMG.	
		Commence search and rescue operation immediately.	
		He will instruct Pilots to keep tugs ready.	
		Alert other vessels within the vicinity and the movement of other vessels into, through and near the location should be stopped.	
		Assistance may be sought from other suitable and available vessels.	
		Inform Salvage association and instruct Senior Marine Engineer and SHS officer to coordinate.	
		In the case of a capsized vessel, make arrangements to hold the vessel in position if drifting would place her in grave danger and, on completion of rescue operations, secure the vessel in position or remove and secure her at some other safe location, whichever is safest and possible, until such time as salvage operations can be undertaken.	

		When clear to do so, arrange for the capsized or sunken vessel to be marked with appropriate buoy(s) and lights, to warn other vessels of her position.	
		Discuss with the Master, owner or agent plans for righting, refloating or salvaging the vessel. Action in this regard is particularly important where the vessel is obstructing fairways, channels or approaches to berths.	
		Ascertain oil pollution- leak source, if any.	
		Inform the MoEF & WBPCB approved private parties for safe disposal and providing reception facilities for Oil/Sludge.	
Asst. Dock Master	Port Control Room Coordinator	Plot exact location of the incident.	Dock Pilot
		Assist in monitoring of other vessels and communicating with the Master and restricting them to enter the emergency location.	
		Allow vessels directly involved in rescue operations within the vicinity.	
		Responsible for Organizing tugs for search and rescue.	
		Hire additional crafts as necessary.	
		Arrange for the marking arrangements with appropriate buoy(s) and lights.	
		Instruct the oil pollution response team to maintain a state of readiness and standby. Coordinate with the team in combating the disaster by taking necessary actions as per the OSCP.	
		Hire the barges for collecting the spilled oil and coordinate with the parties and Pollution response cell involved in the safe disposal of the oil/sludge.	
		Assist Salvage association and SIC.	
Pilot	In Charge of	Shall be ready for taking the	Standby Pilot

	Pilotage	instructions from CIC/SIC and evacuate/move/shift the vessel from the area.	
		Shall monitor the communication on VHF & convey and relay messages on the advice from CIC/ SIC.	
		Responsible for organizing tugs for shifting the vessel to the anchorage area if required.	
MMOH	Marine Pollution Control Coordinator	Shall take orders from the SIC.	Dy. MMOH
		Make arrangements for oil pollution combat personnel and equipment.	
		Coordinate with the party involved in disposal of the Oil/sludge in a safe manner.	
		Supervise and direct personnel to follow the instructions given by SIC.	
		Inform WBPCB as per the instruction of CIC/SIC and other environmental agencies about the incident for getting necessary guidance.	
		Maintain records of the claims.	
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift supervisor
		Coordinate with the party involved in disposal of the Oil/sludge in a safe manner.	
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first-aid team ready with ambulance as required.	Alternate Officer
Sr. Dy. Manager (Traffic)	Traffic Coordinator	Coordinates with ship owners/agents/stevedores.	Dy. Manager
Dy. Commandant-CISF	Security and Evacuation	Shall supervise evacuation of personnel from the scene at the time of emergency.	Asst. Commandant-CISF
		Allow vehicles which are directly involved in rescue operations within the vicinity of the rescue operations.	

S11: Scenario 11
Part A

1. **Fire in Main electrical receiving station and/ substation.**

2. **Precautions:** Periodic Maintenance and Inspection, Protected/covered Electrical installations, protection from flood (equipment raising from ground level), Fire-fighting systems, and trained personnel to combat fire, No smoking zone, House Keeping.

3. **Impact Zone:** Main station/Substation and immediate surroundings.

4. **Resources required:** Organizational setup enumerated in Figure S11.2 and major material and equipment resources as given in **Appendix B**.

Figure S11.1: Action Flow Chart

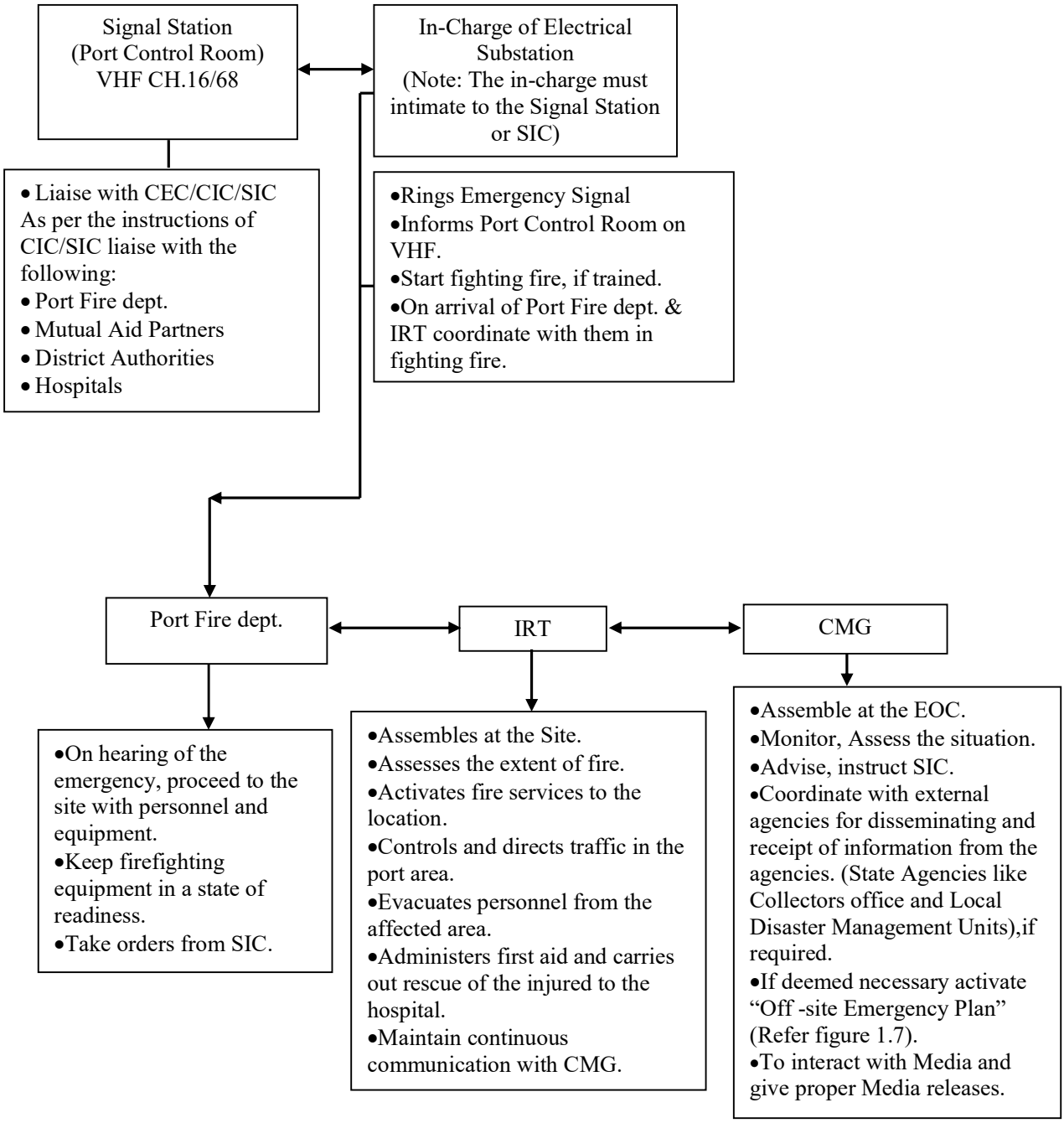
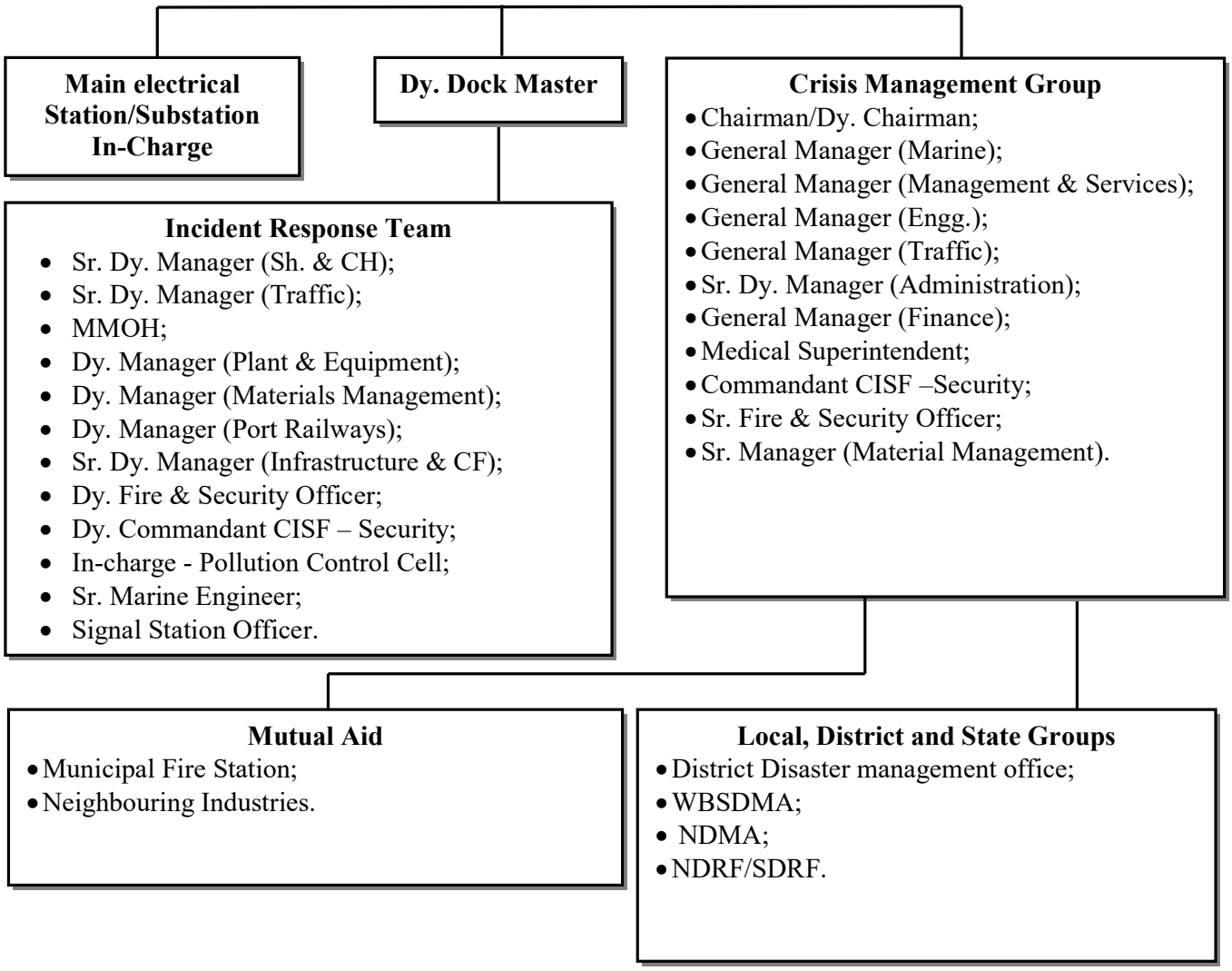


Figure S11.2: Action group



Part B: Action Plan

1. The In-charge of the electrical substation

Response Action	Contact
a. Should raise emergency alarm.	
b. Port should be informed of any incident without delay.	• Port Control Room
c. Shall be responsible for fighting the fire with resources available as well as with the available support from IRT.	

2. Port Control Room should

Response Action	Contact
a. Gather information related to the time of incident.	
b. Notify to CIC and SIC.	• CIC • SIC
c. Gather information about the wind and notify CIC/SIC and Port Fire dept.	• CIC • SIC • Port Fire dept.

3. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. Assess the level of disaster and activate the DMP.	
b. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	
c. Give instructions to SIC, and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Decide on clearing of vehicles in close proximity to the incident location.	
f. Be in constant touch with District and Local Administration for rescue and relief operation.	
g. Terminate the response and debrief before allowing normal operation.	

4. The Fire-fighting Personnel (Port Fire dept.) should

Response Action	Contact
a. Collect the information from Port Control Room and SIC.	• SIC • Port Control Room
b. Assist in-charge in fighting fire as per SIC Instructions.	
c. He will mobilize personnel & fire-fighting equipment to	

the scene & extend all necessary support in case of fire, if required.	
d. Assist in evacuation of the personnel as directed by SIC.	
e. Inform SIC for arrangement of any additional equipment as required.	

5. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information from the substation in-charge.	Asst. Dock Master
		He will report the situation to the CIC/CMG.	
		Alert vehicles within the vicinity.	
		Extend all necessary support to the Port Fire dept. to fight the fire.	
		Instruct the Port Fire dept. to keep the fire-fighting installation in a state of readiness & activate if required.	
Sr. Dy. Manager (Engg.)	E & M Coordinator	Assist SIC or lead the IRT in coordination with SIC.	Dy. Manager
		Coordinate with Electricity board.	
		Shall be responsible for Electrical connections and disconnections to vital equipment and systems at the berth and provide alternate supply if required.	
Asst. Dock Master	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC/SIC.	Dock Pilot
		Assist SIC and maintain Log of events.	
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift supervisor
		Lead the fire-fighting team and mobilize fire tenders, men & fire-fighting equipment to the scene for fire-fighting.	
		Assist in safely rescuing of the personnel, if trapped inside substation.	

		Inform SIC for the arrangement of any additional equipment as required.	
Dy. Commandant-CISF	Security and Evacuation	Controls & directs traffic in the area. Cordon off the area. Shall supervise evacuation of personnel from the scene at the time of emergency.	Asst. Commandant-CISF
Sr. Dy. Manager (Civil)	Civil Coordinator	Liaise with SIC.	Dy. Manager
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first aid team with ambulance as required.	Dy. Medical Superintendent
Sr. Dy. Manager (Traffic)	Traffic Coordinator	Shall prepare vehicles in the vicinity to vacate. Shall mobilize and dispatch sufficient number of vehicles to the site of emergency. Coordinates with ship owners/agents/stevedores.	Dy. Manager

S12: Scenario 12
Part A

1. **Fire in Transit Shed.**

2. **Precautions:** Protected/covered Electrical installations, Fire-fighting systems, trained personnel to combat fire, No smoking zone, House Keeping, precautionary measures against toxic fume generation from fire and evacuation measures as necessary.

3. **Impact Zone:** Warehouse and immediate area.

4. **Resources required:** Organizational setup enumerated in Figure S12.2 and major material and equipment resources as given in **Appendix B**.

Figure S12.1: Action Flow Chart

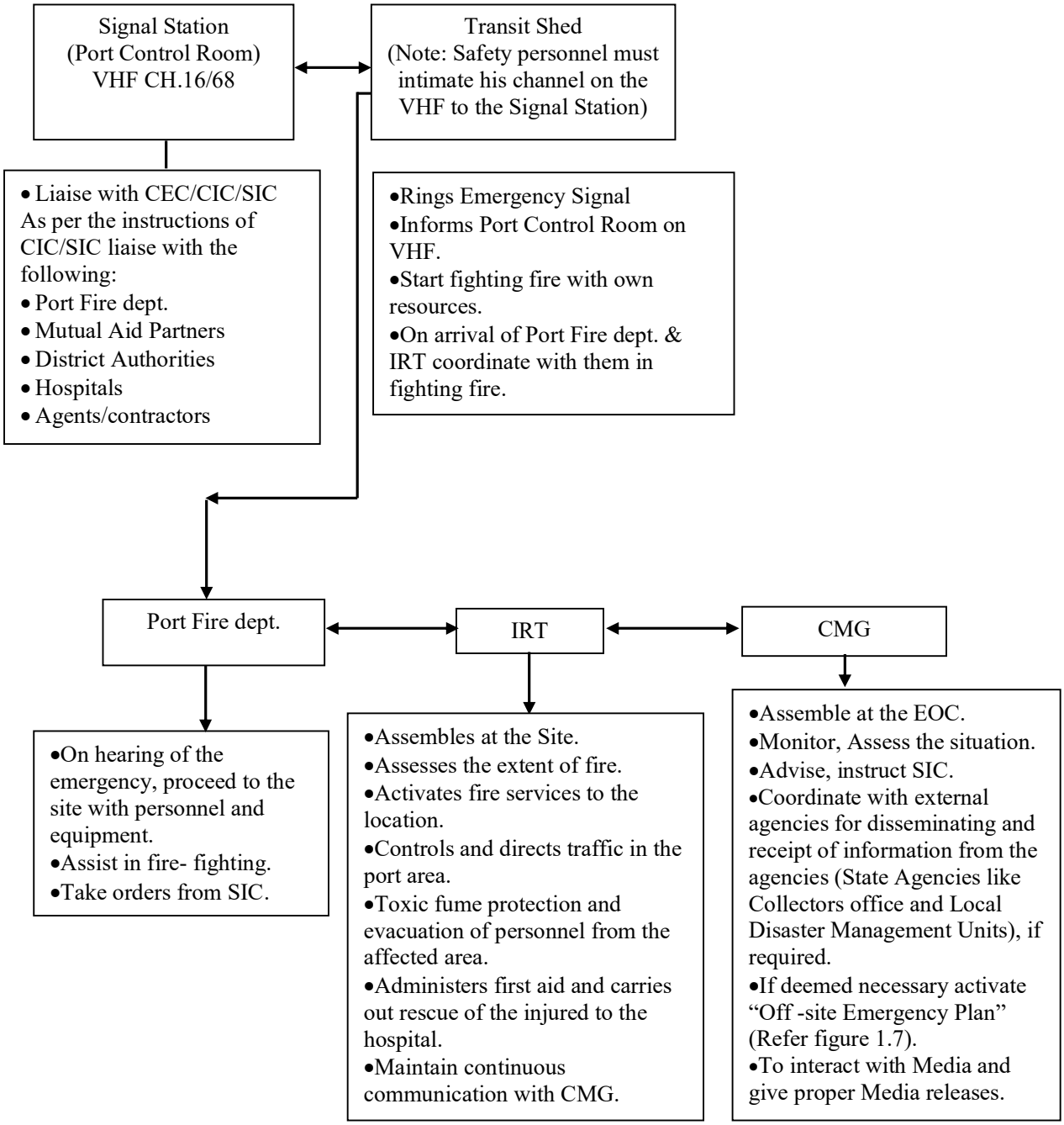
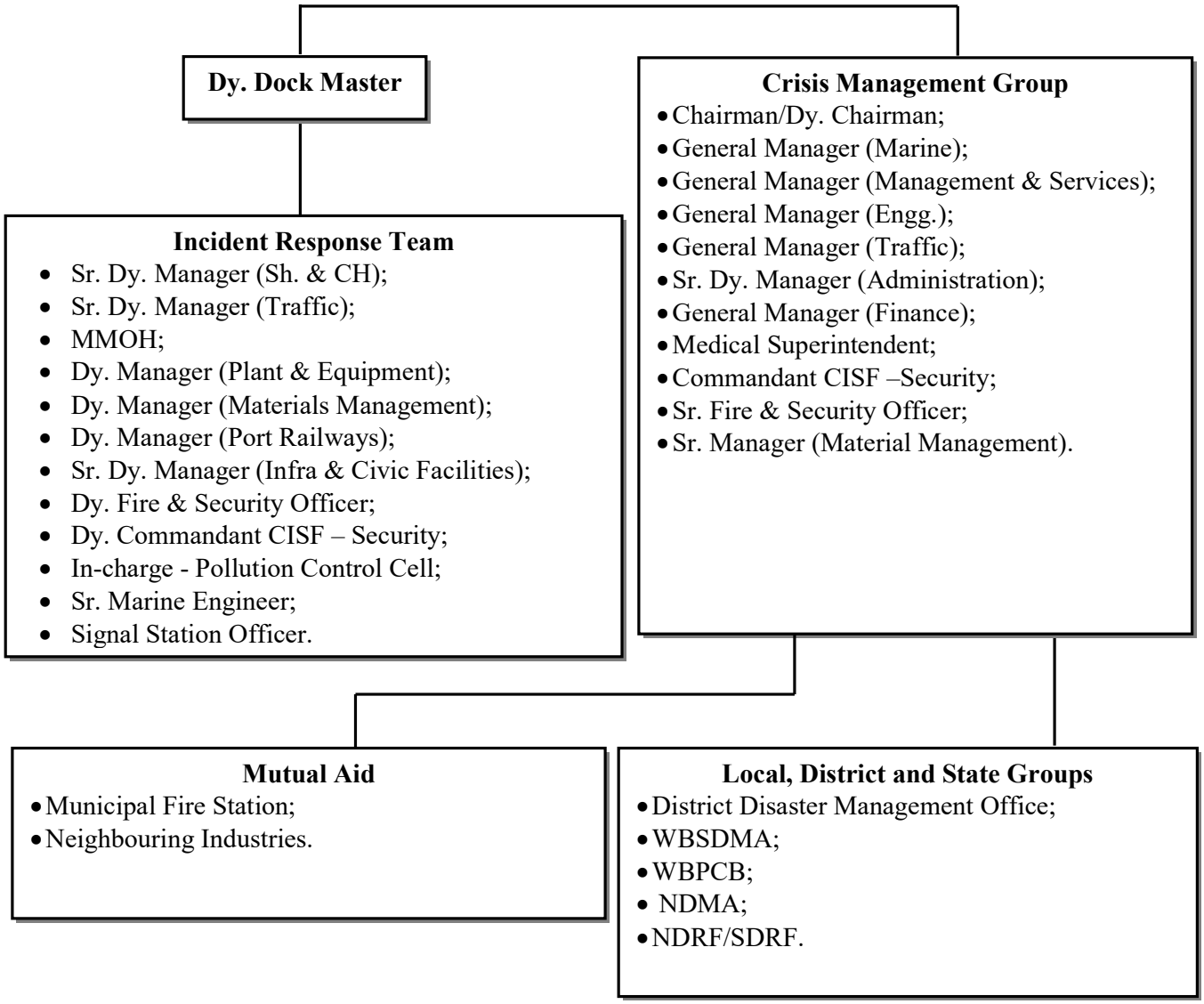


Figure S12.2: Action group



Part B: Action Plan

1. The safety personnel of transit shed

Response Action	Contact
a. Should raise emergency alarm and activate emergency action plan.	
b. Vehicles in the vicinity, Port and nearby terminals should be informed of any incident without delay.	• Port Control Room • Terminals
c. Shall be responsible for fighting the fire with own resources as well as with the available support from IRT and Port Fire dept. Alert nearby terminals in case of release of toxic fumes.	

2. Port Control Room should

Response Action	Contact
a. Gather information related to the fire and time of incident.	
b. Notify to CIC and SIC.	• CIC • SIC
c. Gather information about the wind direction and notify CIC/SIC.	• CIC • SIC

3. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. Assess the level of disaster and activate the DMP.	
b. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	
c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Coordinate with external agencies/authorities.	• Local Authorities
f. Be in constant touch with District and Local Administration for rescue and relief operation.	
g. Terminate the response and debrief before allowing normal operation.	

4. The Fire-fighting Personnel (Port Fire dept.) should

Response Action	Contact
a. Collect the information from Port Control Room and SIC.	• SIC • Port Control Room

b. He will mobilize fire-fighting tenders, personnel & fire-fighting equipment to the scene & extend all necessary support in case of fire, if required and take all precautionary measures to protect against the toxic fumes.	
c. Assist in evacuation of the personnel as directed by SIC.	
d. Inform SIC for arrangement of any additional equipment as required.	

5. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information.	Asst. Dock Master
		Assess and report the situation to the CIC/CMG.	
		Extend all necessary support to fight the fire.	
		He will instruct the Port Fire dept. to keep the fire-fighting equipment and fire-fighting tenders in a state of readiness & activate if required.	
Asst. Dock Master	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC/SIC.	Dock Pilot
		Assist SIC and maintain Log of events.	
MMOH	Pollution Control Coordinator	Determine the level of contamination of the site as a result of incident.	Dy. MMOH
		Ensure clean- up work during and after the emergency as quick as possible.	
		Coordinate with SIC and WBPCB and agencies.	
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift supervisor
		Lead the fire-fighting team and mobilize fire tenders, men & fire-fighting equipment to the scene for fire-fighting.	
		Assist in safely rescuing of the personnel, if trapped inside substation.	

		Inform SIC for the arrangement of any additional equipment as required.	
Dy. Commandant-CISF	Security and Evacuation	Controls & directs traffic in the area. Cordon off the area. Shall supervise evacuation of personnel from the scene at the time of emergency.	Asst. Commandant-CISF
Sr. Dy. Manager (Civil)	Civil Coordinator	Liaise with SIC.	Dy. Manager
Sr. Dy. Manager (Engg.)	E & M Coordinator	Shall be responsible for Electrical supply to vital equipment and systems.	Dy. Manager
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first aid team with ambulance as required.	Alternate Officer
Sr. Dy. Manager (Traffic)	Traffic Coordinator	Shall mobilize and dispatch sufficient number of vehicles to the site of emergency. Coordinates with SIC/CIC.	Dy. Manager

S13: Scenario 13
Part A

1. **Fire in Port Office building/ VTMS/ Control Room/ Hospital**

2. **Precautions:** Smoke and Fire Detection system, Fire-fighting system, trained personnel to combat fire, No Smoking zone, and Protected/covered Electrical installations.

3. **Impact Zone:** Office building/ VTMS/ Control Room/ Hospital.

4. **Resources required:** Organizational setup enumerated in Figure S13.2 and major material and equipment resources as given in **Appendix B**.

Figure S13.1: Action Flow Chart

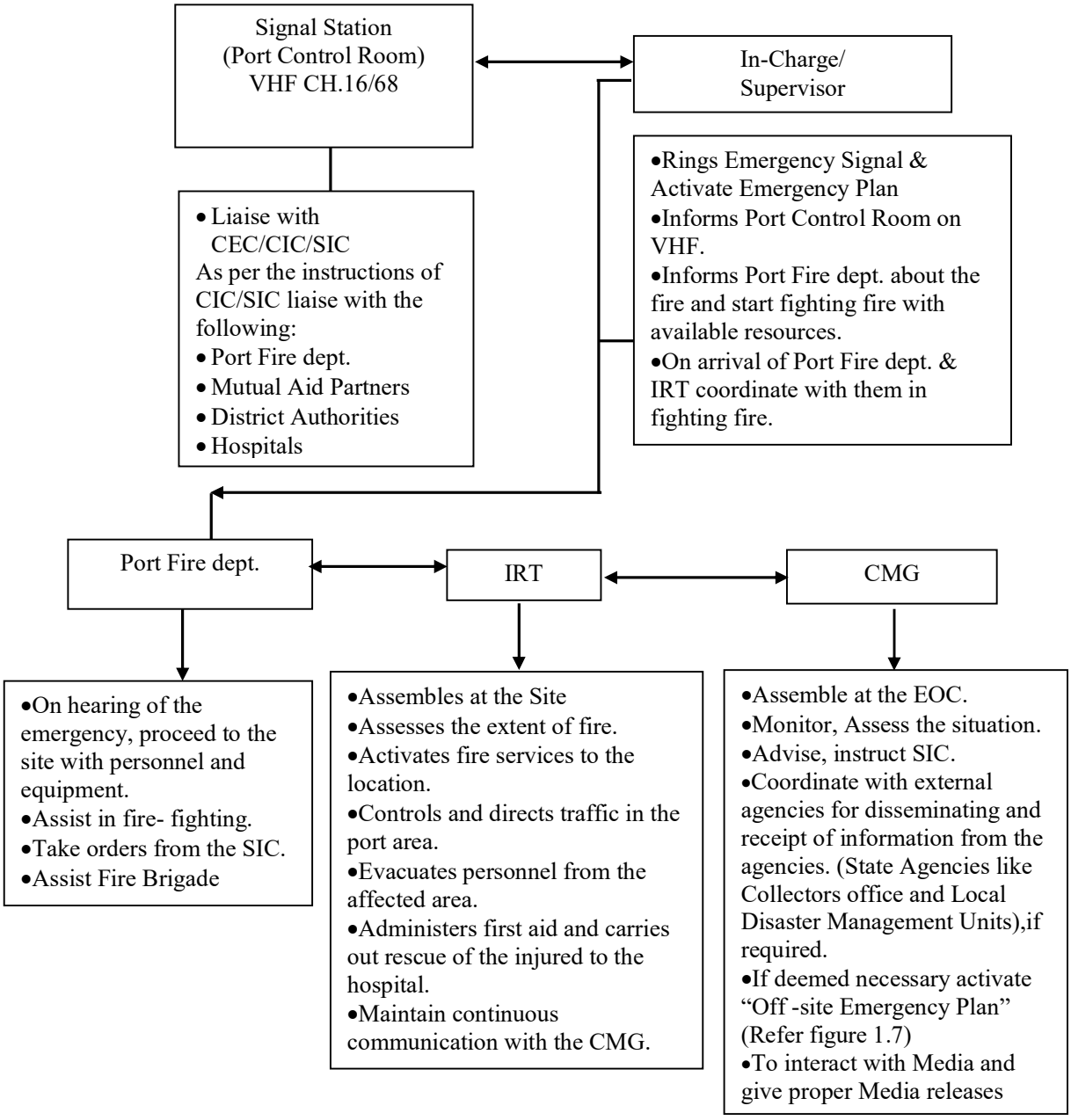
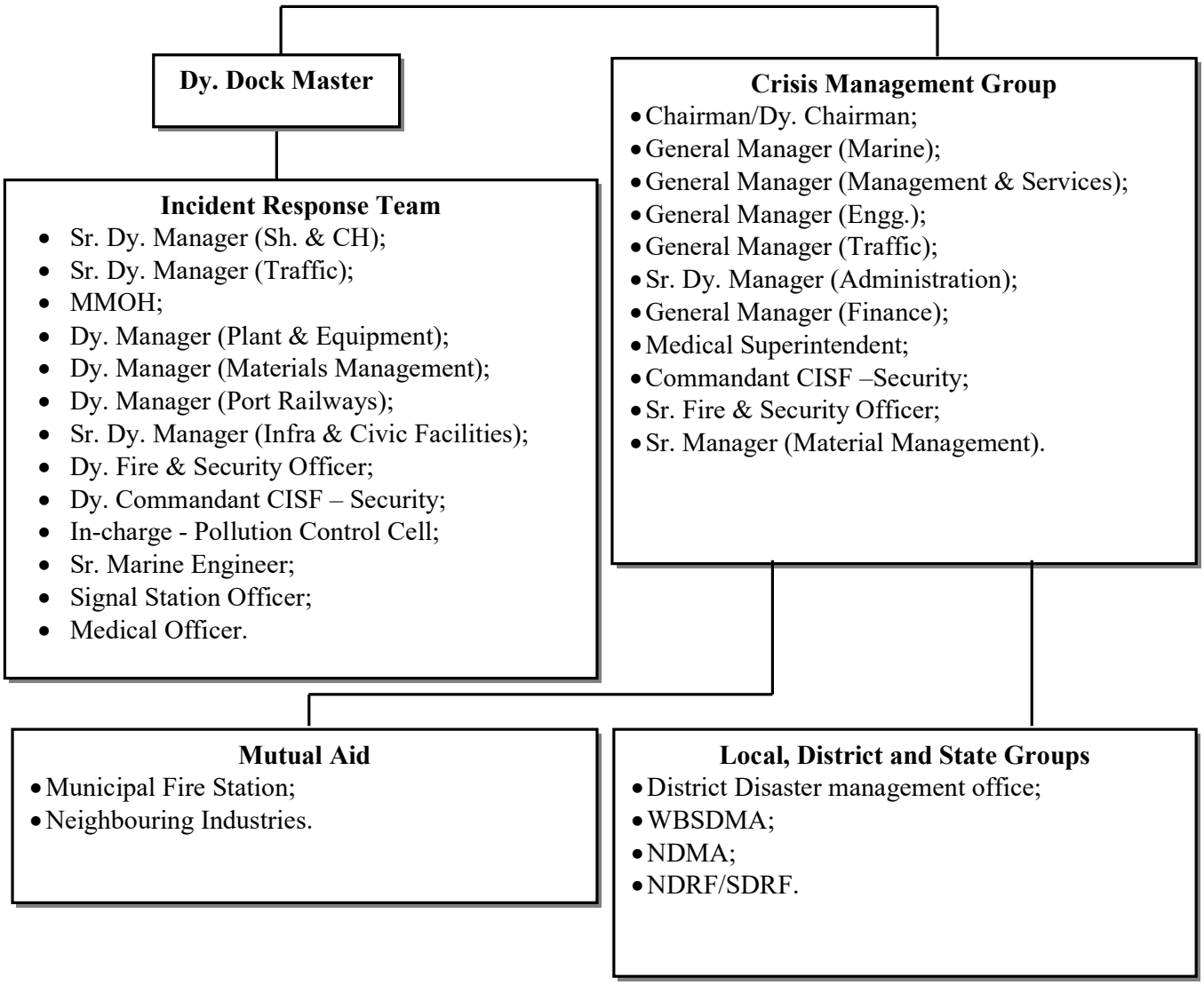


Figure S13.2: Action Group



Part B: Action Plan

1. The Observer/ Building-Fire team/ Action Group member/In-Charge

Response Action	Contact
a. Shout "Fire Fire Fire" and should raise alarm.	
b. Port Control Room should be informed of any incident without delay.	• Port Control Room
c. If fire is in the Port Control Room, inform Port Fire dept. and SIC.	• Port Fire dept. • SIC
d. If trained, try to extinguish the fire and try to evacuate people in assistance with Port Fire dept. and CISF-Security.	

2. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. Assess the level of disaster and activate the DMP.	
b. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	
c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Assess the condition of site take decision on evacuation in consultation with SIC.	
f. Be in constant touch with District and Local Administration for rescue and relief operation.	
g. Terminate the response and debrief before allowing normal operation.	

3. The Fire-fighting Personnel (Port Fire dept.) should

Response Action	Contact
a. Raise Alarm (siren)	
b. Collect the information about the exact location of the fire and people trapped in the building. Ensure safe evacuation of the people in the affected area to a safe location.	
c. He will lead the team and mobilize fire tenders, personnel & fire-fighting equipment to the scene & extinguish the fire.	
d. If the fire is out of control, convey the message to CIC/SIC and seek assistance from Mutual aid partners or other organizations.	• CIC • SIC
e. Control cleanup work during and after the emergency as	

quick as possible.	
f. If the fire is under control and extinguished, give all clear signal	

4. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall proceed to the scene & communicate & collect all information.	Asst. Dock Master
		Assess and report the situation to the CIC/CMG.	
		Instruct the Port Fire dept. to keep the fire-fighting equipment in a state of readiness & activate if required.	
Asst. Dock Master	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC/SIC.	Dock Pilot
		Maintain Log of events.	
MMOH	Pollution Control Coordinator	Determine the level of contamination of the site as a result of incident.	Dy. MMOH
		Ensure clean- up work during and after the emergency as quick as possible.	
		Coordinate with SIC and WBPCB and agencies.	
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift supervisor
		Lead the fire-fighting team and mobilize fire tenders, men & fire-fighting equipment to the scene for fire-fighting.	
		Assist in safely rescuing of the personnel, if trapped inside substation.	
		Inform SIC for the arrangement of any additional equipment as required.	
Dy. Commandant-CISF	Security and Evacuation	Shall supervise evacuation of personnel from the scene at the time of emergency.	Asst. Commandant-CISF
		Cordon off the area.	

		Coordinate with Police and Fire Brigade.	
Sr. Dy. Manager (Civil)	Civil Coordinator	Assist SIC.	Dy. Manager
Sr. Dy. Manager (Engg.)	E & M Coordinator	Shall be responsible for Electrical supply to vital equipment and systems.	Dy. Manager
Sr. Dy. Manager (Traffic)	Traffic Coordinator	Provide necessary assistance to CIC/SIC.	Dy. Manager
		Shall mobilize and dispatch sufficient number of vehicles to the site of emergency.	
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first aid team with ambulance as required.	Alternate Officer

S14: Scenario 14

Part A:

1. **War and Terrorism.**

2. **Precautions:** Protection of the port facilities receiving seagoing ships from terrorist attacks is as per the provision of the "The International Ship and Port Facility Security Code (ISPS Code)".

   Security of the Haldia Dock Complex is being provided by CISF.

   The measures for port security include "installation of VTMS, CCTVs, Biometric Access Control System, patrolling of port areas by vehicles, creation of deterrence by creating proper perimeter wall, illuminating port area, cancelling access to ports and ships, conducting physical verification etc."

   Haldia Dock Complex has installed high-end Security Surveillance System which functions round the clock and enhances the security measures.

3. **Impact Zone:** Entire port.

4. **Resources required:** Intelligence inputs from agencies and organizational setup enumerated in Figure S14.2 and major material and equipment resources as given in **Appendix B**.

Part B: Action Plan

When war like situation is developed or during the declaration of war the priority is to be given to all important/critical areas to remain vigilant to prevent sabotage, to remain ready to combat emergency and to keep normal operation going.

B.1 Prior Emergency Situation (after warnings/inputs)

- Set up Crisis management centre and manned continuously.
- CMG to declare plan/guideline to be followed which could be based on CISF Contingency Plan/Government of India/Statutory bodies/Indian Navy/Air Force/Government of West Bengal etc. instructions.
- CMG to ensure utmost vigilance in identified area to ensure the adequate resources in terms of security personnel, experts in handling equipment, trained manpower, and flood lights, earth moving equipment, mobile cranes, and rescue crafts are available to guard all gates, roads etc. In case of any unidentified/unauthorized person is found, he must be handed over to police.
- CMG to ensure that evacuation plan is prepared and backup systems such as power generator, communication equipment, and safety systems are working. CMG should also ensure that all required manpower such as electricians/technicians/laborer is available all time.
- All terminals/berth operators and sensitive locations should be informed.
- No movement of the vessels in the port vicinity will be allowed.

B.2 During Emergency

- CMG to adopt relevant DMP to combat the emergency.
- In case of an enemy attack inform relevant authorities & internal security to defend installations till the external support arrives.

- When additional security (State ATF/army/BSF) arrives, situation is to be handled jointly.
- CMG to ensure sufficient supply of food and water.
- All vessels inside the port and at the anchorage will observe blackout as per the instruction of CMG.

Figure S14.1: Action Flow Chart

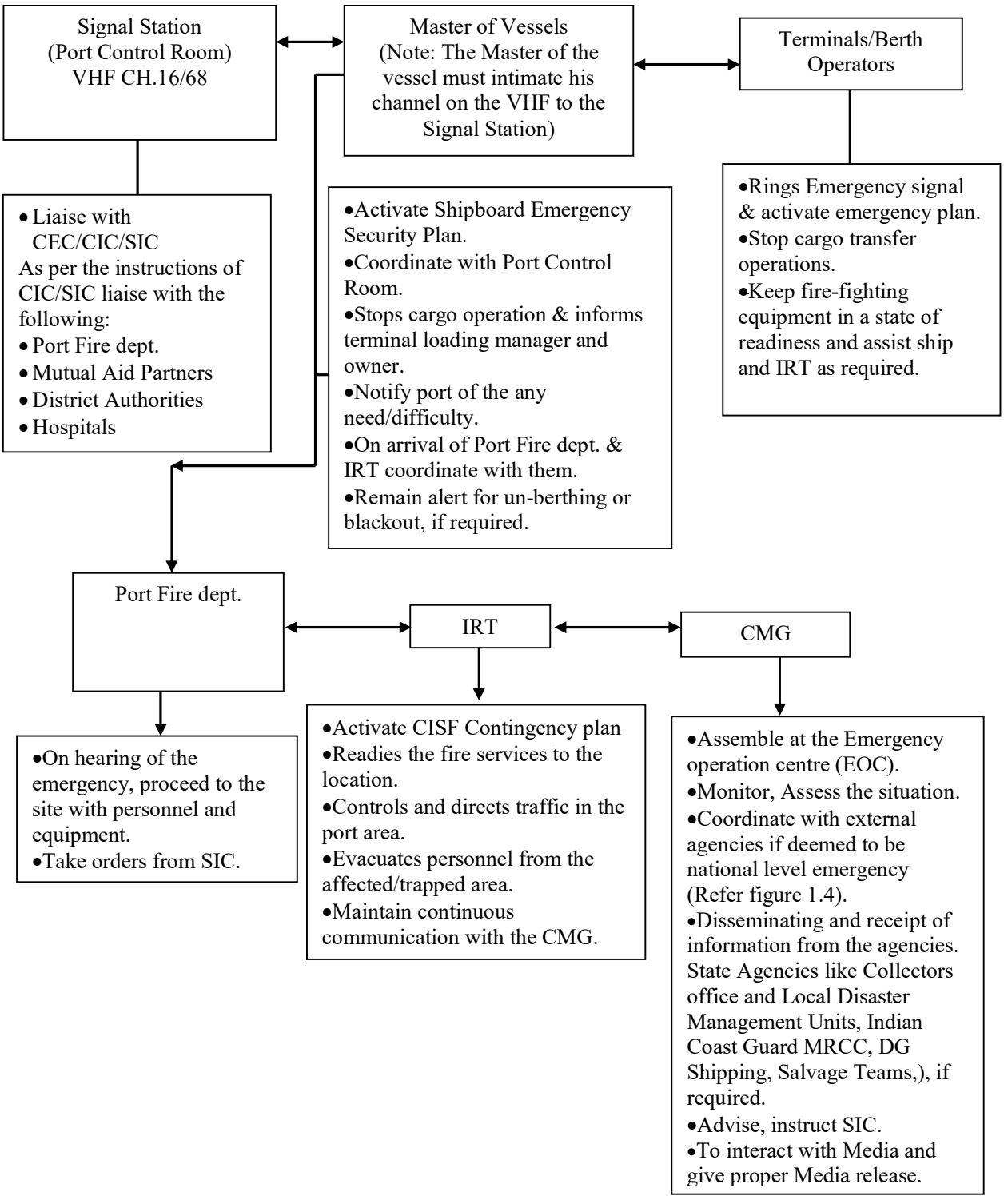
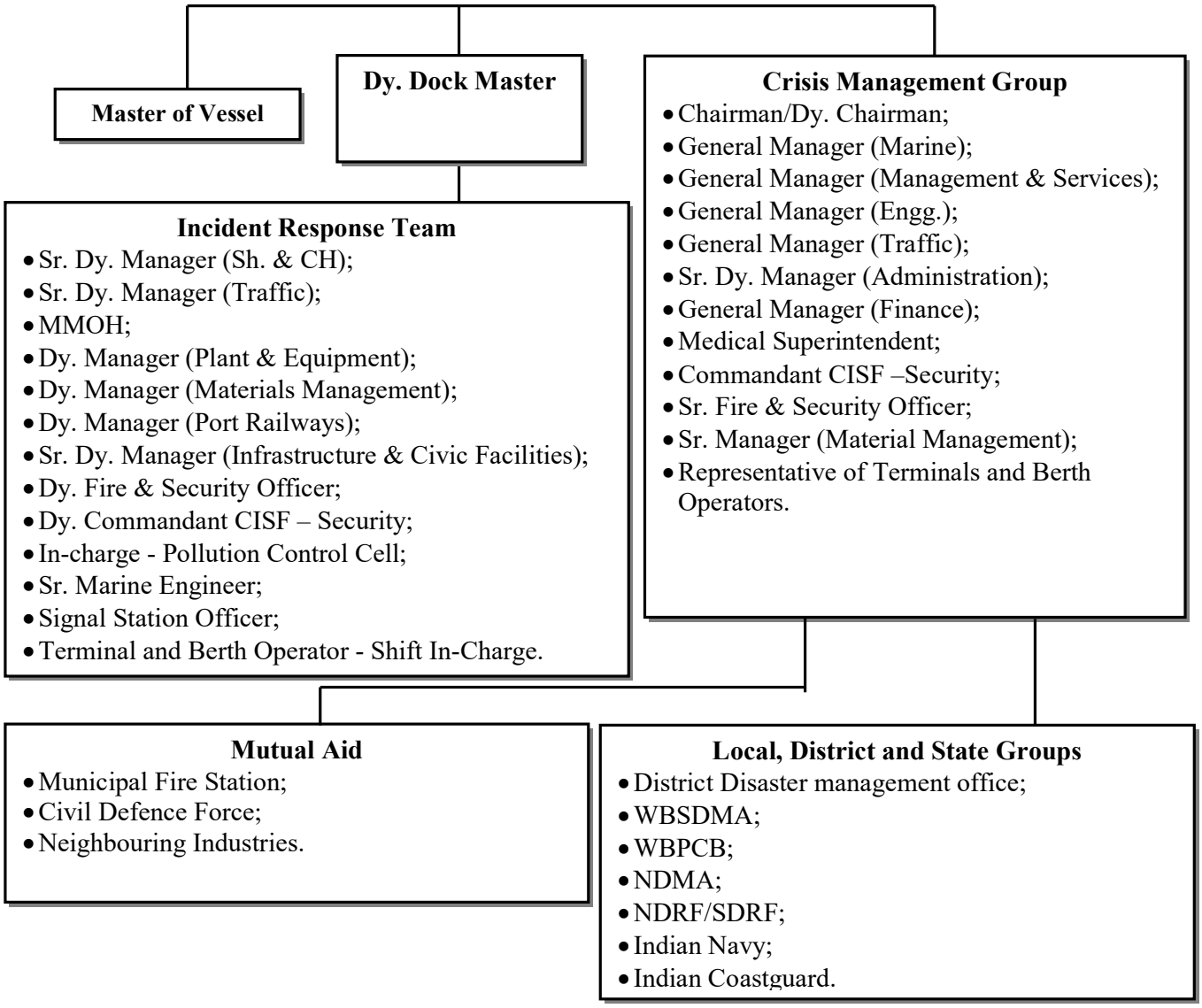


Figure S14.2: Action group



Part B: Action Plan

1. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. Assess the situation and activate the DMP and CISF Contingency Plan.	• CISF-Security
b. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action in coordination with CISF-Security.	• CISF-Security
c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Be in constant touch with District and Local Administration for rescue and relief operation.	
f. Terminate the response and debrief before allowing normal operation.	

2. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall communicate & collect all information.	Asst. Dock Master
		Report the situation to the CIC/ CMG.	
		Extend all necessary help to CISF (Security) as and when required.	
		Ensure that there is blackout at the port and the vessels at the anchorage area as per the guidance and instruction of CMG/CIC.	
Asst. Dock Master	Port Control Room Coordinator	Shall be ready for taking the instructions from CIC/SIC and evacuate/move/shift the vessel from the area.	Dock Pilot
Master of the vessel	In-Charge of operation on board vessel	Be ready to take the vessel out of the port as per the instructions of CIC/SIC.	Chief Officer of vessel
		Coordinate with IRT leader and will be responsible for shutting down all cargo operation on board in coordination with berth operator In-Charge.	
Dy. Fire	Fire, Search	Shall take orders from the SIC.	Shift

Officer	and Rescue Coordinator	Keep the fire-fighting installation in a state of readiness and be in continuous liaise with SIC/CIC.	supervisor
		Ensure all employees (port and contract) within port shifted to safe locations.	
Dy. Commandant-CISF	Security and Evacuation (in case of enemy attack)	Act as per the CISF Contingency plan.	Asst. Commandant-CISF
		Controls & directs traffic in the area.	
		Shall supervise evacuation of personnel from the scene at the time of emergency and shift to shelter stations.	
Sr. Dy. Manager (Civil)	Civil Coordinator	Assist SIC.	Dy. Manager
Sr. Dy. Manager (Engg.)	E & M Coordinator	Arrange for specialized equipment if required as per the instruction of the SIC.	Dy. Manager
		Take orders from CIC/SIC with regards to power supply and shutdown.	
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first aid team with ambulance as required.	Alternate Officer
Sr. Dy. Manager (Traffic)	Traffic Coordinator	Shall prepare vessels to vacate from berth.	Dy. Manager
		Arrange to protect cargo in vicinity from damage.	
		Submits consolidated list of dangerous goods in port – Vessels in port.	
		Coordinates with ship owners/agents/stevedores.	
Duty Pilot	In-Charge of Pilotage	Shall be ready on site for taking the ship out of berth and be ready for providing any assistance on site.	Standby Pilot

S15: Scenario 15
Part A

1. **Bomb Threat**

2. **Precautions:** Protection of the port facilities receiving seagoing ships from terrorist attacks is as per the provision of the "The International Ship and Port Facility Security Code (ISPS Code)".

   Security of the Haldia Dock Complex is being provided by CISF.

   The measures for port security include "installation of VTMS, CCTVs, Biometric Access Control System, patrolling of port areas by vehicles, creation of deterrence by creating proper perimeter wall, illuminating port area, cancelling access to ports and ships, conducting physical verification etc."

   Haldia Dock Complex has installed high-end Security Surveillance System which functions round the clock and enhances the security measures.

3. **Impact Zone:** Entire port.

4. **Resources required:** Organizational setup enumerated in Figure S15.2 and major material and equipment resources as given in **Appendix B**.

Figure S15.1: Action Flow Chart

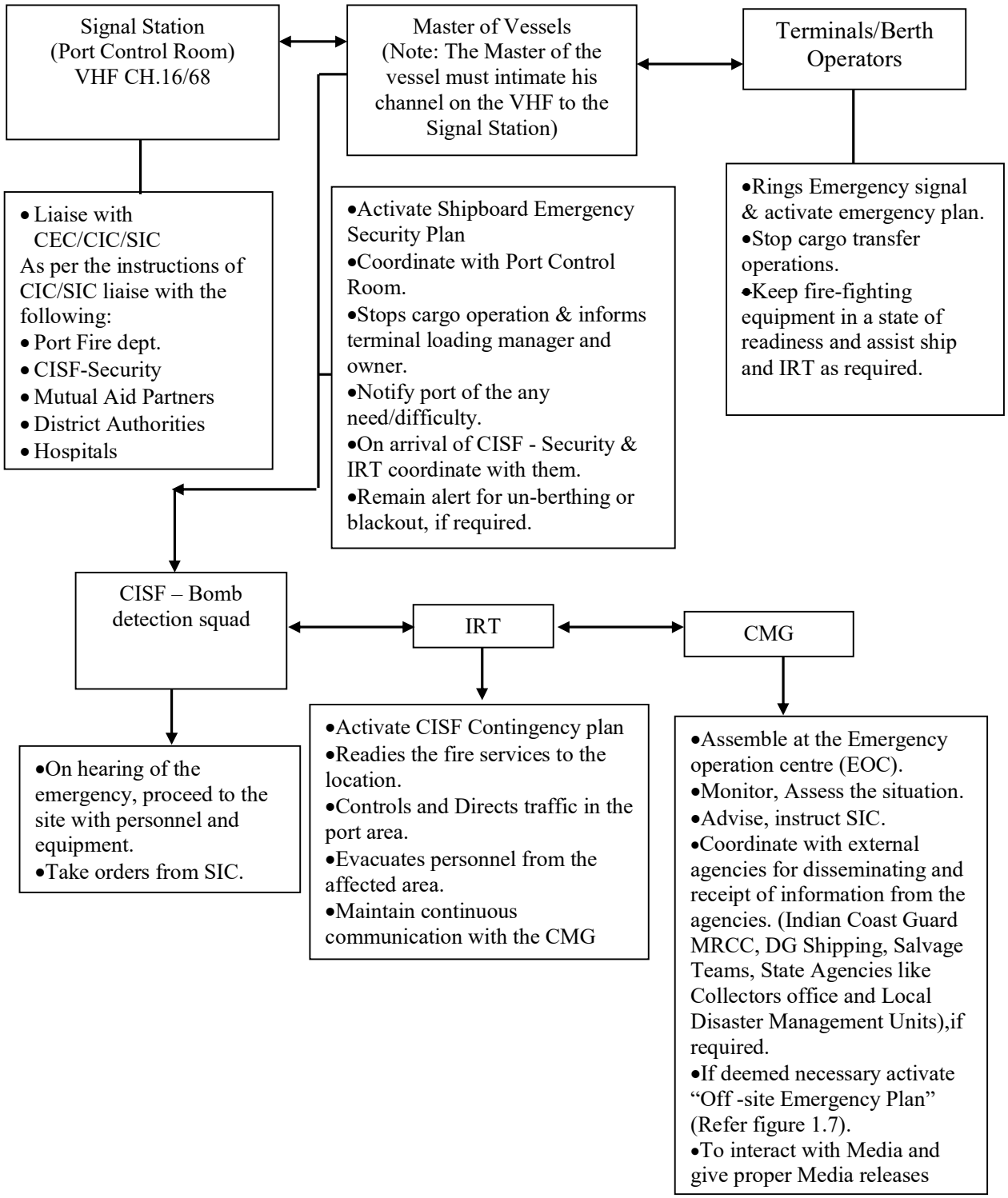
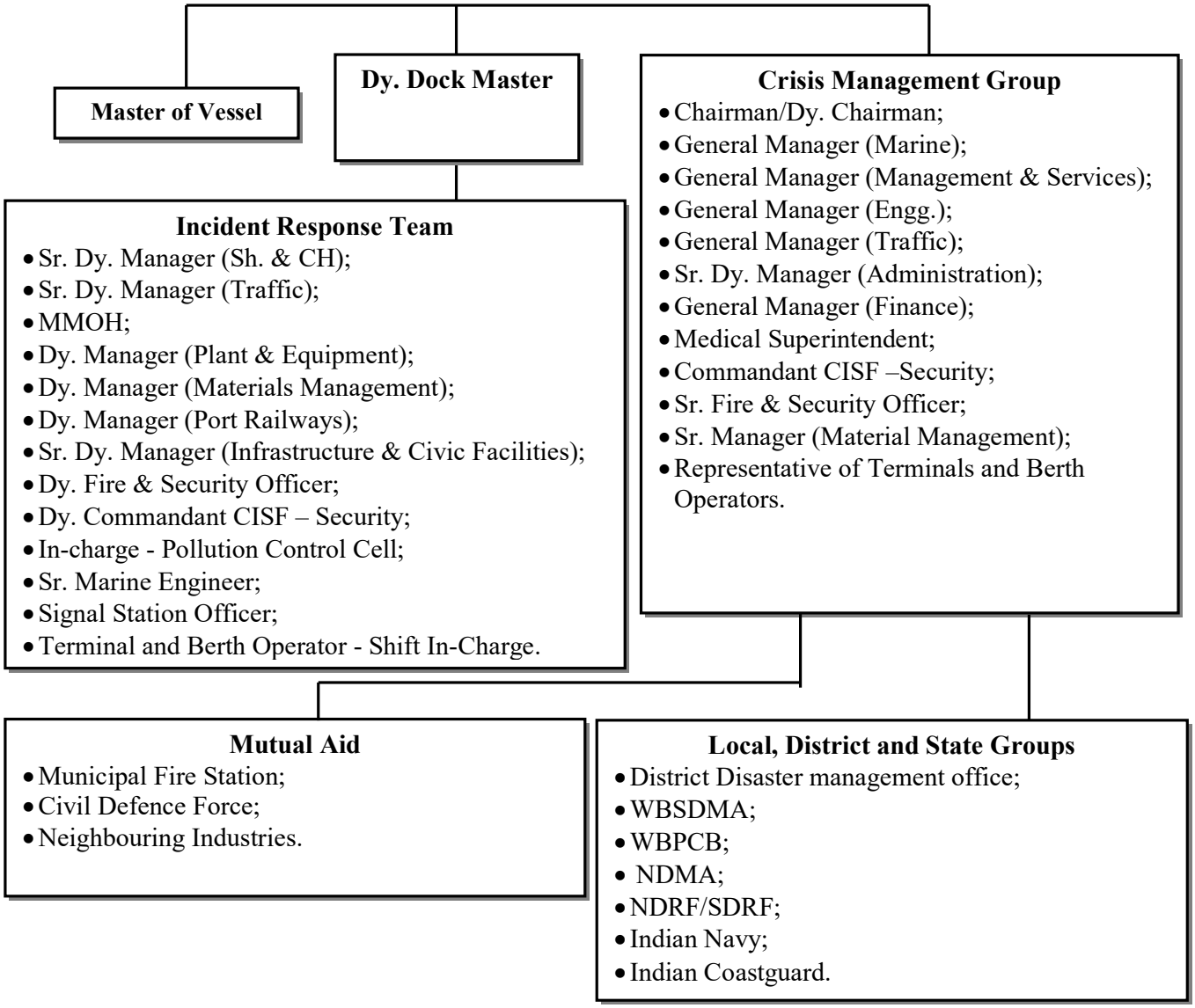


Figure S15.2: Action group



Part B: Action Plan

1. The Observer

Response Action	Contact
a. Port Control Room/CISF should be informed without delay.	• Port Control Room • CISF-Security

2. CISF- Security should

Response Action	Contact
a. Gather the information as per CISF bomb threat checklist based on Intelligence inputs.	
b. Should Implement/activate CISF Contingency Plan and search operation as per the message received of the location.	
c. Identify the location and cordon off the area.	
d. Assist District Police and Bomb Squad as required.	
e. All terminals should be informed.	
f. Relevant port area should be shut down and people inside the port should be taken to a safe location.	

3. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. Assess the situation and activate the DMP.	
b. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	
c. Give instructions to SIC, CISF and Port Control Room & arrange for external aid as necessary.	• SIC • CISF • Port Control Room
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Be in constant touch with District and Local Administration for rescue and relief operation.	
f. Terminate the response and debrief before allowing normal operation.	

4. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall communicate & collect all information.	Asst. Dock Master
		Ensure that the identified location is cordoned off and the people are evacuated.	
		Report the situation to the CIC/ CMG.	
		Extend all necessary help to CISF as and when required.	
Asst. Dock Master	Port Control Room Coordinator	Shall be ready for taking the instructions from CIC/SIC and evacuate/move/shift the vessel from the area.	Dock Pilot
Master of the vessel	In-Charge of operation on board vessel	Be ready to take the vessel out of the port as per the instructions of CIC/SIC.	Chief Officer of vessel
		Coordinate with IRT leader and will be responsible for shutting down all cargo operation on board in coordination with terminal In-Charge.	
Terminal Managers/ Berth Operators	Cargo Work	Shall be responsible of shutting down of cargo operation & coordinating with Port and rendering necessary assistance to the SIC by providing additional equipment as required.	Alternate Officer
		Coordinate with the agencies for screening of their cargoes.	
		Arrange to protect cargo in vicinity from damage.	
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift supervisor
		Keep the fire –fighting installation in a state of readiness and be in continuous liaise with SIC/CIC.	
		Ensure all employees (port and contract) within port shifted to safe locations.	
Sr. Dy. Manager (Civil)	Civil Coordinator	Assist SIC.	Dy. Manager
Sr. Dy.	E & M	Arrange for specialized equipment	Dy. Manager

Manager (Engg.)	Coordinator	if required as per the instruction of the SIC.	
		Take orders from CIC/SIC with regards to power supply and shutdown.	
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first aid team with ambulance as required.	Alternate Officer
Sr. Dy. Manager (Traffic)	Cargo Storage, Shed and Labour Coordinator	Shall prepare vessels to vacate from berth.	Dy. Manager
		Arrange to protect cargo in vicinity from damage.	
		Submits consolidated list of dangerous goods in port – Vessels in port.	
		Coordinates with ship owners/agents/stevedores.	
Duty Pilot	In-Charge of Pilotage	Shall be ready on site for taking the ship out of berth and be ready for providing any assistance on site.	Standby Pilot
		Responsible for organizing tugs for shifting the vessel to the anchorage area.	

S16: Scenario 16
Part A:

1. **Natural Disaster (Cyclone)**
   Note: *The action plan will come into force as soon as the storm warning signal no.5 or higher is hoisted.*

2. **Precautions:** SOP for Cyclone, Continuous weather monitoring, Early warning system, Cyclone Shelters.

3. **Impact Zone:** Entire port**.**
   Note: *The Haldia (Purba Medinipur district) falls under very high damage risk zone (max. wind speed of 50 m/s) as per the vulnerability hazard map of the region.*

4. **Resources required:** Refer Figure S16.2 and **Appendix B**.

Figure S16.1: Action Flow Chart

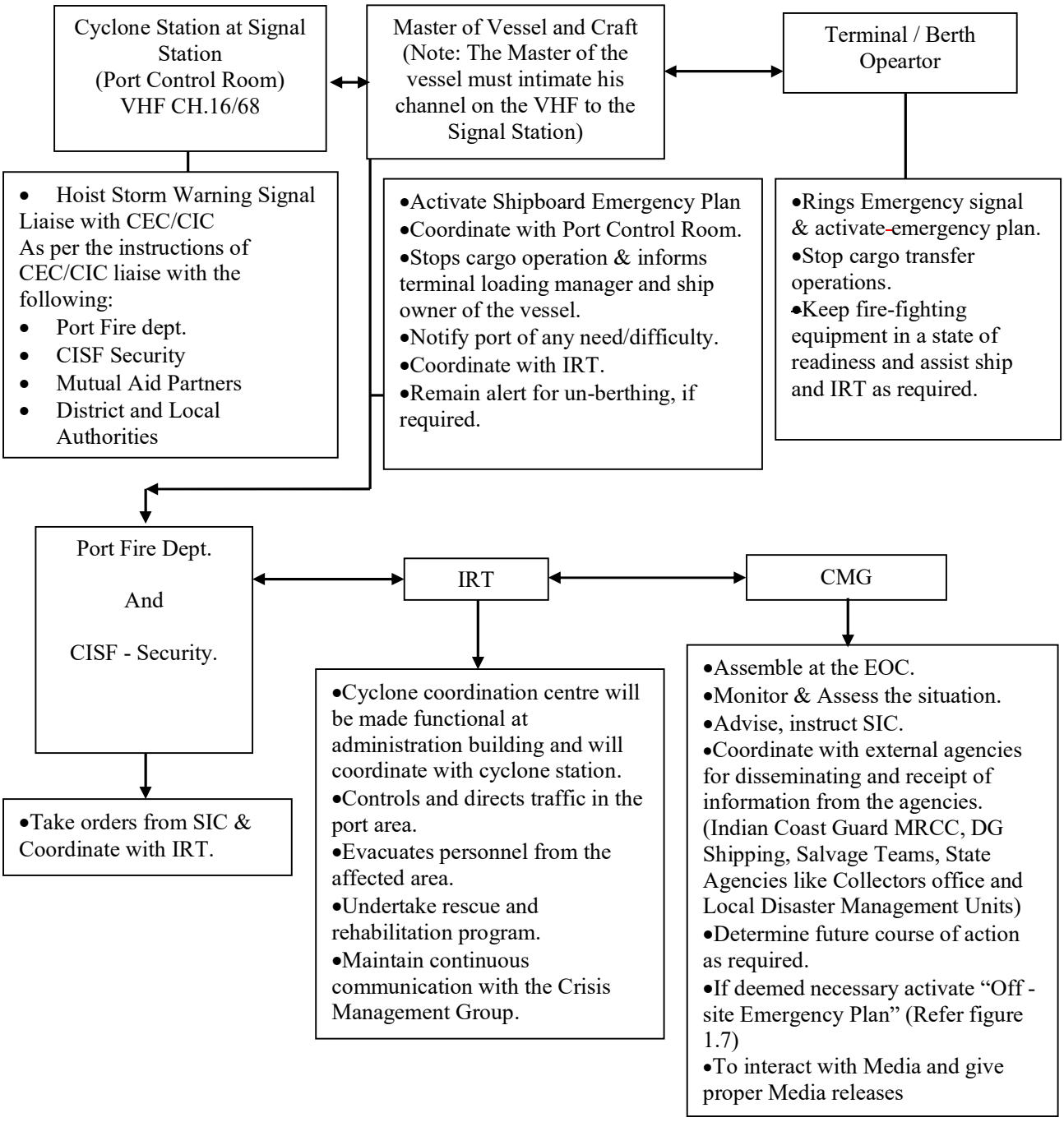
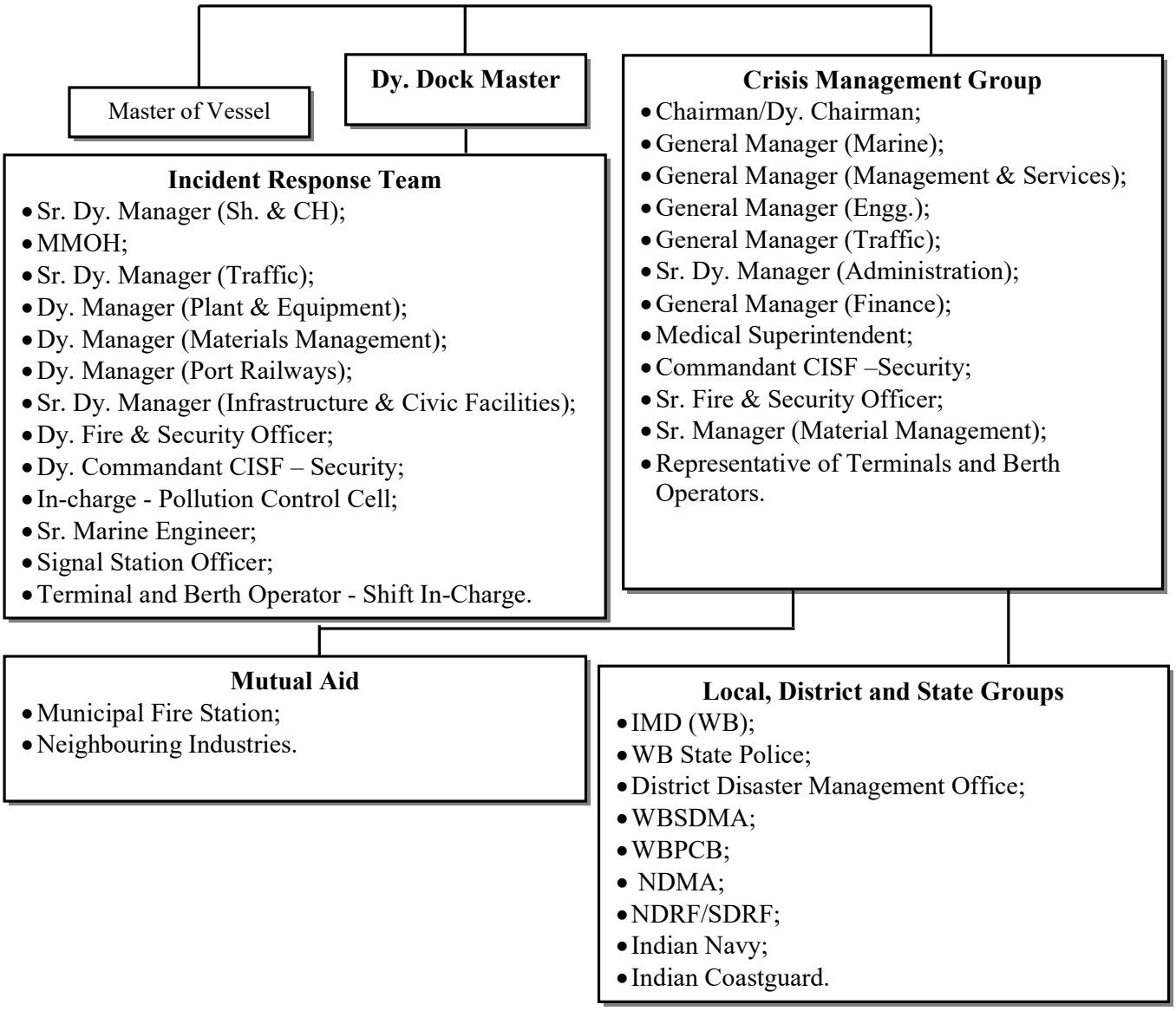


Figure S16.2: Action group



Part B: Action Plan

1. The Cyclone Station setup at Port Control Room

Response Action	Contact
a. Gather information related to the vessel type and position in the port limit.	
b. Gather information related to the weather conditions by liaising with competent agencies for issuing warnings as mentioned in section 9.2.3 and other media. Monitor the weather map either through Internet or Television and record approximate position of the weather and information about its movement as given in the news.	
c. Liaise with Master of the Vessel/Pilot.	
d. Ensure that telephones, one VHF and one walkie-talkie all are operational in the Port control center. Listening watch to be maintained on VHF channel 16/68.	
e. Notify to CEC, CIC, Head of the Departments and the vessels moving into, through and inside the port. Keep CIC informed of all the messages received by telephone, VHF sets or by messenger.	• CEC • CIC • HOD • Master of the vessel
f. Notify the other Authorities and stakeholders within Port as per instructions of CEC/CIC.	• Navy • Coastguard • Stakeholders
g. Inform the Senior Marine Engineer/Marine Engineer of any buoys or crafts or any Port installation is seen adrift.	• Senior Marine Engineer • Marine Engineer
h. Hoist signals or raise alarms, as per the warnings received by the competent agencies for issuing warnings. (for warning signals refer section 9.2.3)	

2. Port Control Room

Response Action	Contact
a. As per instruction of CIC/SIC, sufficient number of staff will be detailed. The staff of signal station will remain on duty until they are relieved by next shift staff or till alternative arrangements are made or till the storm has passed and the GM (Marine) releases them.	
b. Every two hourly barometer reading will be recorded after cyclone warning signal No. 3 is hoisted but the same will be made hourly if further upward signal is placed.	
c. The Signal station will maintain a continuous watch on channel 16/68. Signal station and will keep SIC informed of all the messages received by telephone, VHF sets or by fax / e-mail.	
d. Signal station will inform the SIC if any buoys or crafts	

are seen adrift.	
e. The staff on duty will have sufficient provisions to stay on duty for a period ranging from 24 hours to 48 hours.	
f. Signal station will receive weather facsimile report from New Delhi or any other station and pass on the GM (Marine) and Dy. Dock Master for information.	
g. Any warnings received shall immediately be reported to the Cyclone Station.	
h. Weather messages are to be intimated to the Dy. Manager.	

3. Tidal observatory

Response Action	Contact
a. The Gauge Clerk will record the range of tide, time and heights of high and low water and will report to Senior Hydrographic Surveyor who in turn will apprise the GM (Marine) and the Dy. Dock Master of the actual and predicted tides.	• Senior Hydrographic Surveyor

4. The Master of the Vessel (Alternate: Chief Officer)

Response Action	Contact
a. Should raise ships emergency alarm and activate ship board emergency action plan.	
b. Having raised the alarm, the Master will be responsible for taking all immediate steps to safeguard his ship.	
c. The Master will provide the Port Authority with details of the vessel.	• Port Control Room
d. Should follow the instruction of the CIC/SIC and be in continuous liaison with the CIC/SIC/Port Control Room.	• CIC • SIC • Port Control Room
e. Should be in a state of readiness to take the vessel out of the port.	

5. The terminal personnel /berth operator should

Response Action	Contact
a. Activate EAP (prepared by the terminal) and inform Port.	• Port Control Room
b. Shall be responsible of shutting down of cargo operation (as per Terminal SOP and/ contingency plan) & coordinate with Port and Master of the Vessel and rendering necessary assistance to the SIC and vessel by providing emergency equipment as required.	
c. Submit consolidated list of dangerous goods in port and Vessels in port. Make arrangements to protect cargo.	

d. Assist IRT and provide all necessary equipment.	• SIC
e. He will direct operation staff. Coordinate with the ship in-charge/C&F agents/stevedores.	

6. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. He will keep himself apprise of the weather developments. If the storm is observed on the radar screen, the Deputed Officer will inform Chairman/ Dy. Chairman and cyclone station.	
b. He will be stationed in EOC to review & assess possible developments to determine the necessary course of action.	
c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation periodically and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Consult with Chairman / Dy. Chairman and decide on berthing of vessels as soon as the cyclone is confirmed to pass in close proximity to the Port.	
f. Plan movements of vessels such that the vessels are cleared in shortest possible time.	
g. Coordinate with external agencies/authorities such as Indian Navy and Coastguard.	• Indian Navy • Coastguard
h. Be in constant touch with District and Local Administration for rescue and relief operation.	
i. Terminate the response and debrief before allowing normal operation.	

7. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall proceed to the signal station and establish Cyclone Station & communicate & collect all information.	Asst. Dock Master
		Take over the charge and ensure the action plan is promulgated as per the instructions of CIC.	
		Inform ships alongside berths to double up their moorings, provide shore gang assistance and ask Masters to keep their ships ready	

		to proceed to the sea at short notice as per the instruction of CIC.	
		He will keep close liaison will IMD, Radar Station, Police Wireless Station, Coast Guard HQ, and Ships in Port in regard to the likely weather conditions in the near further.	
		Ensure port control, hoists appropriate storm signal as per the situation.	
		Report the situation to the CIC & the CMG.	
		Keep rescue team ready with rubber boats, Life jackets etc.	
		Ensure that the hazardous cargoes are shifted out of the port or secured/stored in a safe manner.	
		Ensure that the operations are brought back to normal after the termination of the emergency procedure.	
Asst. Dock Master	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC/SIC.	Dock Pilot
		Instruct Pilots to secure tugs, crafts and workboats.	
		He will maintain log of events.	
MMOH	Pollution Control Coordinator	Determine the level of contamination of the site as a result of incident.	Dy. MMOH
		Ensure clean- up work during and after the emergency as quick as possible.	
		Coordinate with SIC and WBPCB and agencies.	
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift supervisor
		Keep fire tenders and fire-fighting equipment in a state of readiness.	
		Ensure the Fire tugs is properly manned and secured with double ropes and engines running in	

		idling condition.	
		Responsible for mobilizing fire tenders, men & fire-fighting equipment to the scene & extend all necessary support.	
		Ensure hazardous cargo out are kept at a sheltered or safe location.	
		CISF-team will make announcement in the township and the adjoining habitats area indicating the precautionary measures to be taken.	
		Liaise with State Fire brigade for any assistance.	
		All other workers to move out of port area.	
Dy. Commandant-CISF	Security and Evacuation	Shall be responsible for forming a cyclone task force and will lead the same.	Asst. Commandant-CISF
		Controls & directs traffic in the area.	
		Shall supervise evacuation of personnel from the scene at the time of emergency and responsible for rescue operations.	
		Till normality is restored, arrangement will be made for thorough checks on all out-going vehicles to guard against pilferage.	
Sr. Dy. Manager (Traffic)	Traffic Coordinator	Submits consolidated list of dangerous goods in port area.	Dy. Manager
		Coordinate with the truck contractors.	
		Ensure availability of vehicles and mobilize and dispatch sufficient number of vehicles to the site during emergency.	
Sr. Dy. Manager (Civil)	Civil Coordinator	Shall ensure the standard procedure before the monsoon has been followed and complied with by all the divisions.	Dy. Manager
		Keep enough number of cement bags ready as per SIC instructions.	

		Pump house equipment and all generator sets shall be tried out and kept ready.	
		Ensure all the drains and obstructions in the creeks/ culverts are cleaned for easy discharge of sludge water.	
Sr. Dy. Manager (Engg.)	E & M Coordinator	Shall ensure the standard procedure before the monsoon has been followed and complied with by all the divisions.	Dy. Manager
		All types of cranes, forklifts, heavy earth moving equipment to be secured in a safe manner.	
		Shall form and head Cyclone mitigation Team comprising of Senior Electrical, Mechanical and Maintenance Engineers.	
		Shall ensure that all the installations and equipment are secured. Also, shall instruct to follow standard procedure for securing of the Cranes, conveyor belts etc. All division and workshops shall follow their standard procedures for securing the equipment and installations.	
		Shall be responsible for alternate electrical supply to vital equipment and systems at the berth.	
		All Sub Stations, Power Control rooms will be manned round the clock.	
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first aid team with ambulance as required.	Alternate Officer
SHS	Hydrographic Survey	Assist SIC.	Pilot
Duty Pilot	In-Charge of Pilotage	Shall be ready on site for taking the ship out of berth or will not bring the ship to berth as per the instruction given by CIC/SIC.	Standby Pilot

		Inform the Masters of all vessels at the berths to double the moorings and to keep engine ready to proceed out to sea if situation warrants.	
		Decision regarding moving ships to the anchorage will be taken depending on the strength of the wind likely to be encountered and number of vessels in the Port.	
		Maintain a close liaison and co-ordination with the Operations In-charge.	
		Take all necessary steps for the safety of the Port crafts.	
		Fender and extra lengths of ropes/wires will be kept ready so as to attend to any craft whose moorings may part.	
		Inform the signal station immediately in the event any craft is seen adrift or any other Port installation is seen in danger. Arrange an Emergency Maintenance team.	
		Responsible for directing tugs for combating the fire and rescue.	
Master Floating Craft		Securing of loose items.	
		Engine room entrance doors, sky lights etc. of all the floating crafts to be kept shut.	
		Master shall be in constant touch with Signal Station.	
Material Management		During cyclonic season sufficient stock of stores like Corrugated iron sheets, J.Hooks, screw hinges, gunny bags, tarpaulins, ropes and wires for Port Crafts, diesel oil, kerosene oil, hurricane lantern, kerosene lamps, torch lights with batteries and bulbs, electrical items etc. is kept.	

POST-CYCLONE DUTIES	
Sr. no.	**Duty**
1.	All the Heads of the Departments are required to assess the damage and submit a detailed report indicating the estimate to the Chairman. For this, a team may be formed comprising Officers of Executive Engineer and above in rank at departmental level and may associate one Officer from Finance Department. The preliminary report is to be submitted within 3 hours and detailed report within three days.
2.	Hydrographic survey to be conducted to assess the channel condition and shipping to resume as early as possible.
3.	In case of any small craft sunk or grounded, the same to be removed to make the channel/ berth safe for navigation. SIC will detail a salvage party headed by Berthing Master for the purpose.
4.	A team of Officers to be nominated by Secretary to supervise the rescue and relief operation and disposal of carcasses in co-ordination with the local and District Administration.
5.	Mobile medical service, if required, to be provided by Medical Superintendent. Preventive measures for epidemics to be taken.
6.	All the operating systems to be attended urgently and made operational as early as possible on war footing basis to resume operation.
7.	Spot tendering procedure can be followed if required in emergency.
8.	Water supply and electricity to be given priority. The Sr. Dy. Manager shall be authorized to extend all assistance for manpower, conveyance, equipment and materials etc. to Electricity Board, if required, for resuming power supply. The electrical cabling network to be checked area wise.
9.	All the damaged temporary roofed warehouses are to be repaired.
10.	The Sr. Dy. Manager (Materials) will nominate a team of officers and staff for procurement and supply of essential materials for repair of various structures and equipment as reported.
11.	To assess the progress of repair works, HOD meeting will be held daily till normalcy is restored.
12.	Damage to furniture, building fixtures may be prepared.

S17: Scenario 17
Part A:

1. **Natural Disaster (Flood due to high tide and/or heavy rains)**
   Note: *The Haldia Dock Complex zone falls under high category flooding risk in the West Bengal state hazard map. However, instances of flooding increase due to storm/cyclonic conditions coupled with infrastructural challenges such as drainage systems, bulk handling and storage yards, internal roads and natural topography of the area. Instances of flooding can also occur as a result of heavy rainfall coupled with high tide. Similar organizational setup for managing this emergency on the lines of cyclone situation will be required.*

2. **Precautions:** Pre-monsoon preparation, Continuous weather monitoring, Early warning system.

3. **Impact Zone:** Entire port**.**

4. **Resources required:** Refer Figure S17.2 and **Appendix B**.

Figure S17.1: Action Flow Chart

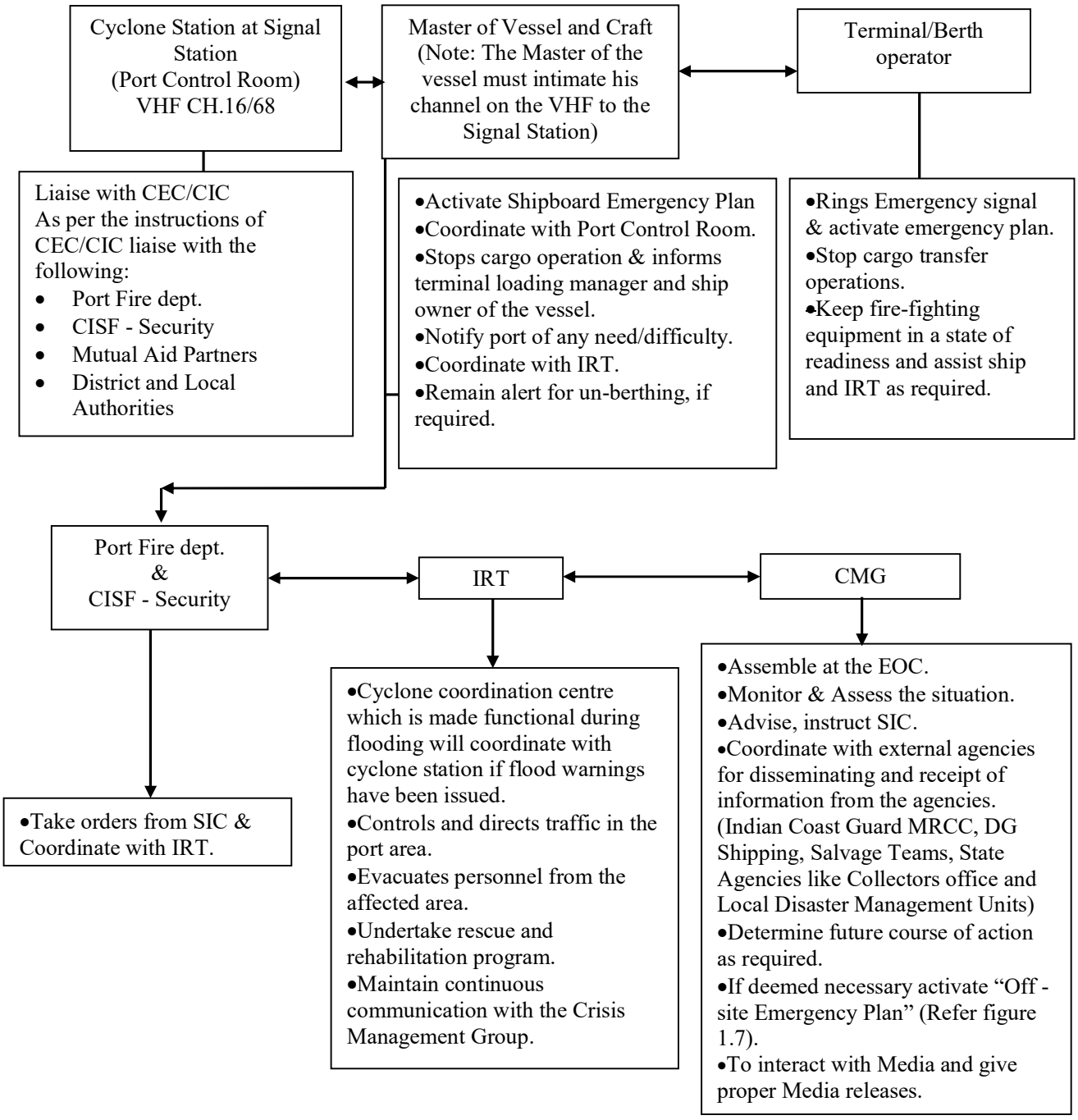
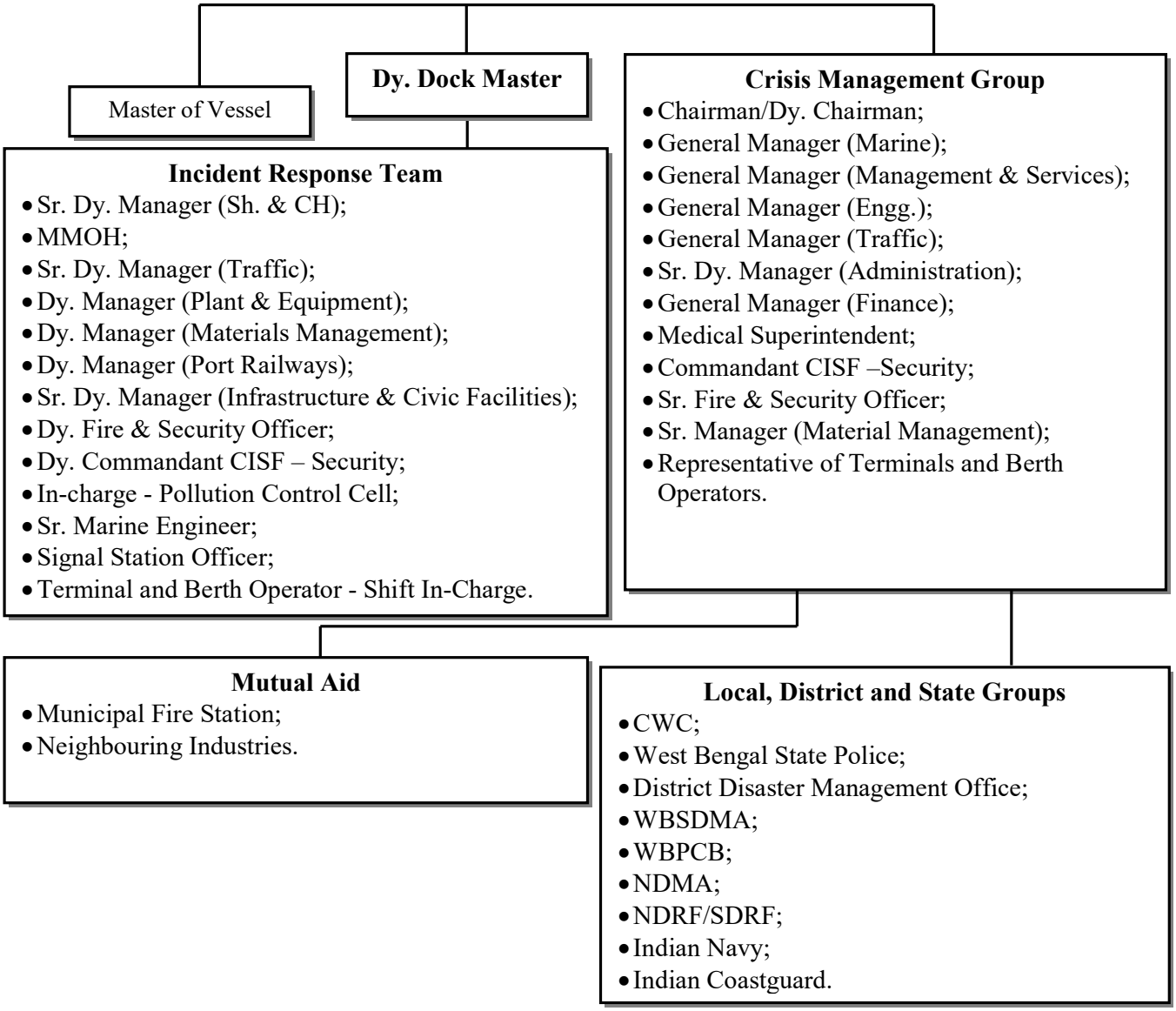


Figure S17.2: Action group



Part B: Action Plan

1. Port Control Room

Response Action	Contact
a. Gather information related to the vessel type and position in the port limit.	
b. Gather information related to the weather conditions by liaising with competent agencies for issuing warnings as mentioned in section 9.2.3 and other media. Monitor the weather map either through Internet or Television and record approximate position of the weather and information about its movement as given in the news.	
c. Liaise with Master of the Vessel/Pilot.	
d. Ensure that telephones, one VHF and one walkie-talkie all are operational in the Port control centre. Listening watch to be maintained on VHF channel 16/68.	
e. Notify to CEC, CIC, Head of the Departments and the vessels moving into, through and inside the port. Keep CIC informed of all the messages received by telephone, VHF sets or by messenger.	• CEC • CIC • HOD
f. Notify the other Authorities and stakeholders within Port as per instructions of CEC/CIC.	• Navy • Coastguard • Stakeholders
g. Inform the Senior Marine Engineer/Marine Engineer of any buoys or crafts or any Port installation is seen adrift.	• Senior Marine Engineer • Marine Engineer
h. As per instruction of SIC, sufficient number of staff will be detailed. The staff of signal station will remain on duty until they are relieved by next shift staff or till alternative arrangements are made or till the storm has passed and the SIC release them.	

2. Tidal observatory

Response Action	Contact
a. The Gauge Clerk will record the range of tide, time and heights of high and low water and will report to Senior Hydrographic Surveyor who in turn will apprise the GM (Marine) and the Dy. Dock Master of the actual and predicted tides.	• Senior Hydrographic Surveyor

3. The Master of the Vessel (Alternate: Chief Officer)

Response Action	Contact
a. Should raise ships emergency alarm and activate ship board emergency action plan.	

b. Having raised the alarm, the Master will be responsible for taking all immediate steps to safeguard his ship.	
c. The Master will provide the Port Authority with details of the vessel.	• Port Control Room
d. Should follow the instruction of the CIC/SIC and be in continuous liaise with the CIC/SIC/Port Control Room.	• CIC • SIC • Port Control Room
e. Should be in a state of readiness to take the vessel out of the port.	

4. The terminal personnel /berth operator should

Response Action	Contact
a. Activate EAP and inform Port.	• Port Control Room
b. Shall be responsible of shutting down of cargo operation (as per Terminal SOP and/ contingency plan) & coordinate with port and Master of the Vessel and rendering necessary assistance to the SIC and vessel by providing emergency equipment as required.	
c. Submit consolidated list of dangerous goods in port and Vessels in port. Make arrangements to protect cargo.	
d. Assist IRT and provide all necessary equipment.	• SIC
e. He will direct operation staff. Coordinate with the ship in-charge/C&F agents/stevedores.	

5. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. Activate the DMP. He will apprise himself of the weather developments.	
b. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	
c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Consult with Chairman / Dy. Chairman and decide on clearing of ships as soon as the cyclone is confirmed to pass in close proximity to the Port.	
f. Plan movements of vessels such that the vessels are cleared in shortest possible time.	

g. Coordinate with external agencies/authorities such as Indian Navy and Coastguard.	• Indian Navy • Coastguard
h. Be in constant touch with District and Local Administration for rescue and relief operation.	
i. Terminate the response and debrief before allowing normal operation.	

6. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall proceed to the signal station and communicate & collect all information.	Asst. Dock Master
		Take over the charge and ensure the action plan is promulgated as per the instructions of CIC.	
		Inform ships alongside berths to double up their moorings, provide shore gang assistance and ask Masters to keep their ships ready to proceed to the safe area at short notice as per the instruction of CIC.	
		He will keep close liaison will IMD, CWC, Radar Station, Police Wireless Station, Coast Guard HQ, and Ships in Port in regard to the likely weather conditions in the near further.	
		Report the situation to the CIC & the CMG.	
		Keep rescue team ready with rubber boats, Life jackets etc.	
		Ensure that the hazardous cargoes are shifted out in a safe manner.	
		Ensure that the operations are brought back to normal after the termination of the emergency procedure.	
Asst. Dock Master	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC/SIC.	Dock Pilot
		Instruct Pilots to secure tugs,	

		crafts and workboats.	
		He will maintain log of events.	
MMOH	Pollution Control Coordinator	Determine the level of contamination of the site as a result of incident.	Dy. MMOH
		Ensure clean- up work during and after the emergency as quick as possible.	
		Coordinate with SIC and WBPCB and agencies.	
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift supervisor
		Keep fire tenders and fire-fighting equipment in a state of readiness.	
		Responsible for mobilizing fire tenders, men & fire-fighting equipment to the scene & extend all necessary support.	
		Liaise with State Fire brigade for any assistance.	
Dy. Commandant-CISF	Security and Evacuation	Shall be responsible for forming a cyclone/flood task force and will lead the same.	Asst. Commandant-CISF
		Controls & directs traffic in the area.	
		Shall supervise evacuation of personnel from the scene at the time of emergency.	
		Till normality is restored, arrangement will be made for thorough checks on all out-going vehicles to guard against pilferage.	
		Shall be responsible for rescue of the personnel.	
Sr. Dy. Manager (Traffic)	Traffic Coordinator	Submits consolidated list of dangerous goods in port area.	Dy. Manager
		Coordinate with the truck contractors.	
		Ensure availability of vehicles and mobilize and dispatch sufficient number of vehicles to the site during emergency.	
Sr. Dy. Manager (Civil)	Civil Coordinator	Shall ensure the standard procedure before the monsoon has been followed and complied with by all the divisions.	Dy. Manager

		Keep enough number of cement bags ready as per SIC instructions.	
		Pump house equipment and all generator sets shall be tried out and kept ready.	
		Ensure all the drains and obstructions in the creeks/ culverts are cleaned for easy discharge of sludge water. Also, make arrangements for additional dewatering pumps as required.	
		As soon as the contingency plan is made operational all the water tanks should be filled up and standby arrangement for supply of water to be made.	
Sr. Dy. Manager (Engg.)	E & M Coordinator	Shall ensure the standard procedure before the monsoon has been followed and complied with by all the divisions.	Dy. Manager
		All types of cranes, forklifts, heavy earth moving equipment to be secured in a safe manner.	
		Shall form and head Cyclone/Flood mitigation Team comprising of Senior Electrical, Mechanical and Maintenance Engineers.	
		Ensure that all division and workshops standard procedures has been followed and equipment and installations are secured in a safe manner.	
		Shall be responsible for alternate electrical supply to vital equipment and systems.	
		All Sub Stations, Power Control rooms will be manned round the clock.	
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first aid team with ambulance & necessary medicines to attend to any injured person.	Alternate Officer
SHS	Hydrographic Survey	Assist SIC.	Pilot

Duty Pilot	In-Charge of Pilotage	Shall be ready on site for taking the ship out of berth or will not bring the ship to berth as per the instruction given by CIC/SIC.	Standby Pilot
		Inform the Masters of all vessels at the berths to double the moorings and to keep engine ready to proceed out to sea if situation warrants.	
		Decision regarding moving ships to the anchorage will be taken depending on the strength of the wind likely to be encountered and number of vessels in the Port.	
		Take all necessary steps for the safety of the Port crafts.	
		Ensure all other crafts are placed at safe place and properly secured excepting one pilot launch and one stand by launch used for inspection and emergency duties.	
		Fender and extra lengths of ropes/wires will be kept ready so as to attend to any craft whose moorings may part.	
		Inform the signal station immediately in the event any craft is seen adrift or any other Port installation is seen in danger. Arrange an Emergency Maintenance team.	
		Responsible for directing tugs for combating the fire and rescue.	
Master Floating Craft		Masters will shift their respective crafts at suitable places as directed by the SIC and will secure them suitably with additional moorings.	
		Masters of respective crafts will be responsible for proper securing and safety.	
		Masters will keep the engines of their crafts ready to proceed at short notice as per the instructions of the Operation In-charge.	
		Extra fenders will be kept ready on board the Tug for use as required.	

		Engine room entrance doors, sky lights etc. of all the floating crafts to be kept shut.	
		Master shall be in constant touch with Signal Station.	
Sr. Dy. Manager	Material Management	During cyclonic season sufficient stock of stores like Corrugated iron sheets, J.Hooks, screw hinges, gunny bags, tarpaulins, ropes and wires for Port Crafts, diesel oil, kerosene oil, hurricane lantern, kerosene lamps, torch lights with batteries and bulbs, electrical items etc. is kept.	
		All the materials which are likely to get damaged in rain and flood are covered with tarpaulin.	

POST FLOOD DUTIES	
Sr. no.	**Duty**
1.	All the Heads of the Departments are required to assess the damage and submit a detailed report indicating the estimate to the Chairman. For this, a team may be formed comprising Officers of Executive Engineer and above in rank at departmental level and may associate one Officer from Finance Department. The preliminary report is to be submitted.
2.	Hydrographic survey to be conducted to assess the channel condition and shipping to resume as early as possible.
3.	A team of Officers to be nominated by Secretary to supervise the rescue and relief operation and disposal of carcasses in co-ordination with the local and District Administration.
4.	Mobile medical service, if required, to be provided by Medical Superintendent. Preventive measures for epidemics to be taken.
5.	All the operating systems to be attended urgently and made operational as early as possible on war footing basis to resume operation.
6.	Spot tendering procedure can be followed for repairs in emergency.
7.	Water supply and electricity to be given priority. The Sr. Dy. Manager shall be authorized to extend all assistance for manpower, conveyance, equipment and materials etc. to Electricity Board, if required, for resuming power supply. The electrical cabling network to be checked area wise.
8.	The Sr. Dy. Manager (Materials) will nominate a team of Officers and staff for procurement and supply of essential materials for repair of various structures and equipment as reported.
9.	To assess the progress of repair works, HOD meeting will be held daily till normalcy is restored.
10.	Damage to furniture, building fixtures may be prepared.

S18: Scenario 18
Part A:

1. **Natural Disaster (Tsunami)**

2. **Precautions:** Continuous weather monitoring, Early warning system, Tsunami Shelters.
   Note: *INCOIS and its monitoring centres will provide early warning by way of messages to the port about the occurrence of tsunami. The nearest earthquake subduction fault zone is located in the Bay of Bengal in the Myanmar coastline. Apart from this the Indonesian region also has considerable seismic activity. Very few earthquakes in the region have been powerful enough to cause a tsunami. Thus, although not very frequent but a clear and present danger of tsunami exist for the port.*

3. **Impact Zone:** Entire port**.**
   Note: *While in the past the Indonesian tsunami (2004) generated a small wave of approx. 2 mtrs. the damages in the event of a higher wave would be in proportion to the proximity to the earthquake zone and the resultant height of wave generation. Thus, the wave energy would impact the port and its constituents including marine and fixed assets in proportion to its severity. Actions at the National and State level for evacuation measures will be taken if the impact assessment is of a high magnitude. Thus, necessary coordination with District and State agencies will be required in case of "Red" and "Orange" alerts.*

4. **Resources required:** Refer Figure S18.2 and **Appendix B**.

Figure S18.1: Action Flow Chart

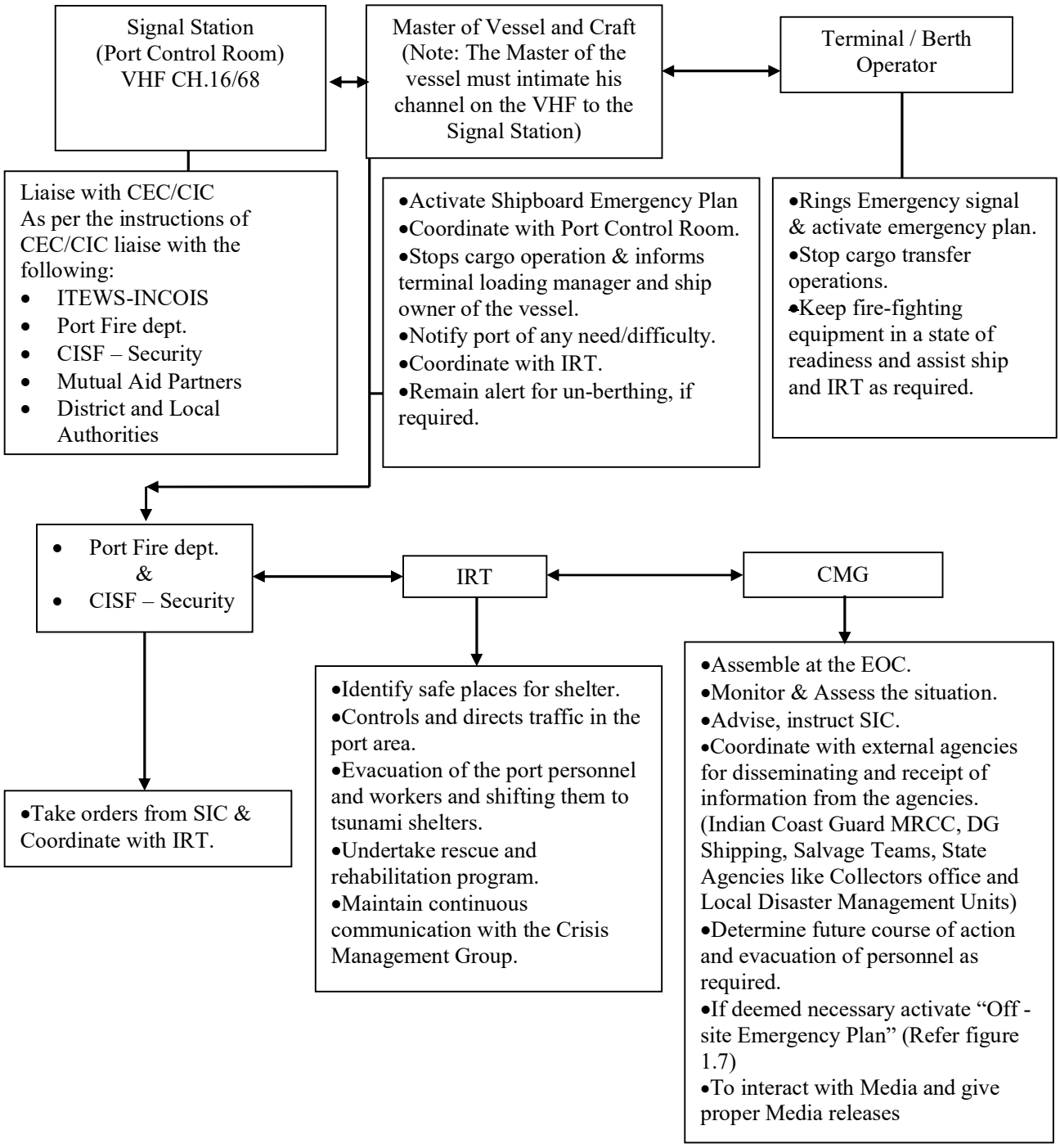
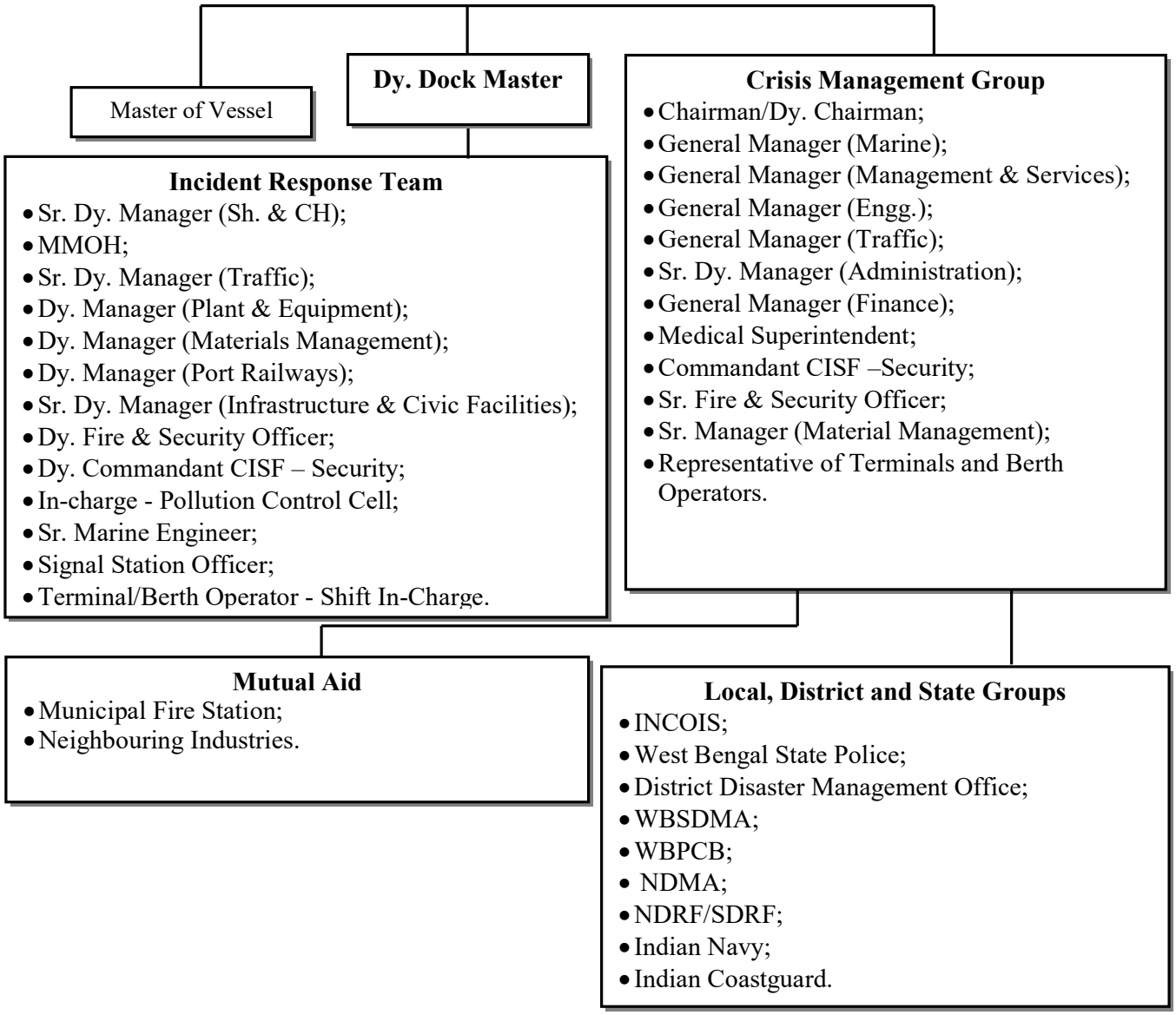


Figure S18.2: Action group



Part B: Action Plan

1. Port Control Room

Response Action	Contact
a. Gather information related to the vessel type and position in the port limit.	
b. Gather information related to the tsunami conditions by liaising with competent agencies for issuing warnings as mentioned in section 9.2.3 and other media. Monitor the conditions through Internet or Television and record approximate position of the tsunami and information about its movement as given in the news.	
c. Liaise with Master of the Vessel/Pilot.	
d. Ensure that telephones, one VHF and one walkie-talkie all are operational in the Port control centre. Listening watch to be maintained on VHF channel 16/68.	
e. Notify to CEC, CIC, Head of the Departments and the vessels moving into, through and inside the port. Keep CIC informed of all the messages received by telephone, VHF sets or by messenger.	• CEC • CIC • HOD
f. Notify the other Authorities and stakeholders within Port as per instructions of CEC/CIC.	• Navy • Coastguard • Stakeholders
g. Inform the Senior Marine Engineer/Marine Engineer of any buoys or crafts or any Port installation is seen adrift.	• Senior Marine Engineer • Marine Engineer
h. Hoist signals or raise alarms, as per the warnings received by the competent agencies for issuing warnings. (for warning signals refer section 9.2.3)	

2. Tidal observatory

Response Action	Contact
a. The Gauge Clerk will record the range of tide, time and heights of high and low water and will report to who in turn will apprise the GM (Marine) and the Dy. Dock Master of the actual and predicted tides.	• Senior Hydrographic Surveyor

3. The Master of the Vessel (Alternate: Chief Officer)

Response Action	Contact
a. Should raise ships emergency alarm and activate ship board emergency action plan.	
b. Having raised the alarm, the Master will be responsible for taking all immediate steps to safeguard ship.	
c. The Master will provide the Port Authority with details of the vessel.	• Port Control Room
d. Should follow the instruction of the CIC/SIC and be in	• CIC

continuous liaise with the CIC/SIC/Port Control Room.	• SIC • Port Control Room
e. Should be in a state of readiness to take the vessel out of the port.	

4. The terminal personnel/berth operator should

Response Action	Contact
a. Activate EAP and inform Port and be in a state of readiness to move out all types of cargo, equipment and vehicles (mobile cranes) outside the port area.	• Port Control Room
b. Shall be responsible of shutting down of cargo operation (as per SOP and/ contingency plan) & coordinate with Port and Master of the Vessel and rendering necessary assistance to the SIC and vessel by providing emergency equipment as required.	
c. Submit consolidated list of dangerous goods in port and Vessels in port. Make arrangements to protect cargo.	
d. Assist IRT and provide all necessary equipment.	• SIC
e. He will direct operation staff. Coordinate with the ship in-charge/C&F agents/stevedores.	

Note: *It is important to understand that movable objects and structures which may float as a result of high-water levels will tend to generate flotsam and move with the current during the flooding and ebb situation of tsunami. This normally results in floating debris in large swaths causing structural, environmental and living beings damages.*
As a lifesaving measure multi-storey building higher than 45ft are considered as safe zones in coastal areas.

5. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. Activate the DMP.	
b. He will be stationed at EOC to review & assess possible developments to determine the necessary course of action.	
c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Consult with Chairman / Dy. Chairman and decide on clearing of ships as soon as the tsunami is confirmed.	
f. Plan movements of vessels such that the vessels are cleared in shortest possible time.	

g. Coordinate with external agencies/authorities such as Indian Navy and Coastguard.	• Indian Navy • Coastguard
h. Be in constant touch with District and Local Administration for rescue and relief operation.	
i. Terminate the response and debrief before allowing normal operation.	

6. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall proceed to the signal station and communicate & collect all information.	Asst. Dock Master
		Take over the charge and ensure the action plan is promulgated as per the instructions of CIC.	
		Inform ships alongside berths to double up their moorings, provide shore gang assistance and ask Masters to keep their ships ready to proceed to safe area at short notice as per the instruction of CIC.	
		He will keep close liaison will INCOIS, Radar Station, Police Wireless Station, Coast Guard HQ, and Ships in Port in regard to the likely weather conditions in the near further.	
		Ensure port control, hoists appropriate signal as per the situation.	
		Report the situation to the CIC & the CMG.	
		Keep rescue team ready with rubber boats, Life jackets etc.	
		Ensure that the hazardous cargoes are shifted out or secured/stored in a safe manner.	
		Ensure that the operations are brought back to normal after the termination of the emergency procedure.	

Asst. Dock Master	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC/SIC.	Dock Pilot
		Instruct Pilots to secure tugs, crafts and workboats.	
		He will maintain log of events.	
MMOH	Pollution Control Coordinator	Determine the level of contamination of the site as a result of incident.	Dy. MMOH
		Ensure clean- up work during and after the emergency as quick as possible.	
		Coordinate with SIC and WBPCB and agencies.	
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift supervisor
		Liaise with State Fire brigade for any assistance.	
Dy. Commandant-CISF	Security and Evacuation	Shall be responsible for forming a task force and will lead the same.	Asst. Commandant-CISF
		Controls & directs traffic in the area.	
		Shall supervise evacuation of personnel from the port at the time of emergency and moving them to identified tsunami shelters.	
		Responsible for rescue operation.	
Sr. Dy. Manager (Traffic)	Traffic Coordinator	Submits consolidated list of dangerous goods in port area.	Dy. Manager
		Coordinate with the truck contractors.	
		Ensure availability of vehicles and mobilize and dispatch sufficient number of vehicles to the site during emergency.	
Sr. Dy. Manager (Civil)	Civil Coordinator	Ensure all the drains and obstructions in the creeks/ culverts are cleaned for easy discharge of sludge water.	Dy. Manager
Sr. Dy. Manager (Engg.)	E & M Coordinator	Shall ensure the standard procedure has been followed and complied with by all the divisions.	Dy. Manager

		All types of cranes, forklifts, heavy earth moving equipment to be secured in a safe manner.	
		Shall form and head mitigation Team comprising of Senior Electrical, Mechanical and Maintenance Engineers.	
		Shall be responsible for alternate electrical supply to vital equipment and systems.	
		All Sub Stations, Power Control rooms will be manned as per the requirement.	
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first aid team with ambulance as required.	Alternate Officer
Senior Hydrographic Surveyor	Hydrographic Survey	Assist SIC.	Pilot
Duty Pilot	In-Charge of Pilotage	Shall be ready on site for taking the ship out of berth or will not bring the ship to berth as per the instruction given by CIC/SIC.	Standby Pilot
		Inform the Masters of all vessels at the berths to double the moorings and to keep engine ready to proceed out to sea if situation warrants.	
		Decision regarding moving ships to the anchorage will be taken depending on the strength of the tsunami likely to be encountered and number of vessels in the Port.	
		Take all necessary steps for the safety of the Port crafts.	
		Ensure all other crafts are placed at safe place and properly secured excepting one pilot launch and one stand by launch used for inspection and emergency duties.	
		Fender and extra lengths of ropes/wires will be kept ready so as to attend to any craft whose moorings may part.	

Master Floating Craft		Masters will shift their respective crafts at suitable places as directed by the SIC and will secure them suitably with additional moorings.	
		Masters of respective crafts will be responsible for proper securing and safety.	
		Masters will keep the engines of their crafts ready to proceed at short notice as per the instructions of the Operation In-charge.	
		Extra fenders will be kept ready on board the Tug for use as required.	
		Engine room entrance doors, sky lights etc. of all the floating crafts to be kept shut.	
		Master shall be in constant touch with Signal Station.	
Material Management		Ensure availability of sufficient stock of stores like Corrugated iron sheets, J.Hooks, screw hinges, gunny bags, tarpaulins, ropes and wires for Port Crafts, diesel oil, kerosene oil, hurricane lantern, kerosene lamps, torch lights with batteries and bulbs, electrical items etc. is kept.	

POST TSUNAMI DUTIES	
Sr. no.	**Duty**
1.	All the Heads of the Departments are required to assess the damage and submit a detailed report indicating the estimate to the Chairman. For this, a team may be formed comprising Officers of Executive Engineer and above in rank at departmental level and may associate one Officer from Finance Department. The preliminary report is to be submitted. The level of restoration and efforts required to clear the area of debris, carcasses and damaged equipment will depend on the level of disaster.
2.	Hydrographic survey to be conducted to assess the channel condition and shipping to resume as early as possible.
3.	In case of any small craft sunk or grounded, the same to be removed to make the channel/ berth safe for navigation. SIC will detail a salvage party headed by Berthing Master for the purpose.
4.	A team of Officers to be nominated by Secretary to supervise the rescue and relief operation and disposal of carcasses in co-ordination with the local and District Administration.

5.	Mobile medical service, if required, to be provided by Medical Superintendent. Preventive measures for epidemics to be taken.
6.	All the operating systems to be attended urgently and made operational as early as possible on war footing basis to resume operation.
7.	Spot tendering procedure can be followed for repairs in emergency.
8.	Water supply and electricity to be given priority. The Sr. Dy. Manager shall be authorized to extend all assistance for manpower, conveyance, equipment and materials etc. to Electricity Board, if required, for resuming power supply. The electrical cabling network to be checked area wise.
9.	All the damaged temporary roofed warehouses are to be repaired.
10.	The Sr. Dy. Manager (Materials) will nominate a team of Officers and staff for procurement and supply of essential materials for repair of various structures and equipment as reported.
11.	To assess the progress of repair works, HOD meeting will be held daily till normalcy is restored.
12.	Damage to furniture, building fixtures may be prepared.

S19: Scenario 19
Part A:

1. **Natural Disaster (Earthquake)**
   Note: *As there are no warning signals for major earthquake the action plan will be for the aftermath of the emergency.*

2. **Precautions:** Earthquake resilient buildings, equipment (cranes, conveyors systems), loading arms, pipeline infrastructure (as per relevant standards), Periodic inspection of old structures, pipelines and their support structures etc.

3. **Impact Zone:** Entire port**.**
   Note: *The Haldia Dock Complex falls under Seismic zone category III (MSK scale VII) as per the vulnerability hazard map of the West Bengal.*

4. **Resources required:** Refer Figure S19.2 and **Appendix B**.

Figure S19.1: Action Flow Chart

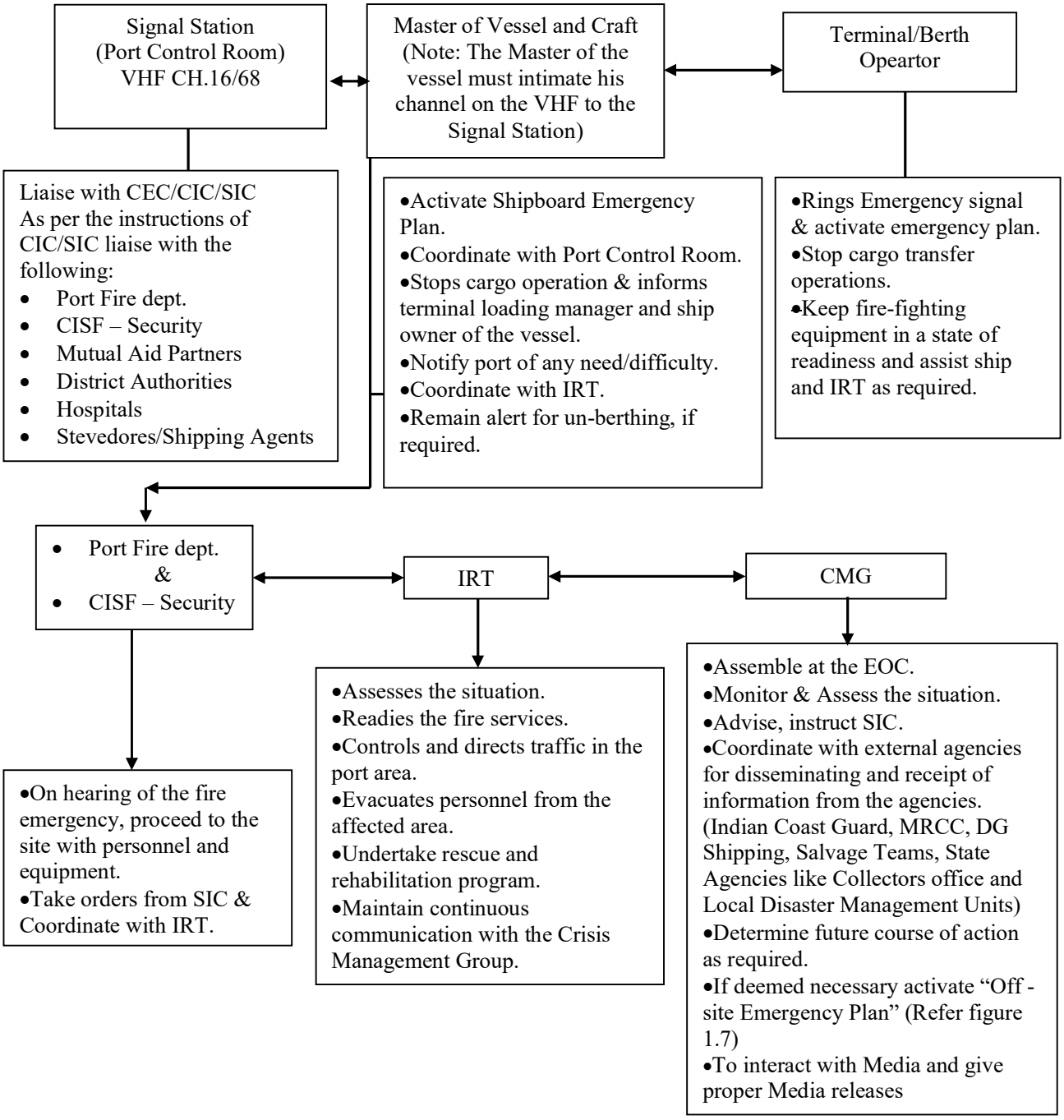
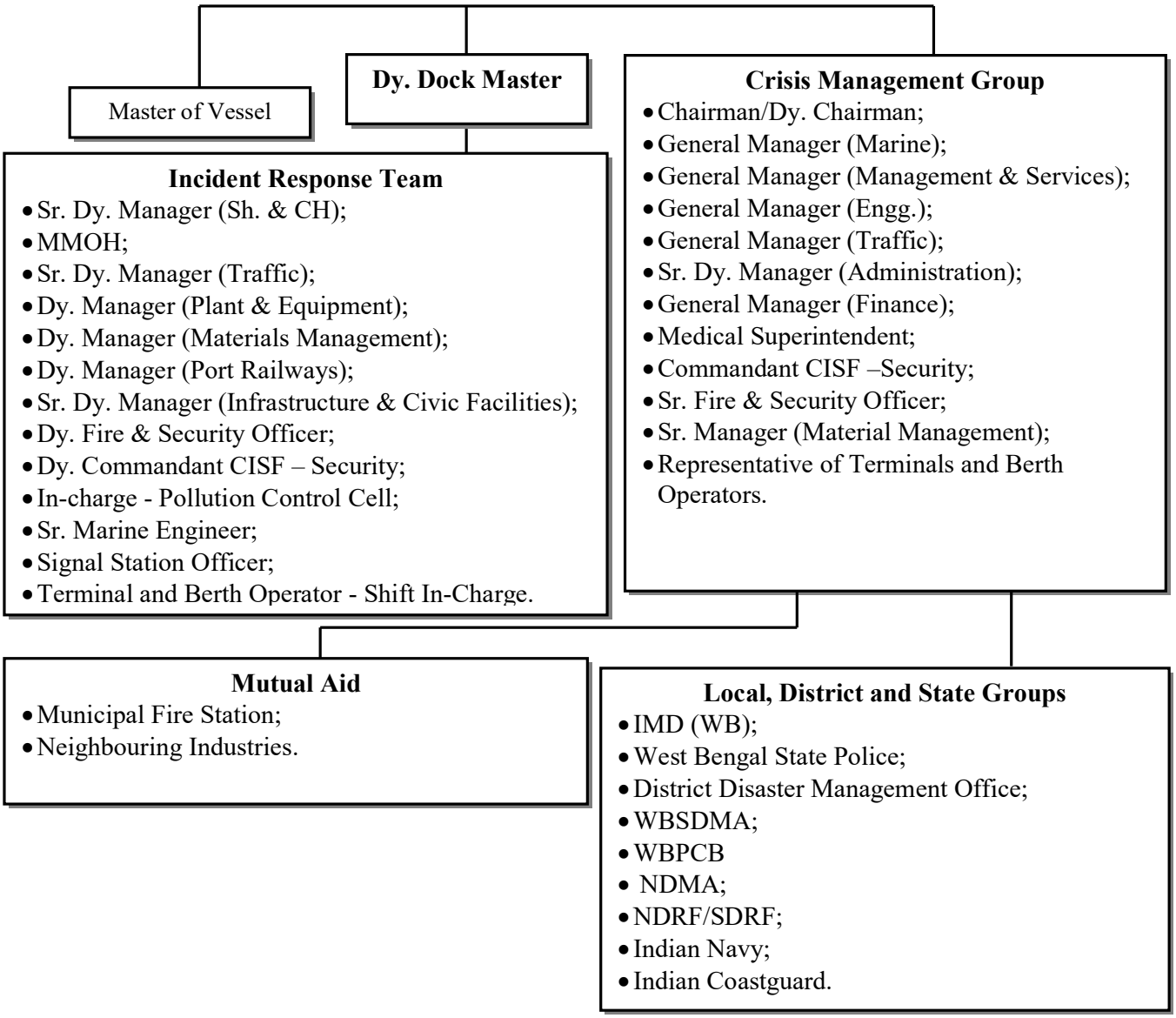


Figure S19.2: Action group



Part B: Action Plan

1. The Port Control Room

Response Action	Contact
a. Gather information related to the vessel type and position in the port limit.	
b. Liaise with Master of the Vessel/Pilot.	
c. Ensure that telephones, one VHF and one walkie-talkie all are operational in the Port control centre. Listening watch to be maintained on VHF channel 16/68.	
d. Notify to CIC, SIC and the vessels moving into, through and inside the port. Keep CIC/SIC informed of all the messages received by telephone, VHF sets or by messenger.	• CIC • SIC
e. Notify the other Authorities and stakeholders within Port as per instructions of CIC/SIC.	• Navy • Coastguard • Stakeholders
f. Notify the information to the owner of the vessel as per the instruction of CIC/SIC/ Master of the Vessel. Pass the information to various Port departments and other Port related organizations through telephones and VHF.	

2. The Master of the Vessel (Alternate: Chief Officer)

Response Action	Contact
a. Should raise ships emergency alarm and activate ship board emergency action plan.	
b. Having raised the alarm, the Master will be responsible for taking all immediate steps to safeguard his ship.	
c. The Master will provide the Port Authority with details of the vessel.	• Port Control Room
d. Should follow the instruction of the CIC/SIC and be in continuous liaise with the CIC/SIC/Port Control Room.	• CIC • SIC • Port Control Room
e. Should be in a state of readiness to take the vessel out of the port, if required.	

3. The terminal personnel/berth operator should

Response Action	Contact
a. Activate EAP and inform Port.	• Port Control Room
b. Shall be responsible of shutting down of cargo operation (as per SOP and/ contingency plan) & coordinate with Port and Master of the Vessel and rendering necessary assistance to the SIC and vessel by providing emergency equipment as required.	

c. Submit consolidated list of dangerous goods in port and Vessels in port. Make arrangements to protect cargo.	
d. Assist IRT and provide all necessary equipment.	• SIC
e. He will direct operation staff. Coordinate with the ship in-charge/C&F agents/stevedores.	

4. General Manager – Marine operation (Alternate: Dy. Dock Master)

Response Action	Contact
a. Activate the DMP and OSCP (if any pollution).	
b. He will be stationed at EOC to review & assess the damage and determine the necessary course of action.	
c. Give instructions to SIC and Port Control Room & arrange for external aid as necessary.	• SIC • Port Control Room
d. Review the situation and accordingly inform to the Chairman/ Dy. Chairman.	• Chairman • Dy. Chairman
e. Consult with Chairman / Dy. Chairman and decide on clearing of ships.	
f. Be in constant touch with District and Local Administration for rescue and relief operation.	

5. Duties of IRT

Designated Officer	Role	Duties	Alternate Officer
Dy. Dock Master	Site Incident Controller	During Emergency shall communicate & collect all information.	Asst. Dock Master
		Take over the charge of control centre and ensure the action plan is promulgated as per the instructions of CIC.	
		Ensure that the operations are brought back to normal after the termination of the emergency procedure.	
Asst. Dock Master	Port Control Room Coordinator	Shall monitor the communication on VHF/any other communication medium & convey and relay messages on the advice from CIC/SIC.	Dock Pilot
		He will maintain log of events.	
MMOH	Pollution Control Coordinator	Determine the level of contamination of the site as a result of incident.	Dy. MMOH

		Ensure clean- up work during and after the emergency as quick as possible.	
		Coordinate with SIC and WBPCB and agencies.	
Dy. Fire Officer	Fire, Search and Rescue Coordinator	Shall take orders from the SIC.	Shift supervisor
		Responsible for mobilizing fire tenders, men & fire-fighting equipment to the scene & extend all necessary support after the earthquake.	
		Liaise with State Fire brigade for any assistance.	
Dy. Commandant-CISF	Security and Evacuation	Controls & directs traffic in the area.	Asst. Commandant-CISF
		Shall search and rescue operations of the personnel trapped under the debris. A special task force can be formed for the same. Shifting of the injured and casualties to hospital.	
		Till normality is restored, arrangement will be made for thorough checks on all out-going vehicles to guard against pilferage.	
Sr. Dy. Manager (Traffic)	Traffic Coordinator	Coordinate with the truck contractors.	Dy. Manager
		Ensure availability of vehicles and mobilize and dispatch sufficient number of vehicles to the site during emergency.	
Sr. Dy. Manager (Civil)	Civil Coordinator	Assist SIC/CIC and CISF after an earthquake emergency.	Dy. Manager
		Deploy engineers to direct or guide earth moving equipment and cranes to remove debris.	
Sr. Dy. Manager (Engg.)	E & M Coordinator	Shall be responsible for Electrical supply to vital equipment and systems at the berth.	Dy. Manager
		Ensure that all Sub Stations, Power Control rooms will be inspected and made operation.	
Medical Officer	First Aid and Medical Coordinator	Shall be responsible to organize and keep first aid team with ambulance as required.	Alternate Officer

		Mobile medical service, if required, to be provided.	
Duty Pilot	In-Charge of Pilotage	Assist SIC and remain standby till further instructions.	Standby Pilot
Sr. Dy. Manager	Material Management	Ensure availability of sufficient stock of stores like Corrugated iron sheets, J.Hooks, screw hinges, gunny bags, tarpaulins, ropes and wires for Port Crafts, diesel oil, kerosene oil, hurricane lantern, kerosene lamps, torch lights with batteries and bulbs, electrical items etc. is kept.	Alternate Officer
		Will nominate a team of officers and staff for procurement and supply of essential materials for repair of various structures and equipment as reported.	

ADDITIONAL POST-EARTHQUAKE DUTIES	
Sr. no.	**Duty**
1.	All the Heads of the Departments are required to assess the damage and submit a detailed report indicating the estimate to the Chairman. For this, a team may be formed comprising Officers of Executive Engineer and above in rank at departmental level and may associate one Officer from Finance Department. The preliminary report is to be submitted.
2.	A team of Officers to be nominated by Secretary to supervise the rescue and relief operation and disposal of carcasses in co-ordination with the local and District Administration.
3.	All the operating systems to be attended urgently and made operational as early as possible on war footing basis to resume operation.
4.	Spot tendering procedure can be followed for repairs in emergency.
5.	Water supply and electricity to be given priority. The Sr. Dy. Manager shall be authorized to extend all assistance for manpower, conveyance, equipment and materials etc. to Electricity Board, if required, for resuming power supply. The electrical cabling network to be checked area wise.
6.	To assess the progress of repair works, HOD meeting will be held daily till normalcy is restored.

9.4 ACTIVATION OF RESPONSE PLAN

9.4.1 Prevention/Protection action implementation plan

Following is the typical Prevention/Protection action implementation plan.

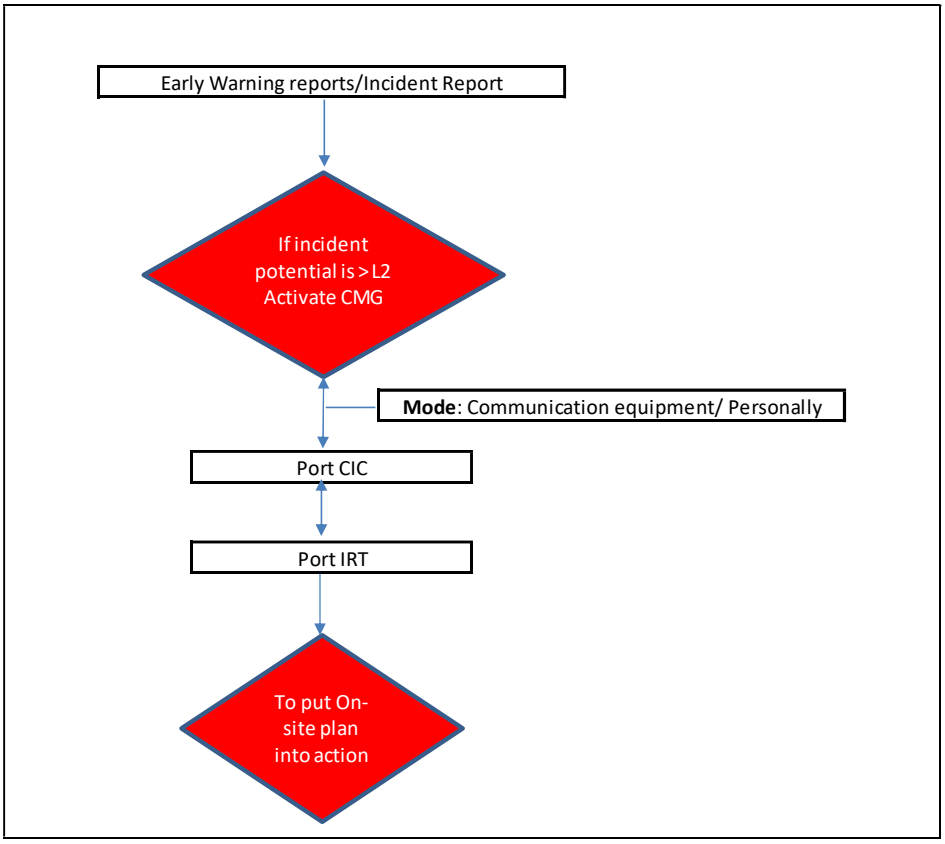


Figure 9.1: Action Implementation Plan

The person who observes the emergency first is called as the First Observer. The First Observer, noticing an unusual occurrence like a fire /gas release /collapse of structure etc., should immediately notify the Signal station/CISF control room/Fire station with available means of communication and also contact the concerned Officer of the area in person.

He would:

1. Raise alarm

2. Call fire station and signal station and pass on following information:

   - Introduce himself
   - State briefly the type of emergency
   - Give the location of the incident.

3. Proceed to a safe place. However, he would return to the location of the incident and place himself in a safe area cross-wind to the wind direction and standby to give assistance if he is part of the action group.

After receiving information from the First Observer, the Signal Station would notify all the key personnel of the Port and also direct the security personnel to activate Siren and will subsequently announce on the available means of Public Address System (say fire jeep which is fitted with PA system) as follows:

- Location of the emergency.
- Type of the emergency.
- Severity of emergency.

After hearing siren or the public announcement, all concerned personnel (identified in the plan) would move to their respective positions and will begin actions as documented in the plan.

SITE CONTROL PROCEDURE			
Site Control should be established for every site where access is to be controlled. This includes the EOC, sites of shoreline cleanup, waste storage, response vessel mooring areas or any site containing hazards or hazardous materials			
Task	**Action**		**Status**
1	Identify perimeter of the "Hot" (secure or prohibited) zone. This may be:		
	i	Oiled shoreline. (Note: This zone should contain all hazards and sensitive areas where access should be restricted).	
	ii	Berth/Jetty area	
	iii	Area around the incident (e.g. Fire and Explosion).	
	iv	EOC	
2	Identify the "Hot" zone perimeter by sign-posting or establishing a cordon.		
3	Identify the "Warm" (exclusion, controlled or support) zone. (Note: This is a non-contaminated/ non-hazardous zone). For e.g.:		
	i	Shelter, canteen, car park etc.	
	ii	Any water area established to exclude non-response vessels.	
4	Identify the "Warm" zone perimeter by sign-posting or establishing a cordon.		
5	Establish any required "Hot" zone perimeter facilities. For example (i) and (ii) this may include:		
	i	Decontamination facility.	
	ii	Temporary waste storage.	
6	Establish "Warm" zone perimeter facilities. Generally this is site security.		
7	Establish support facilities within Warm zone as required		

Table 9.5: Site Control Procedure

Note 1 Entry to a Hot Zone should be restricted to:

- Personnel involved in the on-site work.

- Personnel equipped with appropriate protective gear.
- Personnel who have undergone correct training and induction.

Note 2 The Warm Zone surrounds the Hot Zone and is the zone and is generally:

- The area from which personnel and equipment are deployed.
- The perimeter where site control is exercised i.e. the entry points to the Hot Zone.
- Restricted to those people who operate in the Hot Zone and those who support them.

Note 3 The Cold Zone is all public or otherwise unrestricted areas, i.e. those areas outside of the controlled site.

PLANNING MEETING SCHEDULE & PREPARATION OF THE INCIDENT ACTION PLAN (IAP)						
Phase/ Task				**Action**	**Responsibility**	**Check**
Meeting	1			Briefing on situation.	CIC or others as nominated.	
		a		Current situation		
			i	Type and cause of incident		
			ii	Incident time and location		
			iii	Impact zone		
			iv	Resources mobilized		
		b		Predicted situation		
			i	Trajectory/Dispersion		
			ii	Resources and zones at potential risk		
	2			State Aim of Response.		
	3			Develop and rank response objectives based on protection priorities.	CIC	
	4			Develop Strategies and Tactics.	CIC and all Coordinators	
	5			Identify necessity for obtaining any permit (e.g. dispersant use).	CIC	
	6			Prepare Draft Incident Action Plan.	CIC	
	7			Determine need and location of Advanced Operations Centres or Staging Areas.	CIC and all Coordinators	
	8			Approve and Document IAP.	CIC	

Table 9.6: Planning, Meeting, Schedule & Preparation of Incident Action Plan (IAP)

Note: *Process to be repeated throughout the response as scenario, objectives, strategies or tactics change.*

9.4.2 Mechanism for access control and isolation of the Danger area

1. All gates and jetties should be guarded,
2. Unauthorized person should not be allowed to the restricted area,
3. Authorized person will be entering the zone with all the necessary PPEs,
4. The area should be cordoned off during operation,

5. Proper signage board and warning should be displayed at the place of the operation,
6. Fire-fighting facilities and other required resources should be available till the operation is terminated,
7. The restricted areas should be under surveillance at all times.

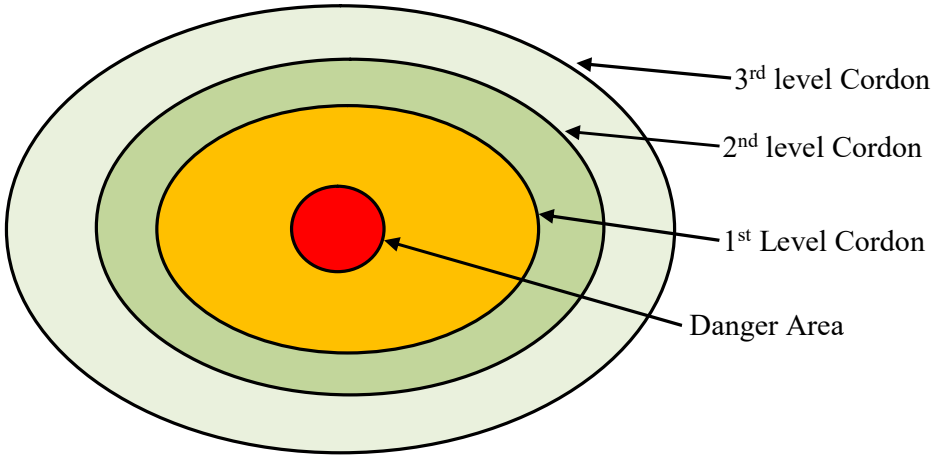


Figure 9.2: Isolation of Danger Area

- Danger/Hazardous area
- 1st Level Cordon off
- 2nd Level Cordon off
  - Site Control point
  - Ambulance
  - Casualty Clearing point
- 3rd Level Cordon off
  - Traffic Control

Note: *Positions will depend on the wind directions*

9.4.3 Search and rescue operation

Search and Rescue shall start as soon as the public warning signal has been issued and should be carried out as per the instructions of CIC/SIC.

9.4.4 Evacuation

On blast of Disaster warning siren, the personnel will assemble at the respective assembly points to be transported to the refuge centers.

9.4.4.1 Evacuation Routes

In case of a general emergency one of the first duties of the CIC is to alert outside authorities and advise them about the actions that should be taken to protect the public, if any. The most significant risk affecting the local population is that of a toxic materials release.

The evacuation route could be by two ways

a. Land
b. Sea

The evacuation route at HDC are as follows

Sr. no.	Incident	Evacuation routes
1.	**Natural Calamities**	Assemble near assembly points to proceed to the Relief Centres or to other shelters (Coordinated by CISF-Security)
2.	**Toxic gas Release**	The route decision will be determined depending upon the wind direction at the time of the incident. It will be in the up-wind direction of the outflow source direction. (Coordinated by Port Fire dept. and CISF-Security)
3.	**Fire at Oil Jetty 1, 2**	Assemble at the fire station to proceed out from Gate as directed (Coordinated by Port Fire dept. & CISF-Security)
4.	**Fire at Oil Jetty 3**	Assemble near to Control room to proceed out as directed (Coordinated by Port Fire dept. & CISF-Security)
5.	**Fire at General Cargo berth**	Assemble at the Assembly points near to berth (Coordinated by Port Fire dept. & CISF-Security)

Table 9.7: Evacuation routes

1. The vehicle-carrying casualty should be given the first priority in traffic movement.
2. While assessing the evacuation route, constant communication link should be maintained with the EOC as well as with the individual assembly point station from where the evacuation is to be undertaken.

9.4.5 Evacuation Shelters

In the event of an impending disaster the affected population would have to be transported to intermediate temporary shelter. The temporary shelters identified for Port are canteen, community halls, located at Port Area.
Dy. Manager (P&IR) will make necessary arrangement in coordination with the local administration for evacuating people from the low-lying area. They will be shifted to Centers as identified local administration:

Administration department shall ensure adequate quantity of water supply at all the temporary evacuation centres.
Medical Superintendent shall ensure that necessary medicine and medical assistance at the temporary evacuation centres is available.
Administration department shall take care of the requirement for food for the evacuees in the temporary evacuation centres. For supply of food packets, etc., they shall immediately contact the agencies of the area.

9.4.6 Transportation

9.4.6.1 Vehicle Pool

All vehicles whether it is of Port or hired should be parked in the location as decided by Dy. Manager-Administration Department HDC for immediate use as soon as the people move into action. Refer **Appendix C** for list of vehicles.

9.4.6.2 Contact with Railways & State Road Transport Corporation

Deputy Manager (Admin) to ensure smooth movement of workers/employees for which he may get in touch with the Station Master Haldia/state transport department and apprise him about the situation so that the movement of staff moves efficiently.

9.4.7 Generator Sets

Wherever generator sets are required, P&E department shall be contacted, who shall immediately hire/procure or provide from whatever sources.

9.4.8 Decontamination

Additional issues in relation to decontamination of the public may arise at some hazardous materials incidents. Decontamination in this context refers to a range of procedures employed to remove hazardous materials from people and equipment.

9.4.9 Medical Facilities

Depending on the nature of the emergency, it may be necessary to alert medical facilities within and outside the port.

Medical facilities likely to be used will need to be informed

- The nature and location of the emergency,
- The likelihood or number of casualties,
- Whether medical staff are required at the location of the emergency,
- Actual details of the casualties, including the names, as soon as these are known.

9.4.9.1 First Aid Centers

First Aid treatments provided at the port First Aid Centers. The Port/hired ambulance, can be used for taking the person to the hospital. Refer **Appendix C**.

9.5 LOGISTICS/SERVICE DELIVERY MECHANISM

The required/necessary equipment and assistance during various types of emergencies can be requested from the Local Industry crisis groups, District crisis group, MoU signed with Industry association operating in port. Additional resources available for disaster relief with the various departments in the Purba Medinipur District can be found from IDRN (https://idrn.nidm.gov.in/).

10. RECOVERY AND RECONSTRUCTION

10.1 RESPONSIBILITY FOR TERMINATING THE RESPONSE

The decision to terminate a response is taken by the CIC in consultation with the Chairman/Dy. Chairman.

10.2 CONDITIONS FOR TERMINATION

10.2.1 In the case of Natural Disasters Response action can also be terminated as per the information received from the "Competent early warnings agencies e.g. IMD" (Refer 9.2.3)**.**

10.2.2 Fire Extinguishing operation should be terminated when:

- Fire has been completely extinguished,
- Area has been declared as "Risk or Hazardous or Smoke' free area.

10.2.3 Marine Response Operations in case of oil spill should be terminated when:

- Oil has been recovered to the extent practicable; or
- The surface oil slick has broken up; or
- The oil slick has gone out to sea and is beyond the range of response options, and is unlikely to return; or
- Oil has impacted shorelines and is no longer on the water.

In the last case marine response resources must remain on standby and equipment maintained at the ready until shoreline response operations have been completed.

10.2.4 Shoreline Response Operations should be terminated when:

- All accessible shorelines are clean to the extent practicable.
- Cleanup is having no further net beneficial effect or having a deleterious effect on the shoreline or associated plants or animals.

Shoreline cleanup operations may be terminated only upon the instruction of the **WBPCB/Coastguard.**

10.2.5 Land Spill Response Operations should be terminated when:

- Chemical has been recovered to the extent possible,
- Area has been declared "Risk or Hazardous" free.
- Source of leakage is stopped and the condition of the area is safe for operation.

Land spill cleanup operations may be terminated only upon the instruction of the **WBPCB.**

10.2.6 Human Induced Disasters response may be terminated when:

a. War and terrorism threats are evaluated by the security agencies and as such the response will be terminated gradually in stages as per the input received from them.
b. Bomb threat related response will be terminated on case to case to basis as per instructions from district and state authorities.

10.3 STAND-DOWN PROCEDURES

10.3.1 Return of Equipment

Upon completion of the response, the SIC (or delegate) will:

- Arrange recovery of all equipment, and unused materials.
- Ensure that all equipment is cleaned.
- Ensure that all equipment is returned to the owner.

10.3.2 Debrief

The SIC may hold a post-incident debriefing. Debriefing should address:

- Spill causes (if known) and future prevention methods.
- Speed of response activation.
- Effectiveness or suitability of strategies, tactics and equipment.
- Health and Safety issues (if any).
- Any other issues required to be communicated.
- Damage in terms of life, injury and loss of property should be assessed.

10.3.3 Incident Report

The Chairman/Dy. Chairman and relevant authority may request the preparation of an Incident Report. This should follow the debrief outline or other format.

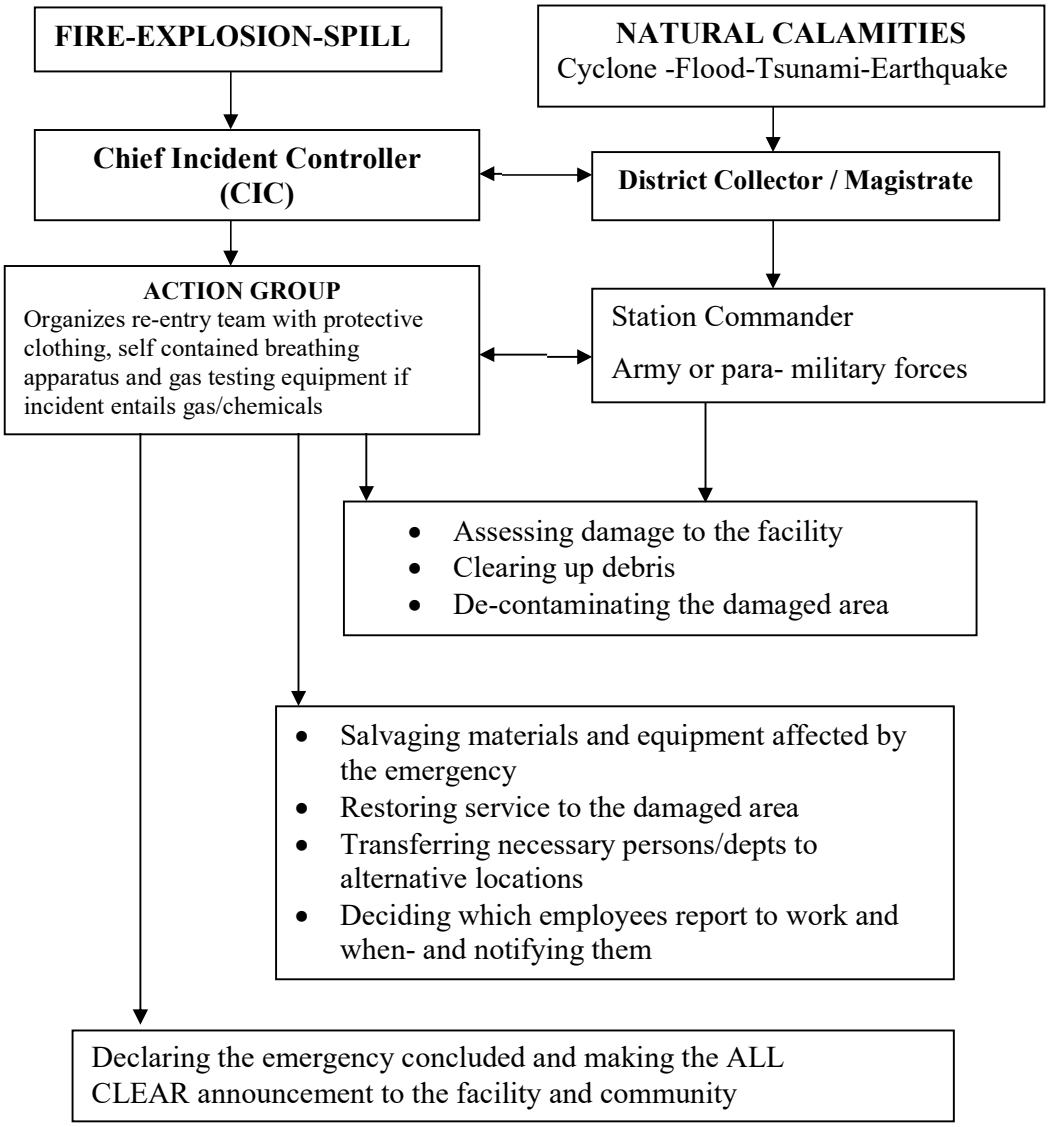


Figure 10.1: DE-ACTIVATION OF THE PLAN-RECOVERY-RESTORATION

Note: *For natural calamities at the District level-the District collector or District magistrate will make the necessary initiative through the paramilitary group. The Port Chairman or CIC may also request para military personnel to assist when the accidents have originated at the port premises.*

10.3.4 Cost recovery

1. All records of costs must be collated for submission to the relevant insurer.
2. For expenses incurred assisting third parties, costs should be kept and submitted to relevant authority.

10.4 DAMAGE, LOSS AND NEED ASSESSMENT

10.4.1 Initial Damage Assessments

Following any major disaster, rapid assessment of damage is important for restoring the facilities, resuming Port operations and cost recovery. In certain cases e.g. terrorism and security related, thorough site or damage assessment is not possible immediately after an event. Access to, and assessment of Port facilities and its

contents may be delayed for a period of time. The delays may be due to possible loss of structural integrity, necessary forensic investigation, or the existence or potential existence of toxic or hazardous materials.

Immediately following a disaster and as soon as it is safe to do so, the CISF or other designated team shall conduct a preliminary damage and environmental assessment by conducting a drive-through of all Port facilities.

10.4.2 Secondary Damage Assessments/Temporary Repairs

Once the affected site is approved for entry, a Damage Assessment Team assembled by the Engineering Department will conduct a more thorough assessment of damage to facilities and utilities. This assessment will focus on those assets needed to facilitate a rapid recovery such as electric power, communications and transportation. The assessment should also identify any potential environmental issues that require immediate attention. Damage should be noted in enough detail to allow it to be communicated to begin developing action plans for recovery. Local utility companies need to be contacted at this time for anticipated schedules for restoration of critical utility services.

10.4.3 Assessment of Damage to Navigational Channel

The assessment of damage to the Navigation Channel is under the jurisdiction of the Indian Navy and Hydrographic department of Survey of India. Assessment of damage to the berthing area portion of the channel is under the jurisdiction of the port. Assessment of damage to Aids to Navigation is under the jurisdiction of the Port. The Dy. Dock Master or Hydrographic Surveyor will provide status report of the condition of the channel to the GM (Marine).

10.4.4 Potential loss estimates analyzed include

- Physical damage to buildings, critical facilities, and infrastructure.
- Economic loss, business interruptions, repair and reconstruction costs.
- Social impacts, including estimates of shelter requirements, displaced households, and population exposed to scenario floods, earthquakes and cyclone Short Term Reconstruction.
- The decision to rehabilitate or abandon port structures depends on the extent of damage, importance of the structure, and limits on its use. Aspects of an inspection may include:
  - An underwater inspection by divers to check for possible demolition damage or deterioration of footings.
  - An inspection of the piling at low water from a boat to check for decay, borer attack, or other damage. The stringers and deck are examined from below to determine the need for repair.
  - Lock Gate, Berths/Jetties, or seawalls are inspected for damage. If breached, such structures are repaired to avoid scour and further damage.
- Assessment of facilities by civil engineers and surveyors to ensure compliance with local building and architectural codes and to ensure that damaged or repaired buildings are safe for occupancy.

In the event of a terrorist act at the port, reconstruction planning should also take into account the interests of security representative, and the need to collect evidence.

10.5 RECOVERY PLANNING

10.5.1 Short-term recovery planning

Short-term recovery planning runs parallel to short term response, and begins during and immediately after an incident

10.5.2 Medium-term recovery planning

In the medium-term recovery planning, port will engage in contracting and setting up for large scale reconstruction and reconstitution operations. This may include financial planning, contracting, and the formation of joint venture agreements to assist in long-term business continuity.

Initial reconstruction of damaged or destroyed facilities begins, as structural and civil engineers rehabilitate existing port structures. They use appropriate methods of lightering and port construction to handle cargo.

The reconstruction activities which may require an Environmental Impact Assessment are as follows:

a. Debris Removal
b. Emergency Protective Measures
c. Repair to Pre-Disaster Condition
d. Modification, Expansion, and Mitigation Projects
e. New Construction and Ground Disturbance

Sr. no. (d) Above has been included so as to undertake proactive mitigation steps as part of **"Build-Back-Better"** of the Sendai Framework.

10.5.3 Long-term recovery planning

In the event that a part of the entirety of a port becomes unusable or requires rebuilding, the long-term reconstruction considerations will be taken by Ministry of Port, shipping and Waterways taking into account the financial planning and resources that may be involved in the process. This may include budgetary support.

10.6 RE-OPENING OF BERTHS TO VESSELS

After the channel to the Port has been re-opened and the Port infrastructure is found to be restored and in good condition, the Port will be in a position to begin accepting request for berthing. This will require coordination between the Port, ship pilots, customers, tenants and private terminals.
Areas of consideration for prioritizing the calling vessels include:

- Available depth in the channel/draft of vessel;
- Condition of facilities to receive the vessel;
- Availability of labor to offload/load cargo;
- Is vessel carrying a critical feedstock for area manufacturing?
- Is vessel carrying commodities that can be used in recovery?

10.7 RAIL-WAGON DELIVERIES

After the Port has found the rail infrastructure in good condition, the Port will be in a position to begin accepting rail wagon deliveries. This will again require coordination between the Port, rail authority, and terminals.

11. BUDGETARY PROVISIONS

11.1 BUDGETING AND FINANCIAL ARRANGEMENTS

11.1.1 DM Budget

The port will assign sufficient funds from its revenue reserves towards disaster management under following broad categories

i. DRR measures (Structural and Non-structural):

- Fire-Fighting and Oil Spill Response Equipment;
- Purchase of Tugs, Navigational aids;
- Training of Personnel;
- Risk Transfer – Insurance;
- Civil works – lock gate, sea wall, berth/Jetty-fenders-Repair and maintenance.

ii. Restoration Measures:

- Administrative building damage;
- Power Supply – restore sub stations;
- Damage to tugs – floating craft;
- Damaged buoys- loss of buoys;
- Repair of damaged roads;
- Injury & infection-medical treatment;
- Flooding & stagnant water - clean drains;
- Electrical & Mechanical works;
- Damage to cranes;
- Civil works –lock gate, sea wall, berth/Jetty-fenders-Damage Repair.

11.1.2 Insurance of Port Assets

The Insurance cover for the port assets/properties should be as follows

1. Building, workshop, transit sheds and other structure inside port;
2. VTMS, Navigational aids structures and equipment;
3. Fire-fighting aids;
4. Berths, Docks, Lock gate & Jetties;
5. Port Equipment & Plant & Machineries;
6. Floating craft and others;
7. Railway permanent way, loco shed and locomotives;
8. Electrical Installations.

11.1.3 Loans and other financing

Loans and other financing for DM will be decided based on the contingency and cases will be put up to Ministry of Ports, Shipping and Waterways accordingly by the port.

12. PLAN MANAGEMENT

12.1 DEVELOPMENT, APPROVAL, IMPLEMENTATION, REVIEW AND REVISION

- This plan is developed in accordance with the template issued by Ministry of Ports, Shipping and Waterways and guidelines of NDMP (2019) and structured to suit the port organization. The implementation will be undertaken by the office of the General Manager (Marine) in association with various stakeholders. It is understood that lessons learned from previous near disaster/disaster situations have been studied and cognizance of the after effect of these disasters noted. Understanding of risk and preventive measures has thus been analyzed and mitigation plan prepared. Prioritization of risks has been done in the HRVCA section.
- Plan would be circulated to all stakeholders.
- Regular Drills/exercises would be conducted to test the efficacy of the plan and check the level of preparedness.
- NDRF, SDRF, BARC (for nuclear and radiological emergencies only) and other agencies e.g. civil defense, local govt. departments would be integrated into the plan.
- Review and updating of the plan would be carried out annually as per Disaster Management Act, 2005 Section 37.
- Consequent to any change/modification, the General Manager (Marine) / Dy. Dock Master is responsible for reviewing, updating and maintaining the DMP.

REFERENCES

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3. Disaster Management Act, 2005.
4. National Disaster Management Plan, 2019.
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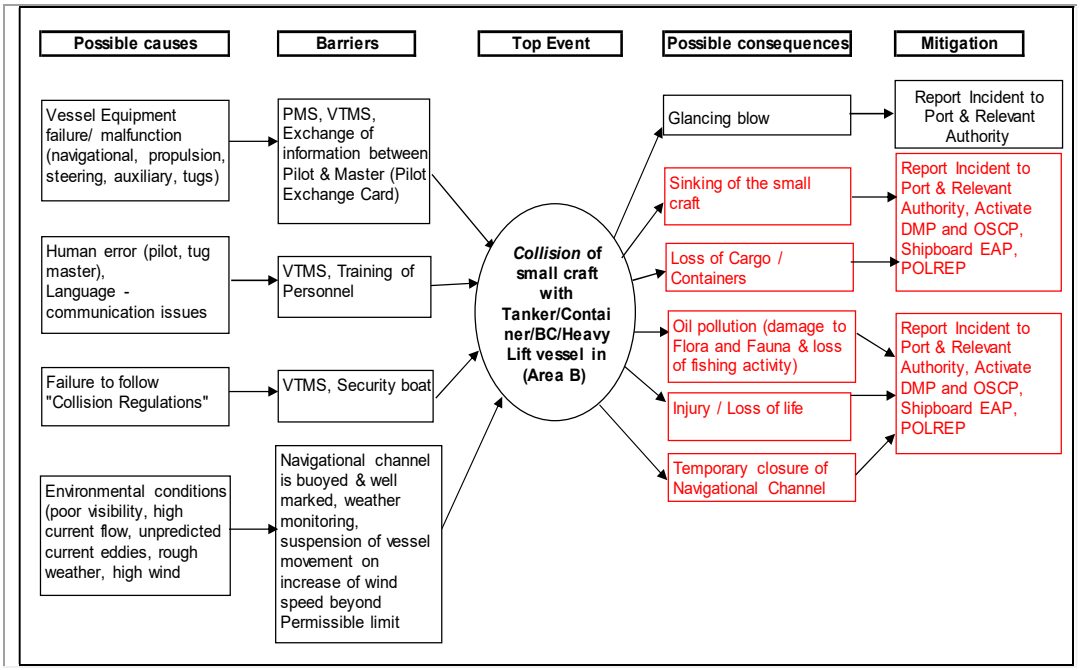
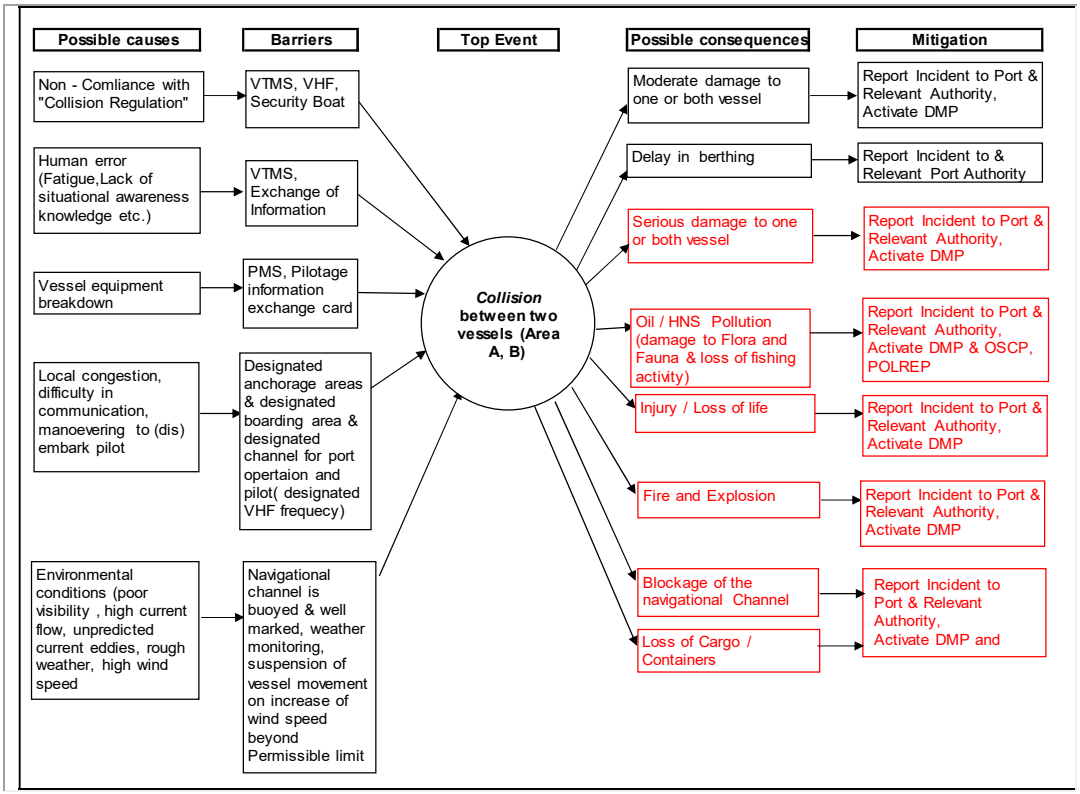
6. PM of India outline- Point agenda for Disaster Risk Reduction.
7. IMO publication 'Revised Recommendations on the Safe Transport of Dangerous Cargoes and related activities in Port Areas', ISBN: 9789280114720, 2007.
8. Bureau of Indian Standards (BIS) 'Hazard identification and risk analysis – Code of practice, IS 15656:2006'.
9. Operational Risk Assessment of Port of London May 2001 by Port of London Authority.
10. IMO publication 'Manual on oil pollution – Section IV – Combating oil spills', 2nd edition, 2005, London, UK.
11. International Safety Guide for Oil Tankers and Terminals (ISGOTT), 5th Edition, London, UK.
12. Vulnerability Atlas of India, BMTPC, 3rd Edition, 2019.
13. Climate of West Bengal, IMD, 2019.
14. Guidelines for Chemical Process Quantitative Risk Analysis, 2nd Edition, Center for Chemical Process Safety (CCPS).
15. PHAST software user manual, DNV-GL, 2021.
16. Loss prevention in the Process Industries, Hazard Identification, Assessment and Control, Volume 3, 2nd Edition. Frank P. Lee.

APPENDIX A: NAVIGATIONAL RISK USING BOW - TIE MODEL

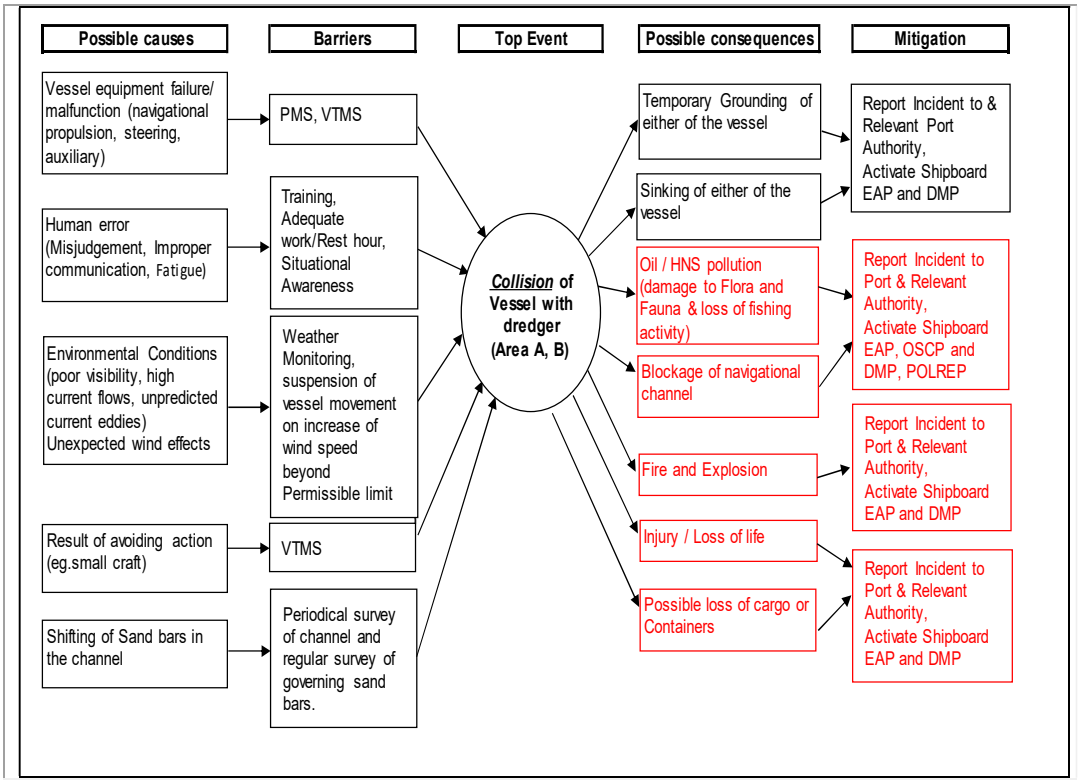
Scenario 1: ***Collision*** of small craft with Tanker/Container/BC/Heavy Lift vessel in (Area B)



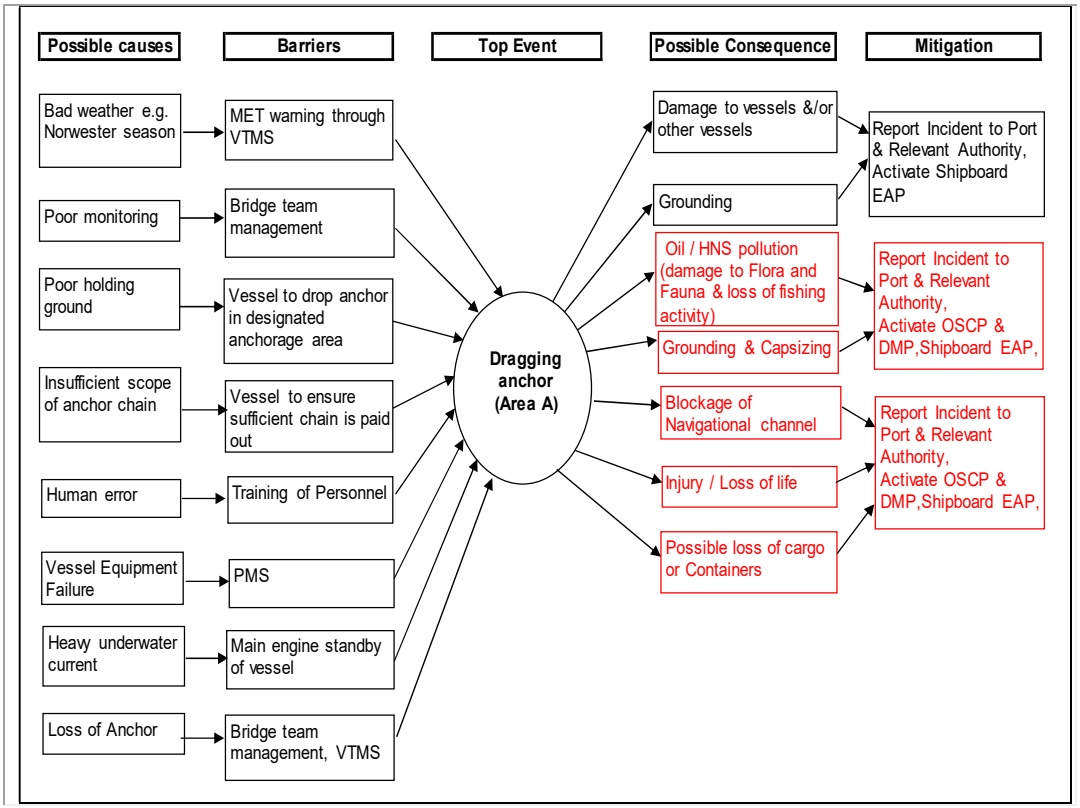
Scenario 2: *Collision* between two vessels (Area A, B)



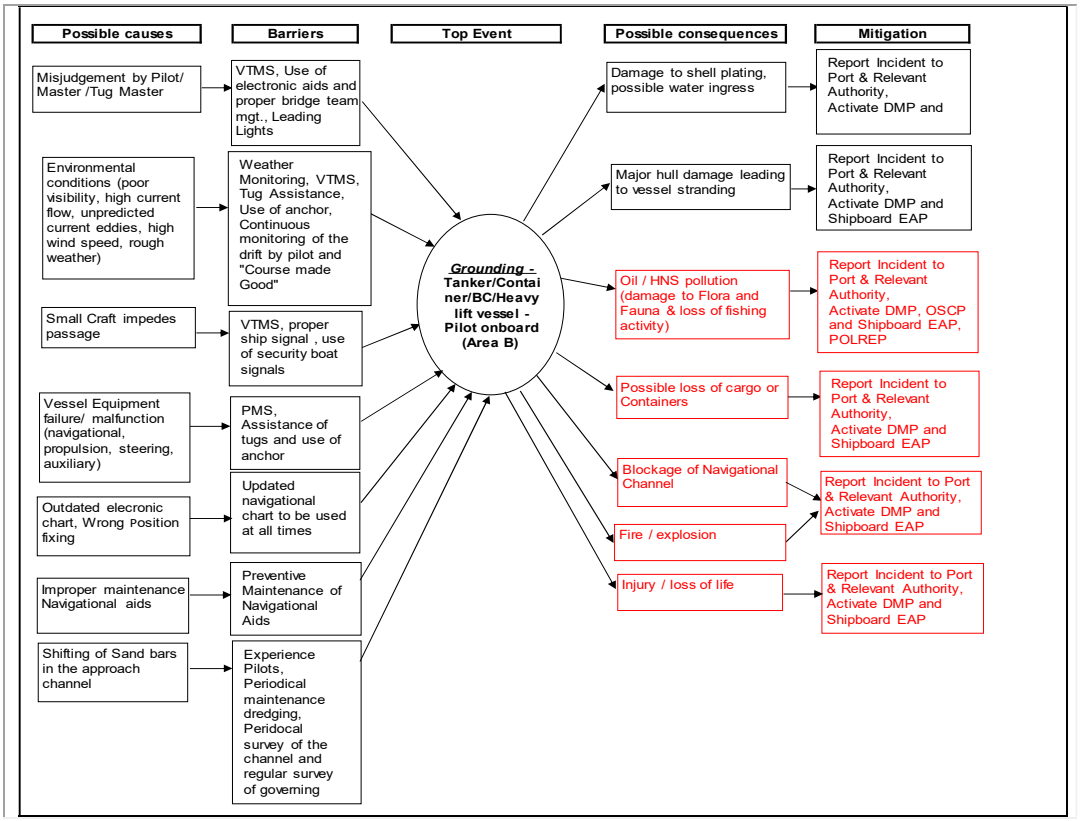
Scenario 3: *Collision* of Vessel with dredger (Area A, B)



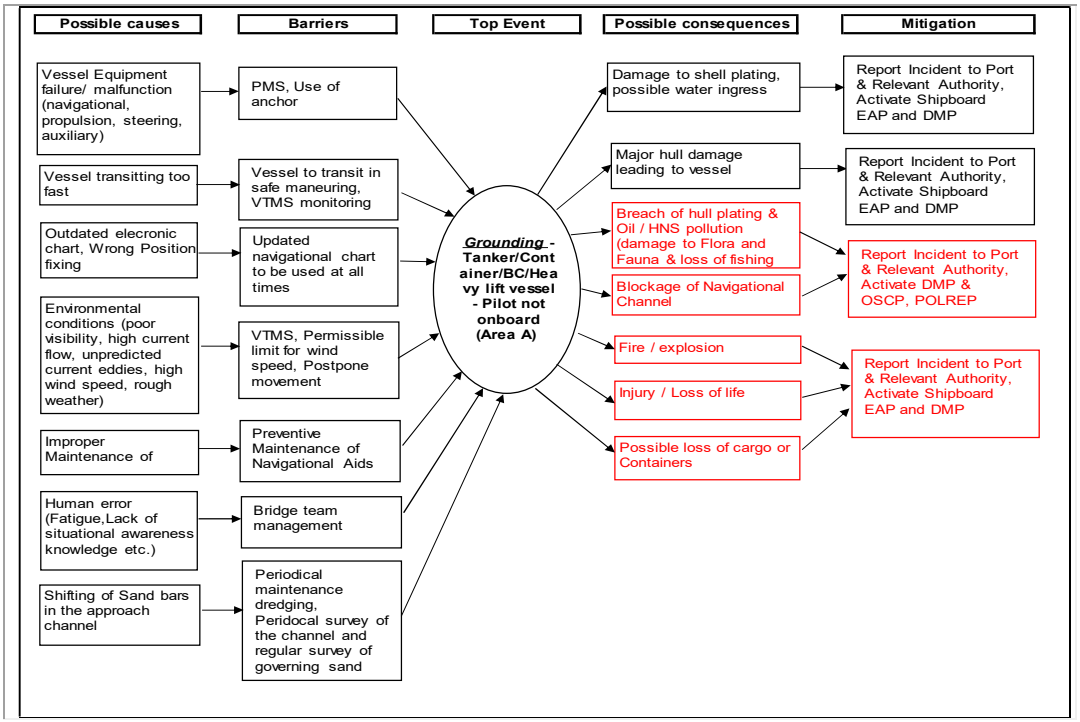
Scenario 4: Dragging anchor (Area A)



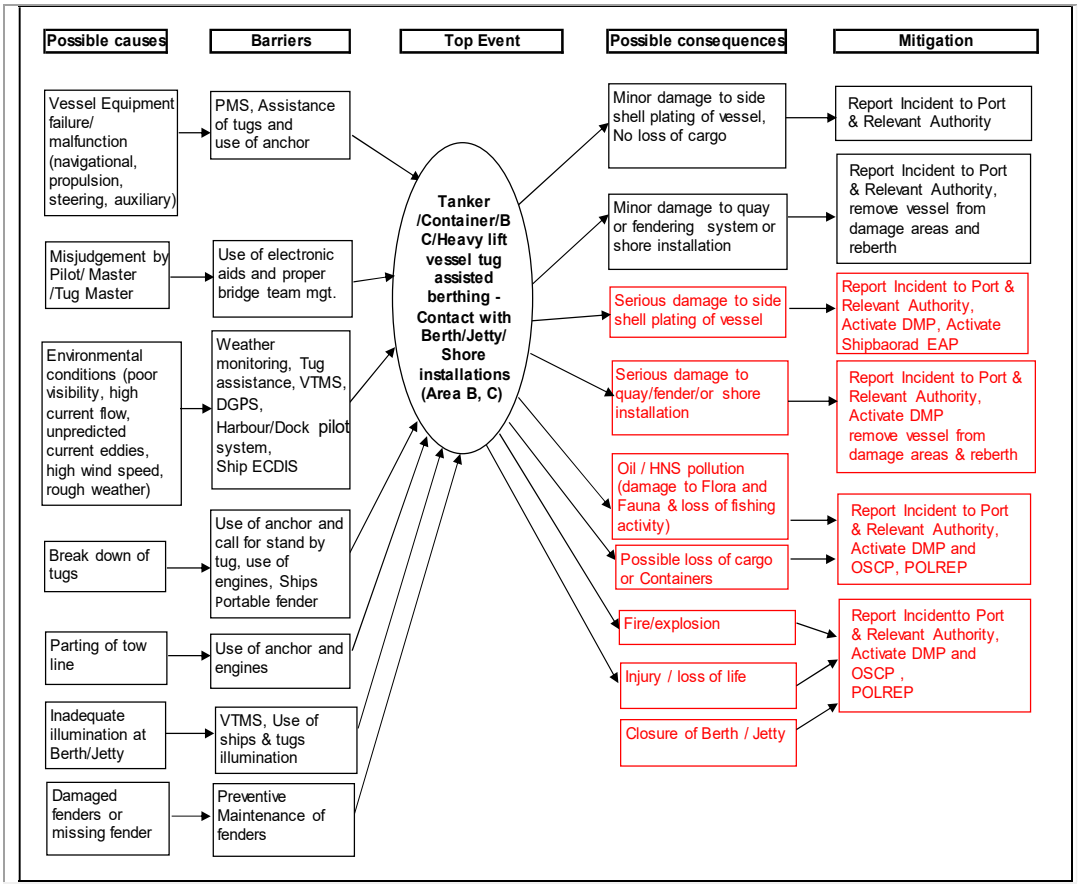
Scenario 5: Grounding- Tanker/Container/BC/Heavy lift vessel - Pilot on board (Area B)



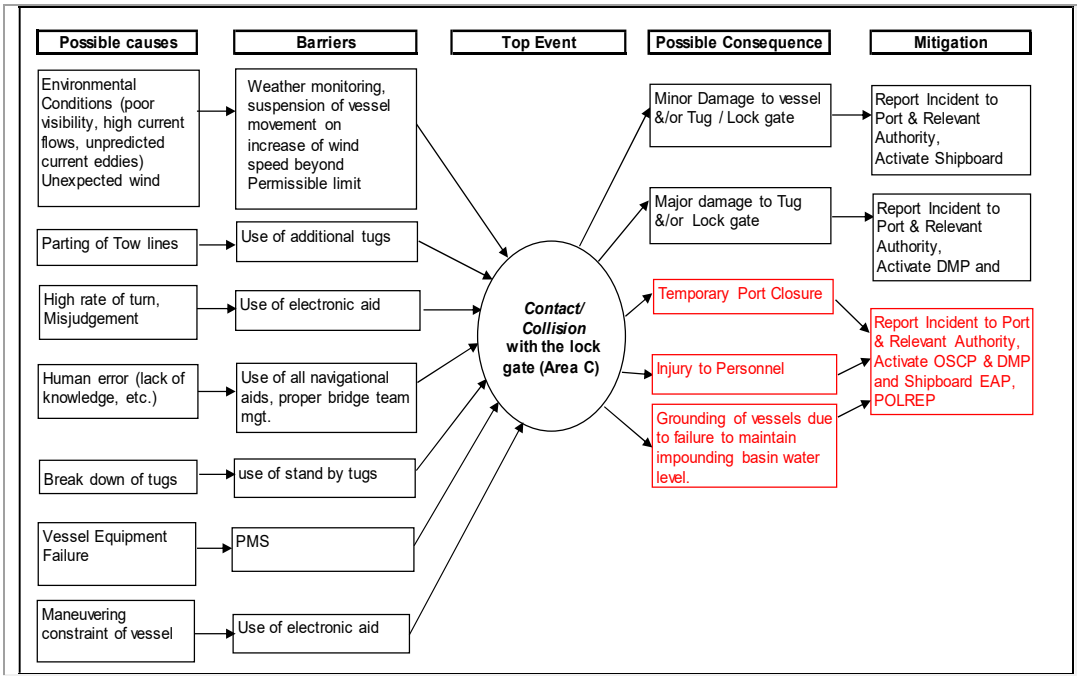
Scenario 6: Grounding- Tanker/Container/BC/Heavy lift vessel - Pilot not on board (Area A)



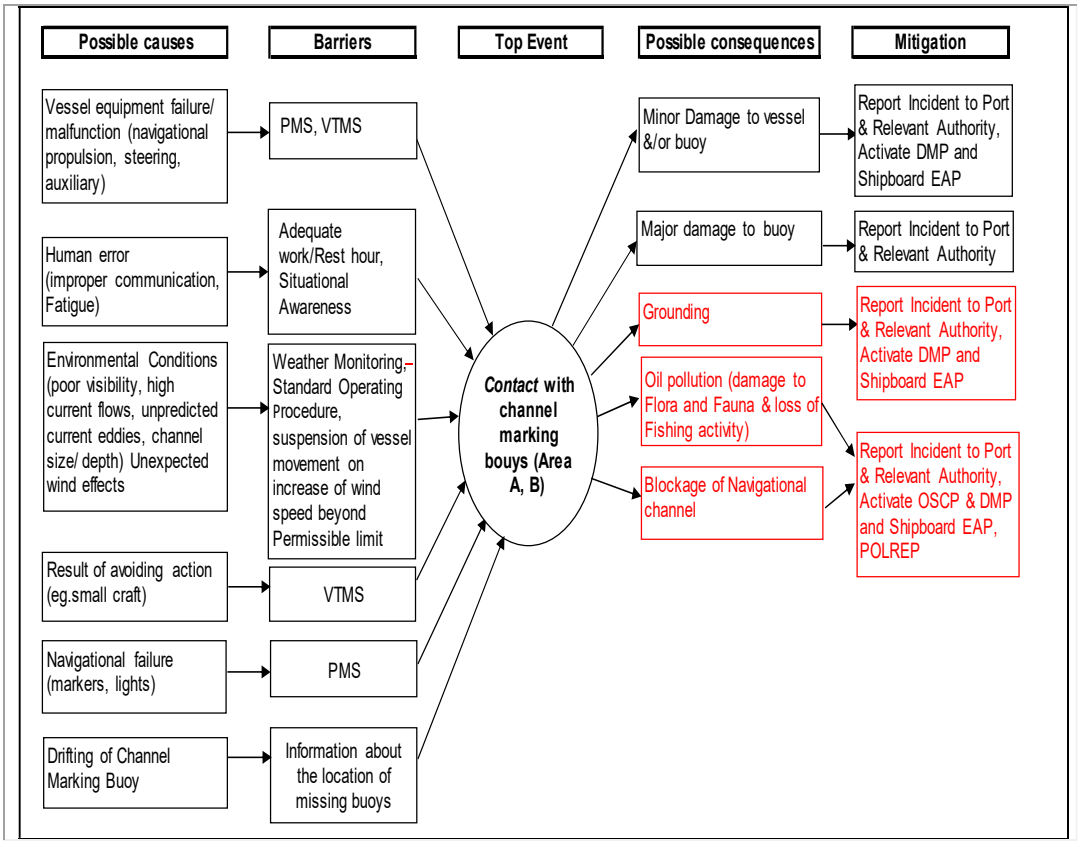
Scenario 7: Tanker /Container/BC/Heavy lift vessel tug assisted berthing - **Contact** with Berth/Jetty/Shore installations (Area B, C)



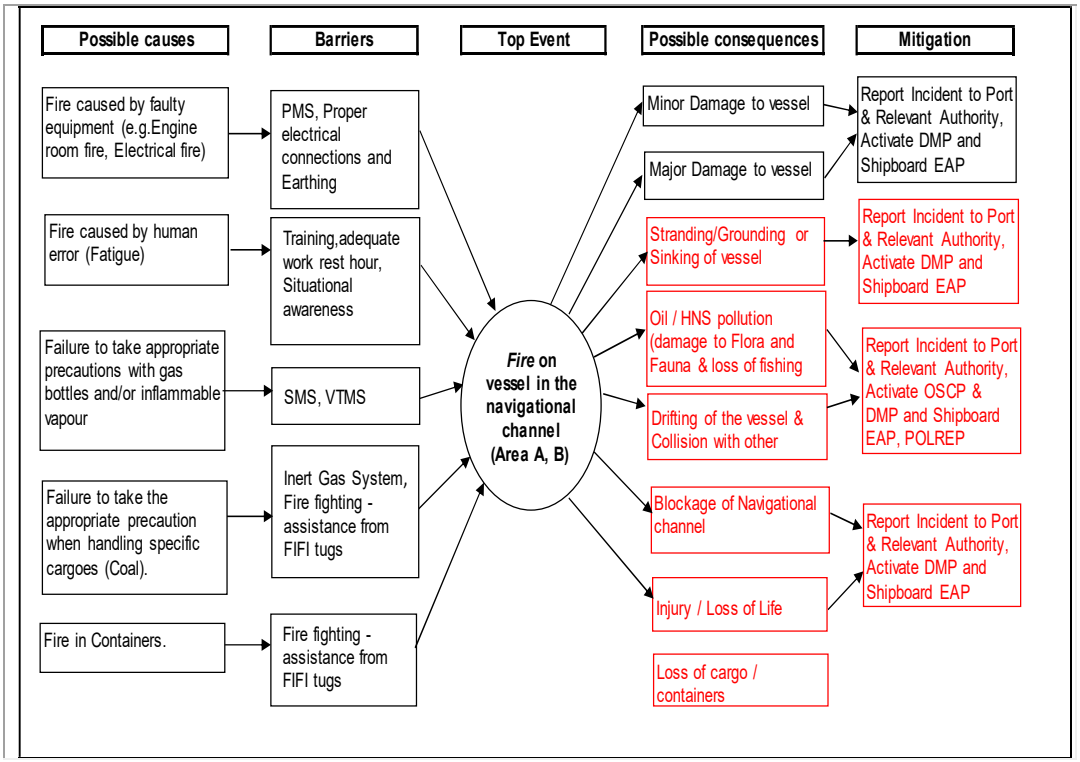
Scenario 8: Contact/Collision with Lock gate (Area C)



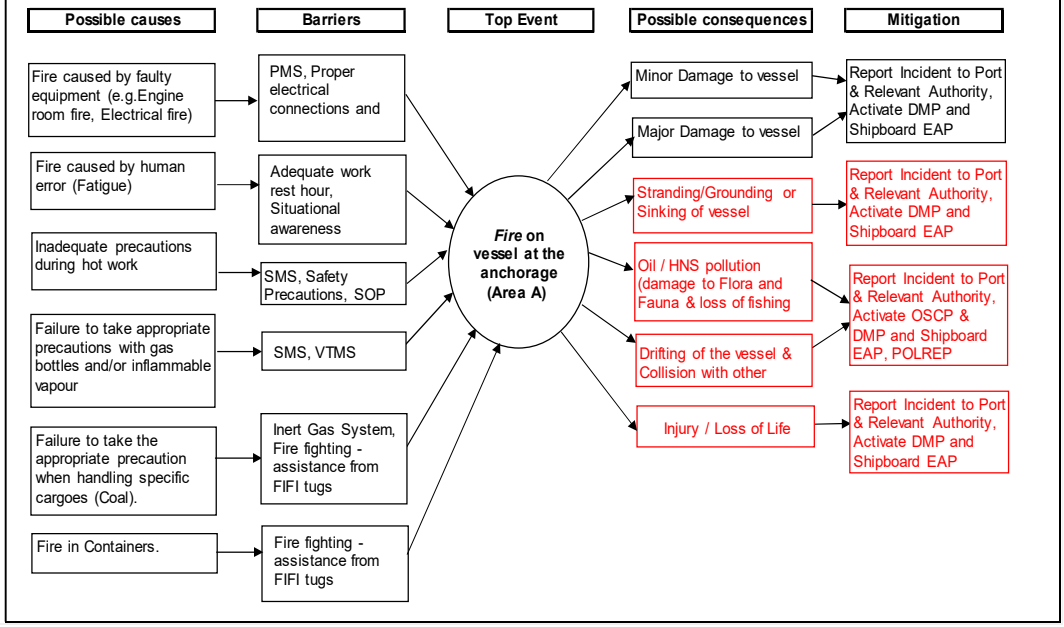
Scenario 9: Contact with channel marking buoys (Area A, B)



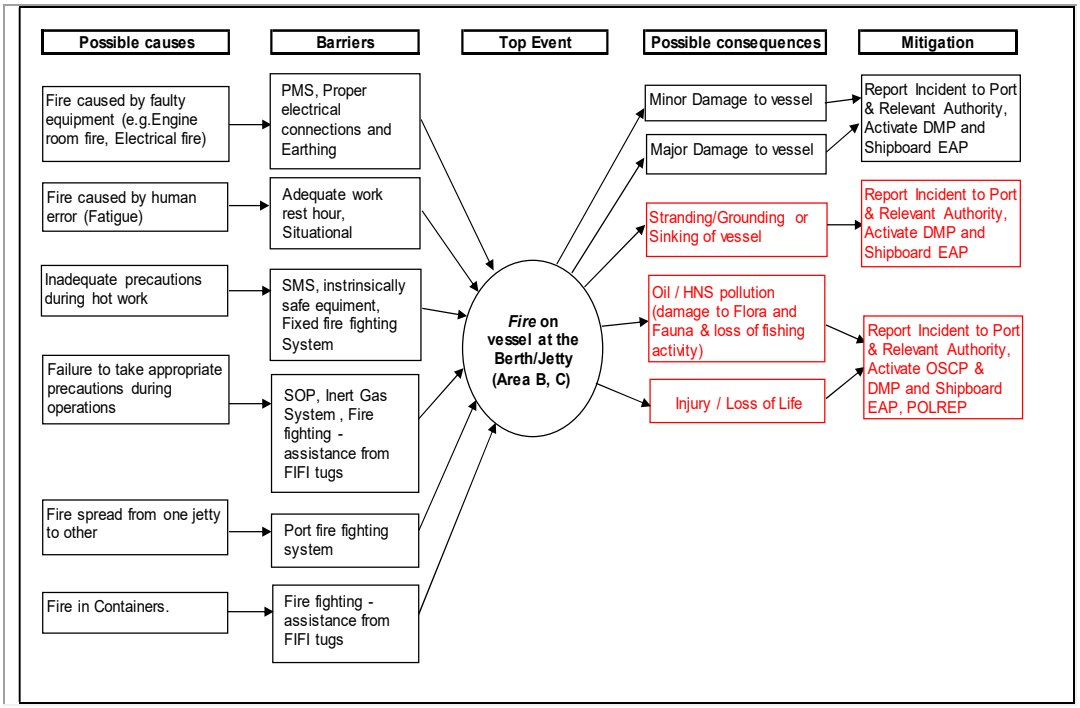
Scenario 10: Fire on vessel in Navigational channel (Area A, B)



Scenario 11: Fire on vessel at Anchorage (Area A)



Scenario 12: Fire on vessel at the Berth/Jetty (Area B, C)



Note:

Area A: Approaches to Haldia Dock Complex (West anchorage Point to Pilot boarding point),

Area B: River passage area (from Pilot boarding point to lock gate),

Area C: Lock gate to Berth/Jetty impounding dock basin.

APPENDIX B
RESOURCES

B1. Firefighting facility at HDC:

Sr. No.	Fire Fighting	Equipment No.	Capacity & Specifications	Location
1	Foam Crash Tender	4	Each FCT Contains: Water: 3600 L Foam: 900 L CO_2 Cylinders: 135 kgs DCP extinguishers: 45 kgs. Pump Capacity: 1800 LPM Water/Foam Monitor: range 60 / 45 m.	1 FCT at HQFS 1 FCT at DFS.
2	Foam Trailer Pumps	5	Pump Capacity: 1800 LPM	
3	Fire-fighting arrangement	Fixed system	As mentioned table below	HOJ-I, II, III
4	Hydrant network		Centrifugal pumps	Dock area – hydrants 127 nos.
5	Hydrant feeding pumps	6	Centrifugal pumps	Berth no. 3, 5 & 13.
6	Wet riser system	1	Centrifugal pumps	Jawahar tower – landing valves 39 nos.

Firefighting facility at Oil Jetty – 3:

Sr. No.	Fire Fighting details	No. & Capacity
1	Fire water main pumps	3 nos.- Diesel driven, 900 m^3/hr each at 15 kg/cm^2 pressure
2	Fire water standby pumps	2 nos.- motor driven, 900 m^3/hr each at 15 kg/cm^2 pressure
3	Jockey Pumps	2 nos., 450 LPM each at 15 kg/cm^2 pressure
4	Foam feeding pumps	2 nos., 450 LPM each at 18 kg/cm^2 pressure
5	Static Water Reservoir	02 nos. – 6400 KL water capacity each.
6	Foam storage tanks	2 nos. – 20000 L foam capacity each.
7	Fire Hydrants	Double headed – 06 nos. on the jetty and 02 nos. at Yard.

8	Ground Monitors	2 nos., 2400 LPM each
9	Jumbo Nozzles	3 nos., 6000 LPM each
10	Jumbo Curtains	19 nos., Fish Tail nozzles
11	Water sprinkling system	Newly installed.
12	Manual Call Points	05 nos. on the jetty.
13	Hose Cabinets	03 nos., 02 hoses each.
14	Extinguishers cabinet	03 nos., 02 Extinguishers each
15	Portable fire Extinguishers	DCP – 75 kgs (02 nos.), DCP – 10 kgs (06 nos.), DCP – 25 kgs (02 nos.).
16	Multipurpose Crash fire tender	01 no.

Firefighting facility at Oil Jetty – 2:

Sr. No.	Fire Fighting details	No. & Capacity
1	Fire water main pumps	02 nos., Diesel driven, 720 m^3/hr each at 12 kg/cm^2 pressure
2	Fire water standby pumps	01 no., motor driven, 720 m^3/hr each at 12 kg/cm^2 pressure
3	Jockey Pumps	02 nos., 360 LPM each at 12 kg/cm^2 pressure
4	Foam feeding pumps	02 nos., 360 LPM each at 15 kg/cm^2 pressure
5	Source of firefighting water	River water
6	Foam storage tanks	02 nos. – 25000 L foam capacity each.
7	Fire Hydrants	Double headed – 06 nos. on the jetty.
8	Ground Monitors	02 nos., 2400 LPM each
9	Jumbo Curtains	31 nos., Fish Tail nozzles
10	Hose Cabinets	03 nos., 02 hoses each.
11	Extinguishers cabinet	03 nos., 02 Extinguishers each
12	Portable fire Extinguishers	DCP – 50 kgs (02 nos.), Mechanical foam – 45 litres (02 nos.).
13	Multipurpose Crash fire tender	01 no.

Firefighting facility at Oil Jetty – 1:

Sr. No.	Fire Fighting details	No. & Capacity
1	Fire water main pumps	01 no.- Diesel driven, 135 m^3/hr each at 7 kg/cm^2 pressure
2	Fire water standby pumps	01 no.- motor driven, 135 m^3/hr each at 7 kg/cm^2 pressure
3	Source of firefighting water	Green Belt canal connected with the river.
4	Fire Hydrants	Double headed – 08 nos. on the jetty.

5	Ground Monitors	03 nos., 2400 LPM each (1 fixed, 2 are built on trollies with foam capacity 500 litres each).
6	Hose Cabinets	03 nos., 02 hoses each.
7	Extinguishers cabinet	03 nos., 02 Extinguishers each
8	Portable fire Extinguishers	DCP – 75 kgs (02 nos.), DCP – 10 kgs (04 nos.), Mechanical foam – 09 litres (04 nos.).
9	Multipurpose Crash fire tender	01 no.

B2. Oil Spill Response Facility available at HDC:

Sr. No.	Item Description	Units	Total quantity available and operational status
1	RO Boom SPI 100 m sections with accessories	3	300 M (Operational)
2	Weir Skimmer and associated TED Mechanisms	2 sets	2 sets (Operational)
3	Flex Barge (10 Tonnes Capacity) and accessories	4 sets	4 sets (Operational)
4	Boom reel for RO boom and associated Mechanisms	1 Set	1 Set (Operational)
5	Permanent Boom 25 m section with accessories	68	1700 m (installation is in progress at oil jetties for pre-booming) – operational
6	U-Boom 200 m with accessories	1 Set	1 Set (Operational)
7	Boom reel for U Boom and associated Mechanisms	1 Set	1 Set (Operational)
8	Air Blower with accessories	3 Set	3 Set (Operational)
9	Multi-skimmer (Brush/Disc/Drum) and associated Mechanisms	2 Set	2 Set (Operational)
10	Shore Cleaning equipment (Vacuum pump, Oil transfer pump, Hopper with vacuum head, Oil spill dispersant applicator-back pack type, Temporary storage tank) with accessories	5 Set	5 Set (Operational)
11	Oil Spill Dispersion applicator with nozzle and spray arms and its associated Mechanisms	6 Set	6 Set (Operational)
12	Sorbent Boom pack	500 m	500 m (Operational)
13	Oil Spill Dispersant	1000 Ltrs.	1000 Ltrs. (Operational)

14	Sorbent Pads	140 packs	140 packs (1 pack contains 100 sheets, Operational)
15	Anti-Pollution vessel / work boat	1	1

B3. Assembly Points:

Following areas are earmarked as assembly points.

1. Near firefighting pump house in L-3 as marked on the plot plan.
2. Pump house, Light tower near to the concrete road.
3. GC berth canteen building.
4. Near gate no. 4.
5. Near fire station – in the case of emergencies other than in Oil Jetty – 1 and 2*
6. Marine house
7. Near Operator control room

* Please note that fire station at its present location will not be able to function in case of any emergency / disaster in Oil jetty 1 or 2.

B4. Fire Station Employee Details:

Sr. no.	Details of Employees	
1.	Strength (no. of employees) of the fire station	Officers:2, Supervisor:1, Regular staff:11, Contractual: 17, Skilled Labor: 41., Unskilled Labor: 1, Clerical Staff: 1
2.	Training details of the fire station employees	All employees of the Fire unit are having basic training in fire-fighting from recognized institutes.
3.	Fire tender manning details	Each fire tender is manned with: Supervisory staff: 1, Driver cum pump operator:1, Firemen: 4.

B5. Port maintains following schedule for the contingency mock drills

Sr. no.	Drill	Frequency
1.		
2.		
3.		
4.		
5.		
6.		
7.		

B6. Emergency Control Room equipment

Equipment	Quantity (nos.)	Remarks
Satellite phone		With battery backup
VHF sets		With battery backup
Telephones		Power supply not required
Walkie-talkie sets & mobile		
Charts		
Emergency lights and torches		
Portable PA/loud hailer set		
With emergency generator-dry food & water for 72 hours		

B7. Other equipment including rescue items:-

Sr. no.	Nomenclature	Quantity
1.	B.A. Set	
2.	Fire Entry Suit	
3.	Aluminum Proximity Suit	
4.	Chain Saw	
5.	Hydraulic pump	
6.	Circular Saw	
7.	Bolt Cutter	
8.	Tripod	
9.	Dragon Search Light	
10.	Life Buoy	
11.	Life jacket	

B8. Required resources for the identified Emergencies

The following table shows the risks identified in this plan and the key resources that may be required during emergencies arising from each risk.

Identified Risk	First Aid/ Medical equip-ment	Lifting equipment/ Fork lift	Cranes	High angle rescue equipment	Boats/ Vessels	Fire Fighting equip-ment	Communica tions	Oil Containment/ cleanup equipment	Others
Marine casualty (Collision/Grounding)	√				√		√		PPE, Ambulance
Fire or Explosion on a vessel at berth	√	√	√		√	√	√		Ambulance, vehicles, PPE, Equipment for cordoning, torch light
Fire or Explosion on a vessel in the water	√				√	√	√		Ambulance, vehicles, PPE, Equipment for cordoning, torch light
Oil Spill					√		√	√	PPE
Utility Fire (Electrical Substation)	√					√	√		PPE, Generator, Lightings, torch light
Dangerous Goods spill (other than oil)	√				√	√	√	√	PPE, Dangerous good container/cleanup equipment, Equipment for cordoning, torch light
Gas dispersion	√					√	√		PPE, Equipment for cordoning, torch light
Crane Collapse/ Container fall	√	√	√	√	√		√		PPE, Equipment for cordoning, torch light
Terrorist incident	√	√	√	√	√	√	√		Ambulance, vehicles, Equipment for cordoning, torch light
Bomb Threat	√					√	√		
Cyclone /Severe Storm/Tsunami	√	√	√	√	√	√	√		
Flooding	√	√			√		√		
Earthquake	√	√				√	√	√	PPE, torch light, ambulance, vehicles

B.9. Mutual Aid Agreement

All Port operators/agencies/institutions, where possible, will supply resources to support emergency response operations when requested by CEC/CIC/SIC or whole of Port Emergency Operation Centre as per the Mutual Aid Agreement.

B.10. Resource Inventory (IDRN)

India Disaster Resource Network is an online inventory designed as a decision-making tool for the Government administration and crisis managers to coordinate effective emergency response operations in the shortest possible time.

The Ministry of Home Affairs, Government of India has developed a web-based database of resource named India Disaster Resource Network (IDRN). This database contains information about equipment (such as boats, bulldozers, etc.), manpower (divers, swimmers, etc.) and critical supplies (oxygen cylinder, firefighting foams, etc.) required during the response.

Resources which are available with the various departments in the Purba Medinipur District are uploaded in IDRN portal (www.idrn.nidm.gov.in).

APPENDIX C
EMERGENCY CONTACT NUMBERS

Name of Authority	HDC Office (STD code: 03224)
Chairman	033-22305370/3451, 09073963001
Dy. Chairman	263209
Director-Marine	033-22303451. 09836298639
General Manager (Marine)	263303, 264818
General Manager (M & S)	263171, 264943
General Manager (Engg.)	252142, 264433
General Manager (Finance)	264466, 263170
Manager (Marine)	252104
Medical Superintendent	263265, 265848
Sr. Dy. Manager (MM)	263255
Sr. Fire & Security Officer	252307
Dy. Dock Master	252513
Dy. Manager (Traffic)	252067
Dy. Manager (ME)	252340
Sr. Dy. Manager (I & CF)	252110, 252740
Sr. Dy. Manager (P & E)	252663
Sr. Dy. Manager (P & IR)	263160, 264848
Sr. Dy. Manager (Admin.)	263178
Sr. Dy. Manager (SH & CH)	252208, 252246
Sr. Dy. Manager (F)	263674
Safety Officer	263993
Sr. Dy. Manager (Railways)	252209, 252058
Dy. Commandant (CISF)	252229
Asst. Commandant (CISF)	252457, 252711
CISF Control Room	252222
Dy. Fire Officer	217502
Master Unit Sub Station (MUSS), HDC T/5 Sub-station	263373
Central Gate Complex – CISF	252222
GC Berth Main Gate	252466
Port Hospital	263388, 266021
Ambulance Room – Shift Office	263388, 266021
Fire Station HQ/Shift in charge	252433
HDC Township Main Gate (Security Gate)	263966
HDC Pump House	266124

Name of Authority and Contact Details	
Chief Controller of Explosives, Nagpur - 440006	0712 – 2510389 / 2510103 / 250102
Joint Chief Controller of Explosives, Kolkata	033 – 22439322
District Magistrate, Purba Medinipur	03228 - 263098
Addl. District Magistrate	03228 – 263667
Municipal Commissioner, Haldia	03224 – 252996
WBSEB, Chiranjibpur	252182
St. John Ambulance	033 – 24636031
District Superintendent of Police, Purba Medinipur	2659580
Police Control Room	252335
Police Control Room (Durgachak)	252378
Police Station, Haldia T/S	263487
Water Supply Station, HDC	266124
Dy. Director, Inspectorate Dock Safety, Kolkata	033 – 22830719
Asst. Director, Inspectorate Dock Safety, HDC	--
Member Secretary, WBPCB, Kolkata	18003453390
Regional Officer, WBPCB	03224 - 252996

Transport Services	
SBSTC – Durgachak	274439
SP, Purba Medinipur	269580
Other Police officals and Police station	263487
Dy. Controller of Civil Defence	272986

Port Users – Contact Details	
Indian Oil Corporation Ltd.	08083804927
HPCL	03224 - 274007
BPCL	09051644240
Petronas	0603-20515000 / 20265000
HPL (Plant)	03224 – 274007 / 877 / 876 / 400 / 882 / 384
MCPI	03224 – 275572 / 73
Tata Power	251399
Reliance Petroleum	0288 - 22785214
HBCPL	03224 - 274999

Health & Medical	
CMOH – Purba Medinipur	09233176634
Sub Divisional Hospital, Durgachak	274108
CMO, IOCL, Haldia Refinery	08083804927
CMO, B. C. Ray Hospital, Haldia	269048
District Hospital, Tamluk	03228 - 266059

Emergency Telephone no.	
Fire	252433
Doctor On Duty	263388, 266021
HDC Hospital	265862, 266558
Marine House Control Room	252313

Fire Services	
West Bengal Fire Service	252500
Haldia Refinery, Haldia	252322 / 252562
HBCPL, Haldia	03224 – 274999
MCPI	03224 – 275572 / 73
Haldia Petrochemicals Ltd.	03224 – 274007 / 877 / 876 / 400 / 882 / 384

Coast Guard		
HQ Coast Guard Region NE, Coast Guard	Newtown Rajarhat, Kolkata 700157	033-2324 8002 email: ops-ne@indiancoastguard.nic.in
Officer In Charge MRSC, Haldia, HQ	Coast Guard District No 8 (West Bengal) Anchorage Camp Haldia, West Bengal 721605	032-24 264541; email: dhq8@indiancoastguard.nic.in

MINISTRY OF PORTS, SHIPPING & WATERWAYS AND OFF-SITE MUTUAL AID			
	Office	**Residence**	**Web site- fax no**
Transport Bhavan, 1 Sansad Marg New Delhi 110 001			www.shipping.nic.in Fax 011-23719023/23710356
Minister	011-23711252 23710121	-	
PS (Minister)	011-23356750	-	Fax 011-23715118
Secretary Ministry of Shipping	011-23714938	-	Telefax 011-23716656
Spl. Sey & Financial Advisor	011-23710140	26850062	Fax: 011-23715195
Joint Secy (P)	011-23356712		Fax: 011-23753396
NDRF National Helpline No.	9711077372		

NDRF Control Room, New Delhi	011-24363260	Fax: 011-24363261	E-mail: hq.ndrf@nic.in Exchange: 011-24369279 (Tel.) 011-24363261 (Fax)
Dredging Corp of India Limited			http://www.dredge-india.com
Directorate General Shipping	022-25752029/35	Fax. 022-25752040/42/43/45	dgship@dgshipping.com
Indian Ports Association			www.ipa.nic.in
Tariff Auth Major Ports (TAMP)			www.tariffauthority.gov.in
National Maritime Academy Chennai	24530343/44/45	Fax 044-24530342	EC Road,Uthandi,Chennai 119 www.nipm.in.nic.in
Ministry of Home Affairs			
Control Room (IB)	011-23093756		
Control Room (VIP Security)	011-23438271		
Control Room (Law & Order)	011-23092885		
Bhaba Atomic Research Centre	022-25505050	25592000	022-25505151 / 25519613

OTHER EXPERTS AGENCIES	
Name of body	**Telephone / fax**
Indian Register of Shipping, Mumbai	022-30519400 / 25703611 ho@irclass.org
IIT – Mumbai	022-2572 2545 / 2572 3480
Meteorological Centre, Kolkata, West Bengal	033-24790596 kolkatarmc@gmail.in
The National Environmental Engineering & Research Institute (NEERI), Nagpur	0712-2249999 / 660 / 2244900
Ministry of Petroleum & Natural Gas	011-23382426 / 23383100
National Institute of Ocean Technology (NIOT), Chennai	044-66783300 / 22460275 / 22460645
National Ship Design and Research Centre, Visakhapatnam	0891-2578360 / 2577754 nsdrc@itpvis.ap.nic.in

NDRF – 2nd BATTALION					
Name & designation	**Address**	**Contact & email id**	**Fax no.**	**Mobile**	**Control room no**
Mr. Nishit Upadhyay - Commandant	2nd BN NDRF, Near RRI Camp. Haringhata, Mohanpur, Nadia, (West Bengal) Pin - 741246	033-25875032 wb02-ndrf@nic.in	033-25875032	09474061104	033-25875032

SALVAGE COMPANY	**TELEPHONE**

FIRST AID POST		
Post no.	**Location**	**Telephone**
First Aid Post		

TRANSPORTATION-VEHICLE POOL			
Sr. No.	**Name of travels**	**Telephone**	**Mobile**
1.			
2.			
3.			
4.			

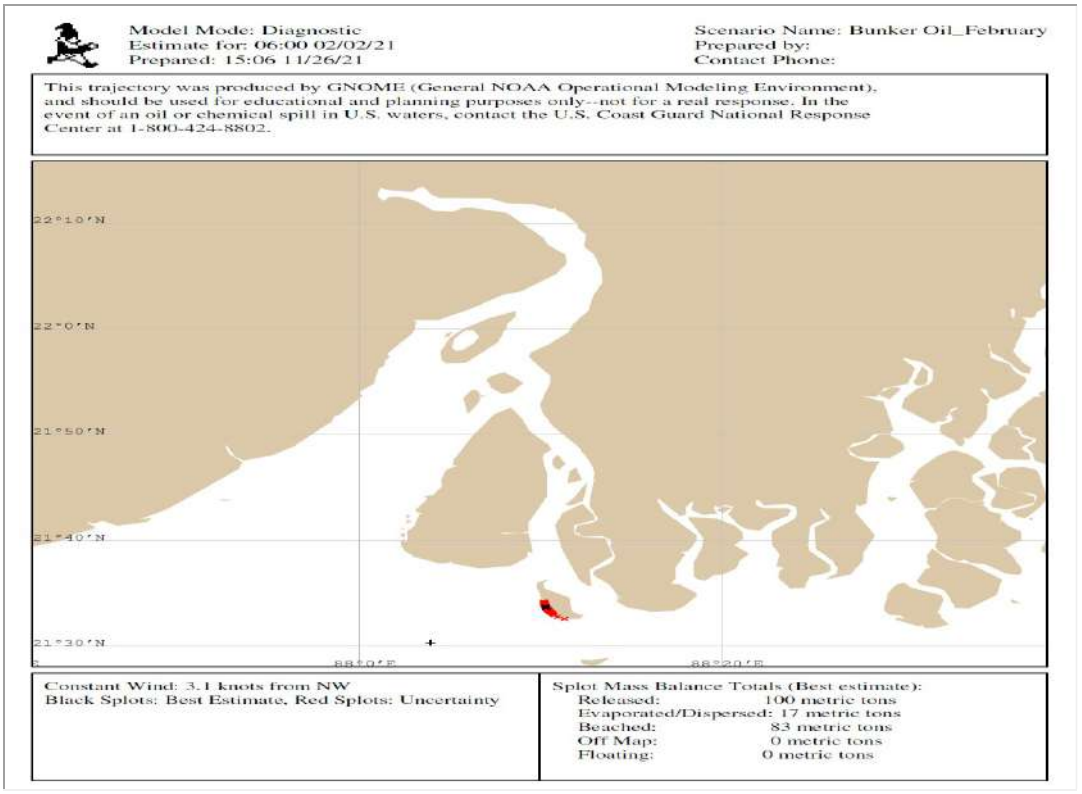
APPENDIX D
OIL SPILL TRAJECTORY MODELING BY USING GNOME

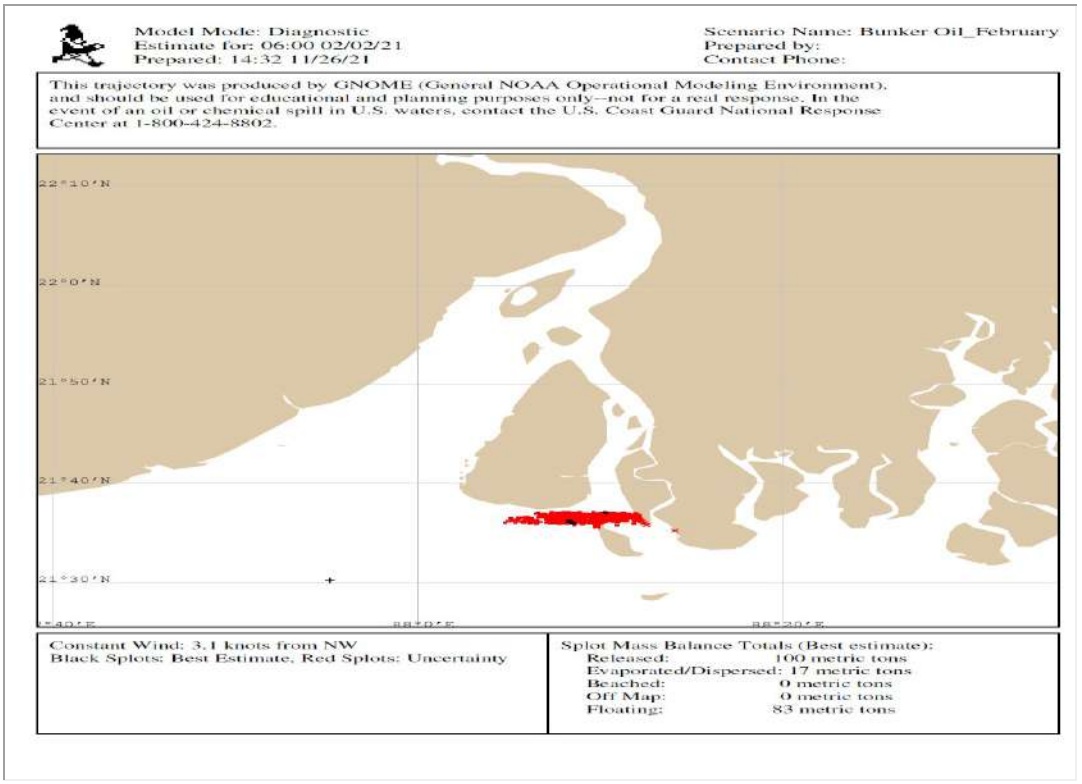
The National Oceanic and Atmospheric Administrations (NOAA's) GNOME model is used to simulate trajectory of Oil Spill. Input data for GNOME includes:

- Map file generated from GNOME global custom map generator.
- Current file is taken from Geostrophic currents.
- Location of Spill (marked by "+" in figures):
  - Near Anchorage (Eastern - for Kolkata Dock System and Eden channel- for Haldia Dock Complex)
- Trajectory Modelling is carried out for spillage of Bunker Oil and Diesel Oil for 100 MT month of February, July and November.

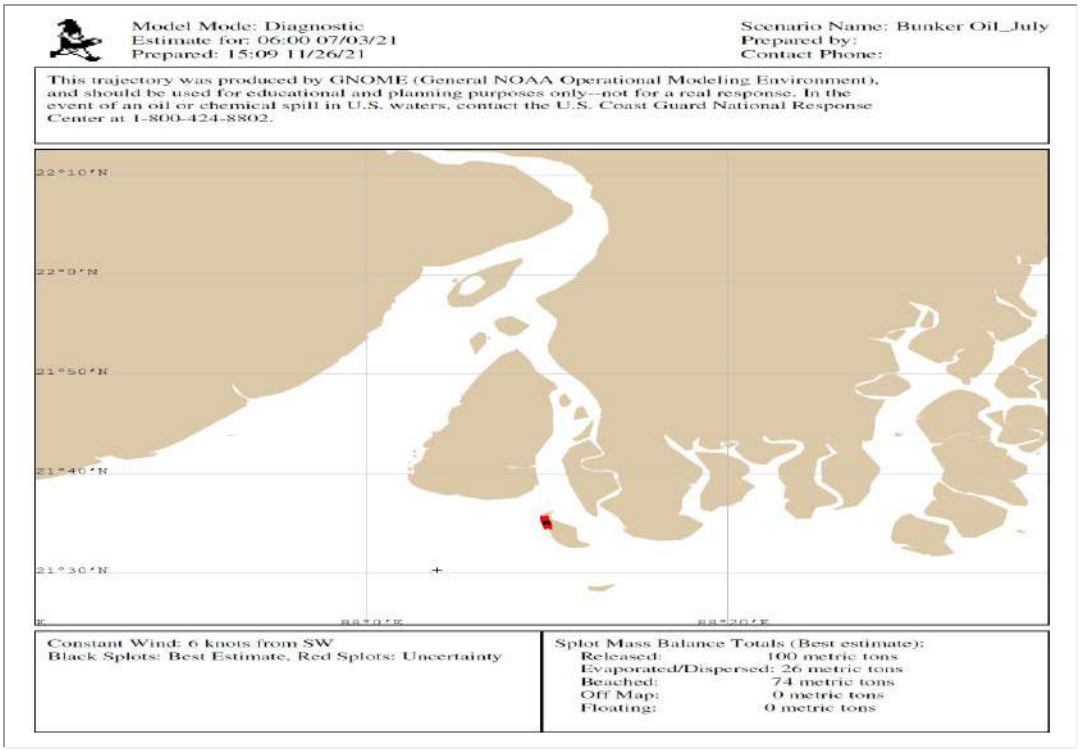
1. BUNKER OIL SPILLAGE NEAR ANCHORAGE POINTS

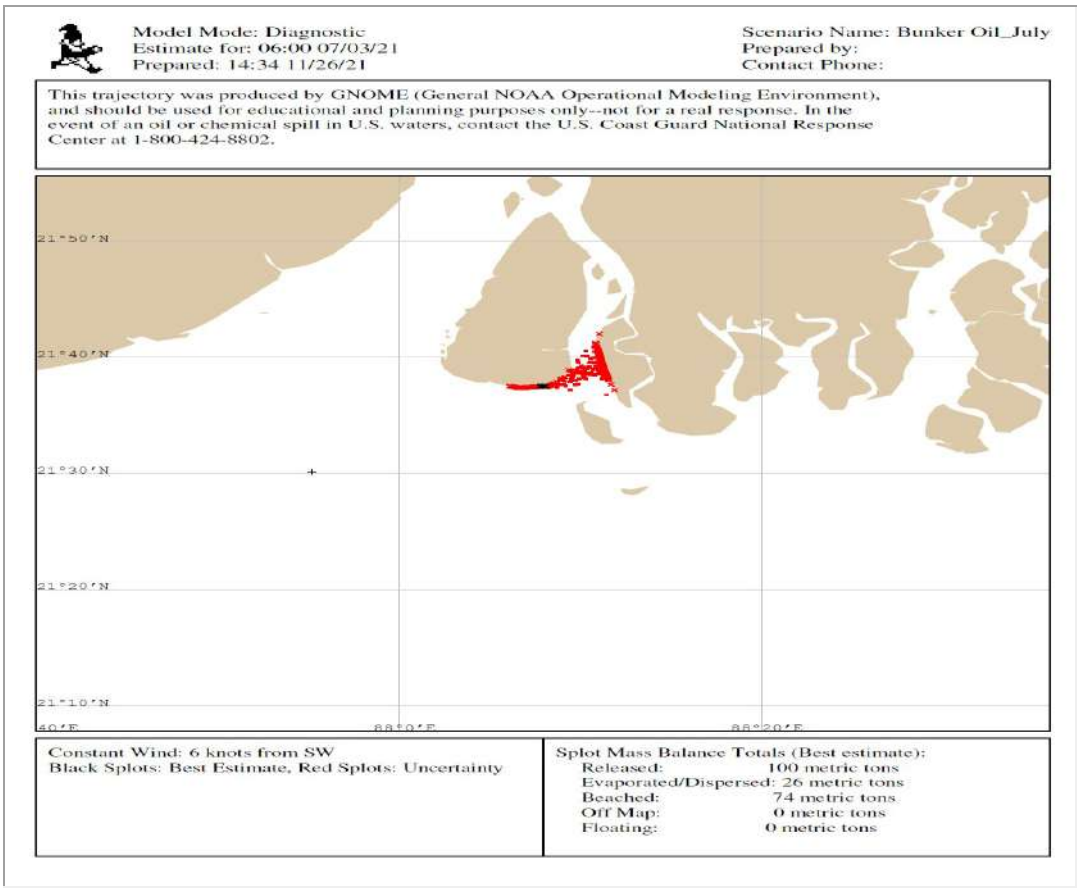
1.1 Trajectory of spillage of Bunker oil of 100 MT at Anchorage for the month of February is as shown in below figure. After 24 hrs the position of the slick is shown in the figure.



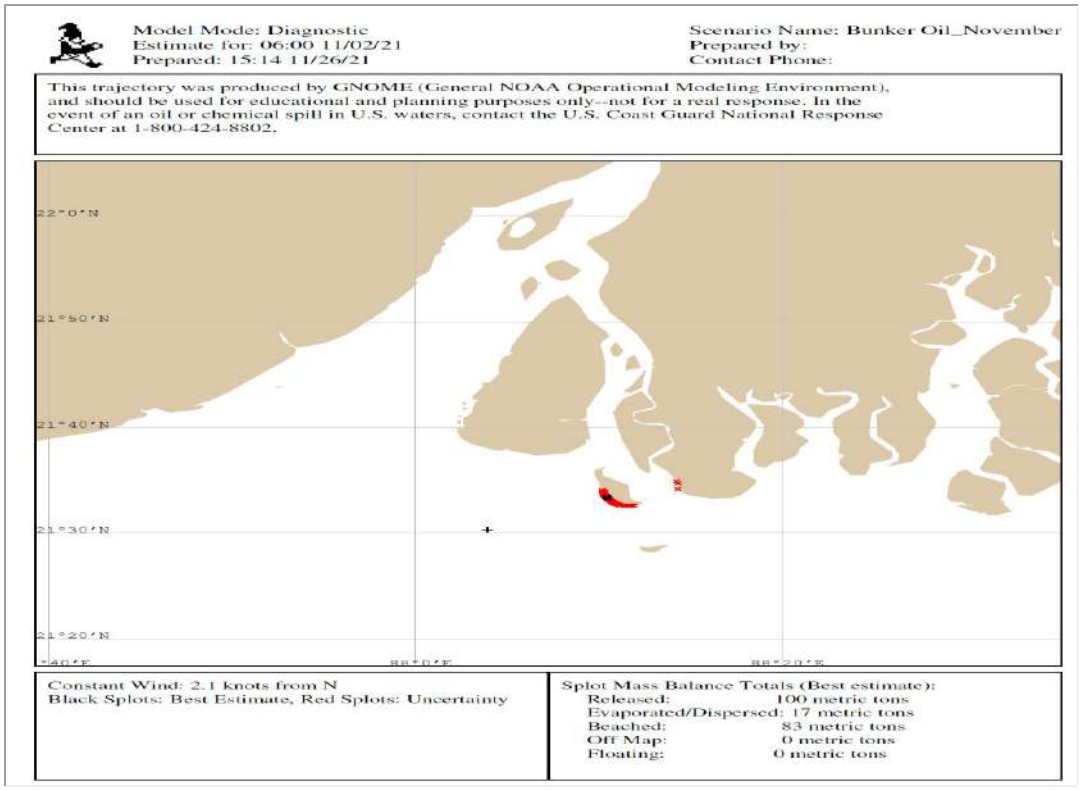


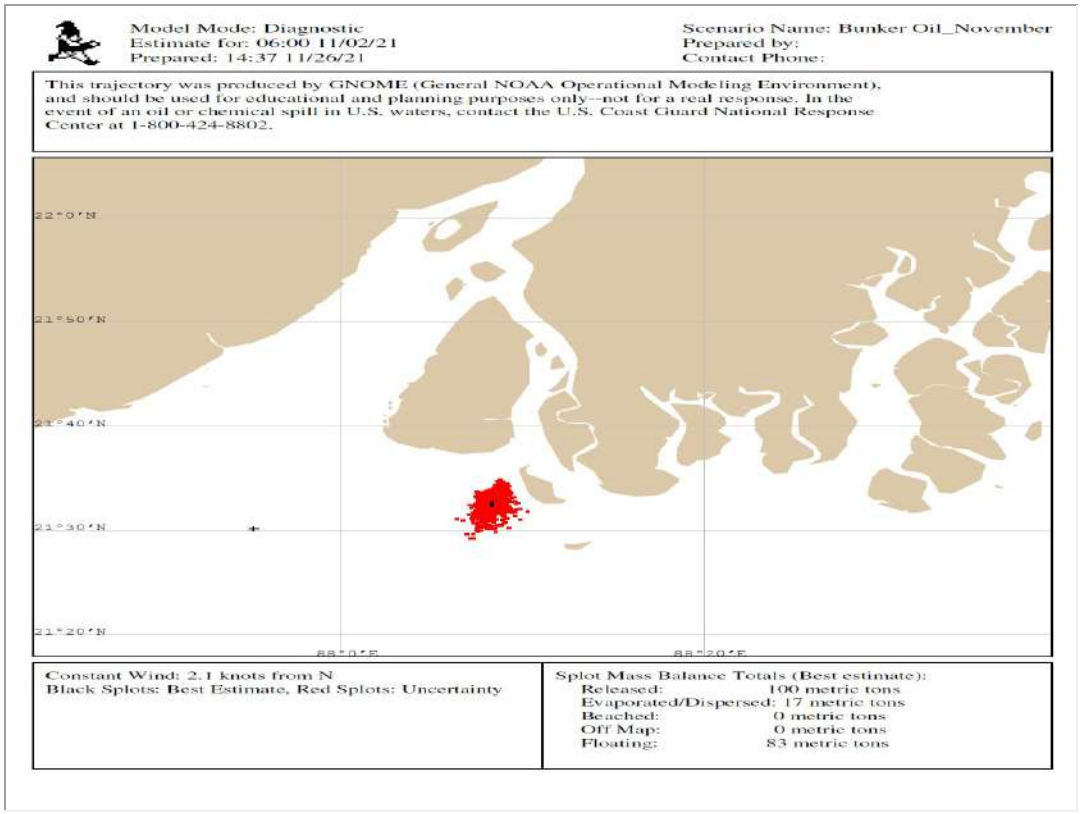
1.2 Trajectory of spillage of Bunker oil of 100 MT at Anchorage for the month of July is as shown in below figure. After 48 hrs the position of the slick is shown in the figure.





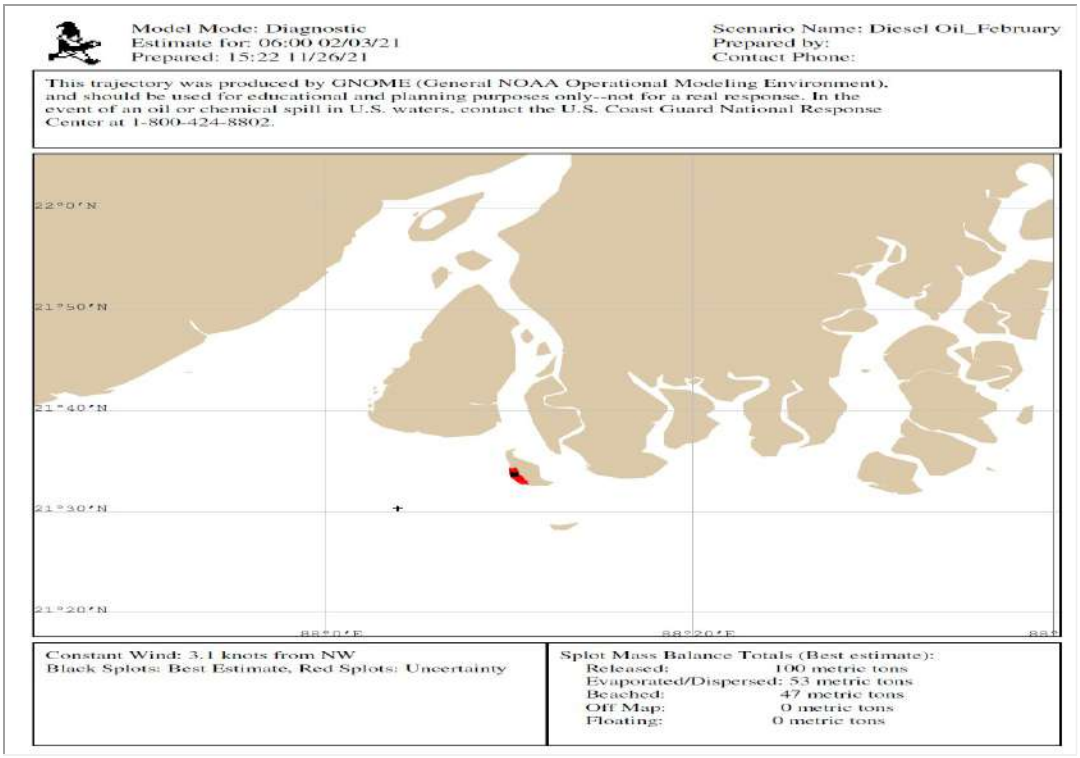
1.3 Trajectory of spillage of Bunker oil of 100 MT at Anchorage for the month of November is as shown in below figure. After 24 hrs the position of the slick is shown in the figure.

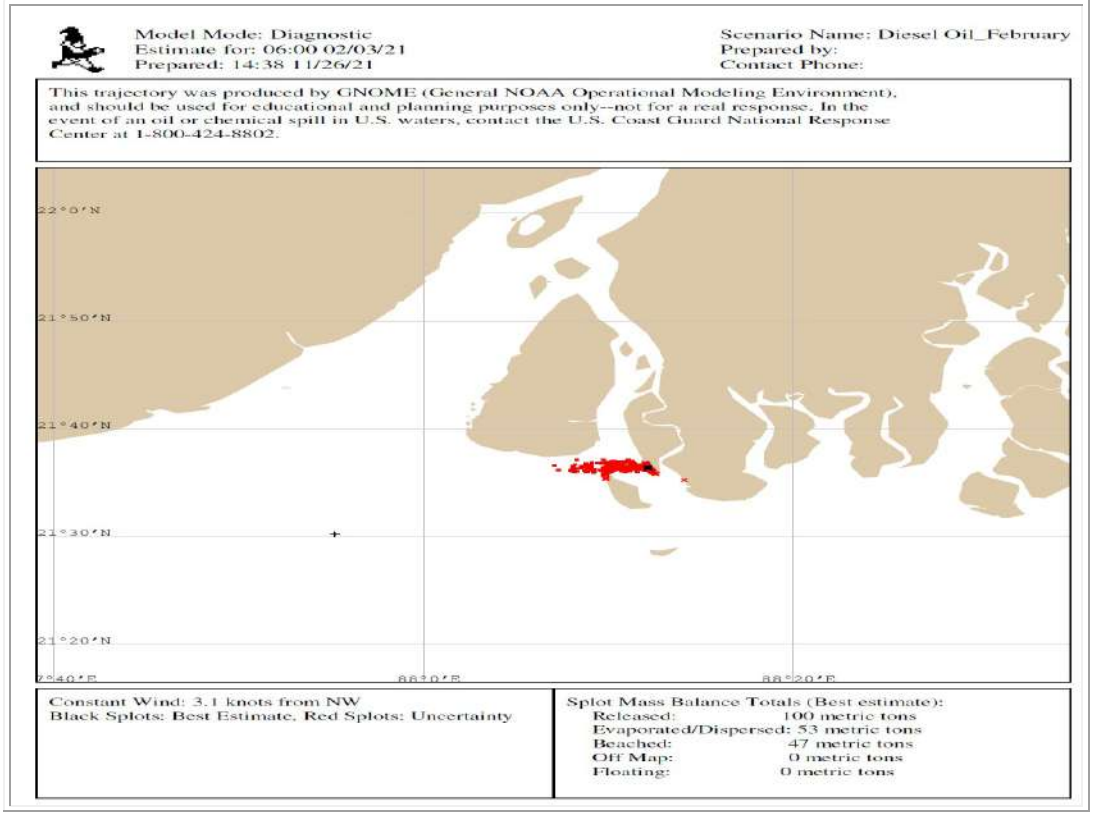




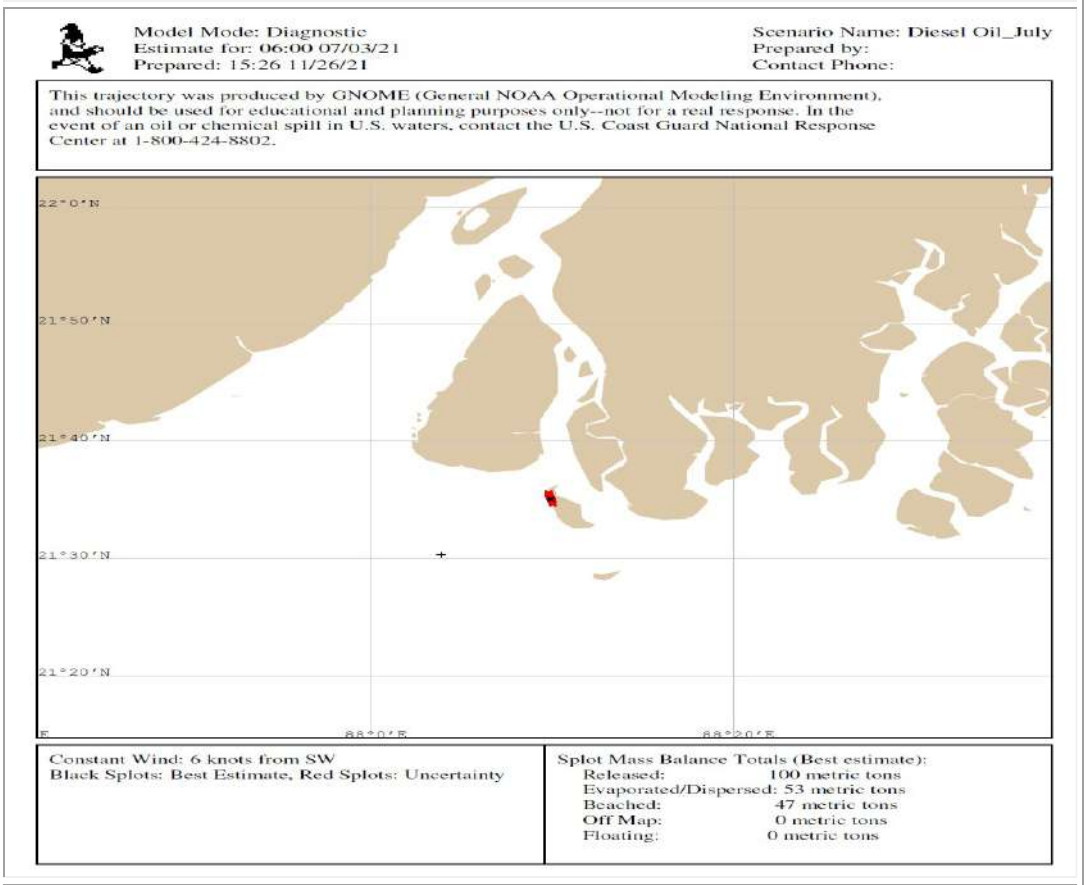
2. DIESEL OIL SPILLAGE NEAR ANCHORAGE POINTS

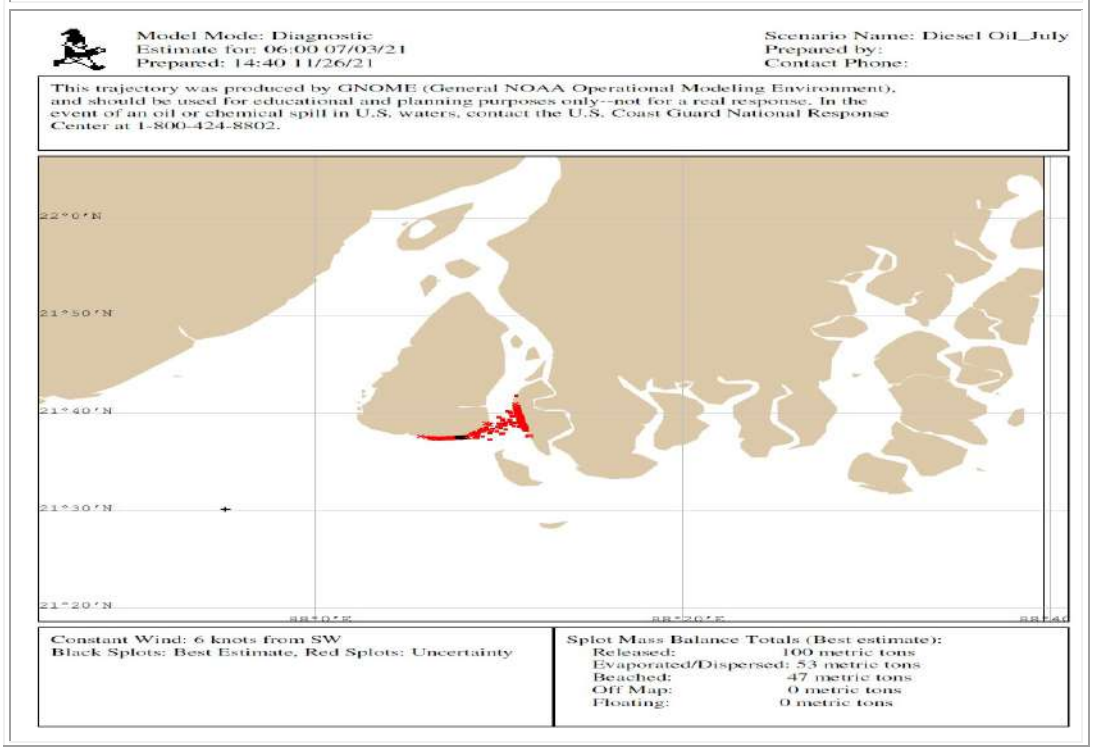
2.1 Trajectory of spillage of Diesel oil of 100 MT at Anchorage for the month of February is as shown in below figure. After 48 hrs the position of the slick is shown in the figure.



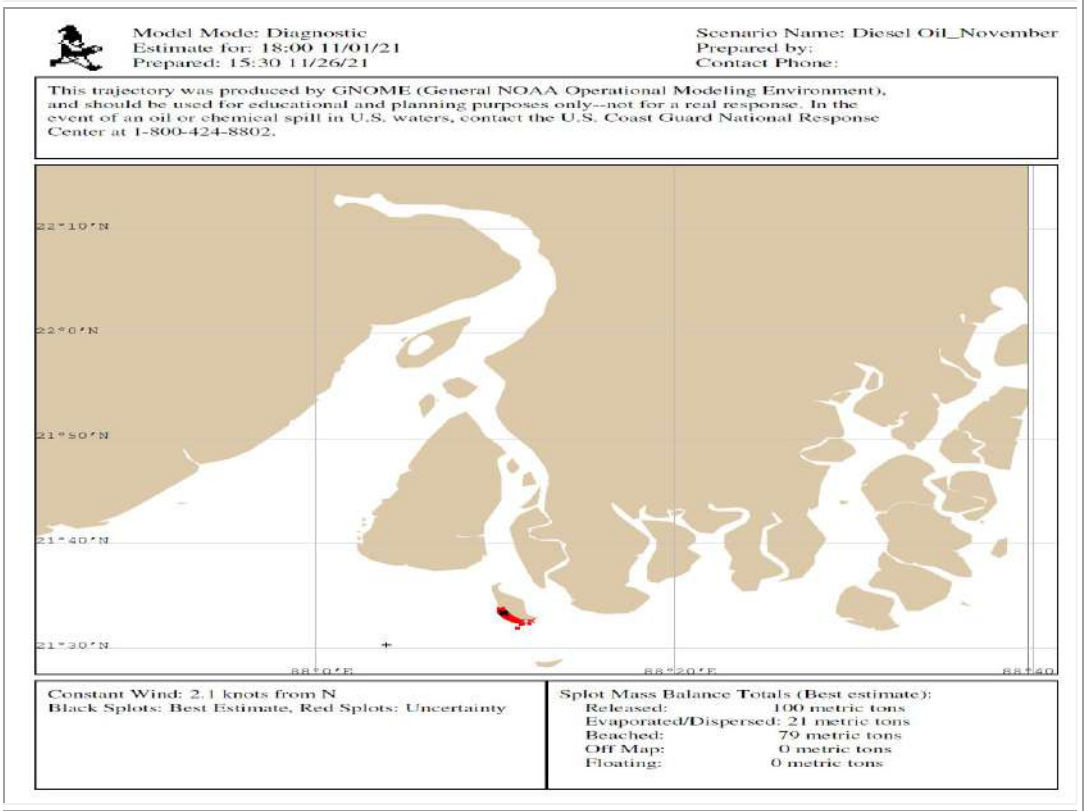


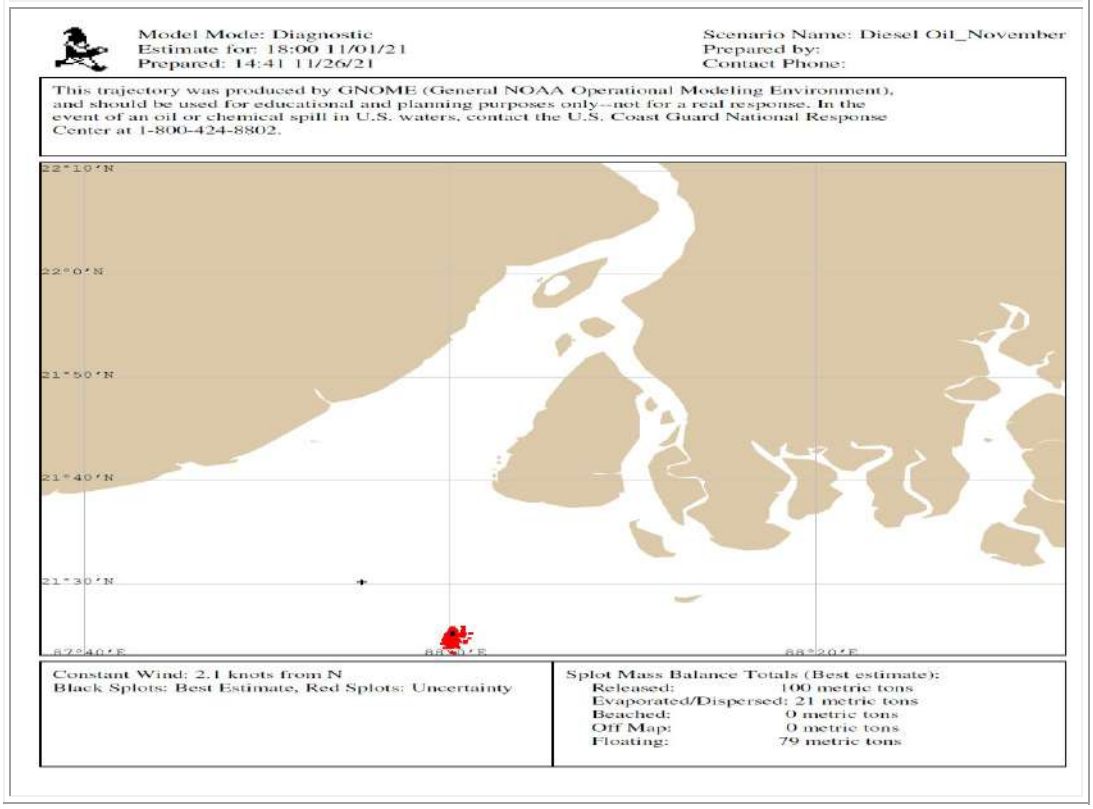
2.2 Trajectory of spillage of Diesel oil of 100 MT at Anchorage for the month of July is as shown in below figure. After 48 hrs the position of the slick is shown in the figure.





2.3 Trajectory of spillage of Diesel oil of 100 MT at Anchorage for the month of November is as shown in below figure. After 12 hrs the position of the slick is shown in the figure.





Type of Oil: Bunker Oil,
Quantity: 100 MT,
Location of Spill: Near Anchorage Points
Note:

1. R- Released; F- Floating; B – Beached; ED – Evaporated & Dispersed
2. Wind speed and direction is taken from online site

NEAR EASTERN CHANNEL																	
Month	**Mean Wind Speed in knots**	**Direction (from) Wind**	**6hr**				**12hr**				**24hr**				**48hr**			
			R	**F**	**B**	**ED**	**R**	**F**	**B**	**ED**	**R**	**F**	**B**	**ED**	**R**	**F**	**B**	**ED**
February	3.1 knots	NW	100	0	93	7	100	0	89	11	100	0	83	17	100	0	74	26
July	6 knots	SW	100	0	93	7	100	0	89	11	100	0	83	17	100	0	74	26
November	2.1 knots	N	100	93	0	7	100	0	89	11	100	0	83	17	100	0	74	26

NEAR EDEN CHANNEL																		
Month	**Mean Wind Speed in knots**	**Direction (from) Wind**	**6hr**				**12hr**				**24hr**				**48hr**			
			R	**F**	**B**	**ED**	**R**	**F**	**B**	**ED**	**R**	**F**	**B**	**ED**	**R**	**F**	**B**	**ED**
February	3.1 knots	NW	100	93	0	7	100	89	0	11	100	83	0	17	100	0	74	26
July	6 knots	SW	100	93	0	7	100	89	0	11	100	0	83	17	100	0	74	26
November	2.1 knots	N	100	93	0	7	100	89	0	11	100	83	0	17	100	0	74	26

Type of Oil: Diesel Oil,
Quantity: 100 MT,
Location of Spill: Near Anchorage Points
Note:

1. R- Released; F- Floating; B – Beached; ED – Evaporated & Dispersed
2. Wind speed and direction is taken from online site

NEAR EASTERN CHANNEL																	
Month	**Mean Wind Speed in knots**	**Direction (from) Wind**	**6hr**				**12hr**				**24hr**				**48hr**			
			R	**F**	**B**	**ED**	**R**	**F**	**B**	**ED**	**R**	**F**	**B**	**ED**	**R**	**F**	**B**	**ED**
February	3.1 knots	NW	100	0	88	12	100	0	79	21	100	0	66	34	100	0	47	53
July	6 knots	SW	100	0	88	12	100	0	79	21	100	0	66	34	100	0	47	53
November	2.1 knots	N	100	88	0	12	100	0	79	21	100	0	66	34	100	0	47	53

NEAR EDEN CHANNEL																		
Month	**Mean Wind Speed in knots**	**Direction (from) Wind**	**6hr**				**12hr**				**24hr**				**48hr**			
			R	**F**	**B**	**ED**	**R**	**F**	**B**	**ED**	**R**	**F**	**B**	**ED**	**R**	**F**	**B**	**ED**
February	3.1 knots	NW	100	88	0	12	100	79	0	21	100	0	66	34	100	0	47	53
July	6 knots	SW	100	88	0	12	100	79	0	21	100	0	66	34	100	0	47	53
November	2.1 knots	N	100	88	0	12	100	79	0	21	100	66	0	34	100	0	47	53

APPENDIX E
CONSEQUENCE ASSESSMENT RESULTS

1. Consequence Assessment

Potential for damage of property, loss of lives and injury to health due to possibility of accidents has been estimated for various credible scenarios as mentioned in para below.

1.1 Consequence modeling generally involves three distinct steps:

i. Estimation of the source term, i.e., how much material in what form (gas/liquid/two-phase) is being released from containment as a function of time, and development of the release scenarios or possible hazard outcomes (cloud dispersion, fire, explosion, etc.) following the release.

ii. Estimation of the hazard level (hazard modeling) as a function of time and at selected receptor locations, i.e., estimation of:
   - Ambient concentrations for a toxic or flammable gas release (for modeling the effects of a toxic cloud or flash fire),
   - Thermal radiation flux for fires (for a jet fire, pool fire, or fireball),
   - Overpressure for explosions (for a confined explosion, boiling liquid expanding vapour explosion [BLEVE], or vapour cloud explosion [VCE]).

iii. Estimation of damage level on the selected receptor, based on the hazard level at the receptor location (vulnerability modeling).

2. Incident Outcomes – Definitions

2.1 Fireball

One of significant fire hazard related to liquefied gas. The fireball either results from the bursting of pressure vessel or from vapor cloud explosion. In the first case bursting may occur under fire conditions and be part of a BLEVE or it may occur in the absence of fire. Momentum forces predominate, if fireball is formed from the bursting of vessel, while buoyancy forces predominate, if it is formed from a vapor cloud.

2.2 Pool Fire

A pool fire occurs when a flammable liquid spills onto the ground and is ignited. A fire in a liquid storage tank is also a form of pool fire, as is a trench fire. A pool fire may also occur on the surface of flammable liquid spilled onto water.

2.3 Jet Fire

Normally on high-pressure release of pressurized vessel or pipelines on ignition, burn likes a jet flames in open space. Any equipment can come in heavy thermal load if the flame jet impinges on it. The consequent radiation hazard is very small.

2.4 Unconfined Vapor Cloud Explosions (UVCE) and Flash Fire

When gaseous flammable material is released a vapor cloud forms and if it is ignited before it is diluted below its lower explosive limit, a vapor cloud explosion or a flash fire will occur. Insignificant level of confinement will result in flash fire. The vapor cloud explosion will result in overpressure.

2.5 Boiling Liquid Expanding Vapor Explosion (BLEVE)

A BLEVE occurs when there is a sudden loss of containment of a pressure vessel containing a superheated liquid or liquefied gas. It is sudden release of large mass of pressurized superheated liquid to atmosphere. The primary cause may be external flame impinging on the shell above liquid level weakening the vessel and leading to shell rupture.

2.6 Toxic Effect

The critical toxicity values which should be considered for evaluating effect on humans in the event of release of chemicals are:

a) Permissible exposure limits
b) Emergency response planning guidelines
c) Lethal dose levels.

3. Damage Severity Criteria

The quantitative estimation of effects of Thermal radiations and overpressure on human population, process and equipment is given in following three tables.

Table 1: Exposure at different incident levels of Thermal radiation

RADIANT HEAT (kW/m^2)	HUMAN EXPOSURE LIMITS*
35 to 37.5	100% lethality in 1 min; 1% lethality in 10 seconds
25	100% lethality in 1 min; significant injury in 10 seconds
12.5 to 15.0	1% lethality in 1 min; first degree burns in 10 seconds
9.5	Pain threshold reached after 8 seconds; second-degree burns after 20 seconds
4.0 to 5.0	Sufficient to cause pain to personnel if unable to reach cover within 20 seconds; However, blistering of the skin (second-degree burns) is likely; 0% lethality
1.6	Will cause no discomfort for long exposure

Table 2: Thermal radiation damage levels

INCIDENT HEAT FLUX (Kw/m^2)	DAMAGE TO EQUIPMENT	REMARKS
35.0 to 37.5	Damage to process equipment	Generally includes steel tanks, chemical process equipment, industrial machinery
25.0	Minimum energy to ignite wood at indefinitely long exposure without a flame	
18.0 to 20.0	Plastic cable insulation degrades	
12.5 to 15.0	Minimum energy to ignite wood	

	with a flame; melts plastic tubing	
* Based on an average 10 min exposure time		

Table 3: Explosion overpressure damage impacts

Overpressure (bar)	Mechanical Damage to equipment	Damage to people
0.3	Heavy damage to plant & structure	Fatality probability = 1 for humans indoor as well as outdoor >50% eardrum damage >50% serious wounds from flying objects
0.1	Repairable damage	1% death >1% eardrum damage >1% serious wounds from flying objects
0.03	Major glass damage/10% glass damage	Slight injury from flying glass

4. Software used for consequence assessment

Analysis of liquid/gaseous release events are made by analytical methods, like computer dispersion models PHAST which will predict real time scenario of the situations. The values of downwind concentration of vapor clouds are determined by the physical properties of the dangerous substances, meteorological data, leakage rate, etc. PHAST software is developed by DNV and is used for both consequence and risk calculations. It contains a series of up to date models that allow detailed modeling and quantitative assessment of release rate pool evaporation, atmospheric dispersion, Vapour Cloud Explosion, Combustion, heat radiation effects from fires etc.

5. Consequence assessment results using PHAST software are superimposed in map given in below table:

1. **Flash fire** from Full Bore Rupture of **Propane** unloading arm with wind speed **2 m/s** and **F stability class** at Oil Jetty-I (OJ-I).

2. **Jet fire** from Full Bore Rupture of **Propane** unloading arm with wind speed **2 m/s** and **F stability class** at Oil Jetty-I (OJ-I).

3. **Vapor Cloud Explosion** from Full Bore Rupture of **Propane** unloading arm with wind speed **2 m/s** and **F stability class** at Oil Jetty-I (OJ-I).

4. **Vapor Cloud Explosion** from Full Bore Rupture of **Butane** unloading arm with wind speed **2 m/s** and **F stability class** at Oil Jetty-I (OJ-I).

5. **Jet fire** from Full Bore Rupture of **Butene** unloading hose with wind speed **2 m/s** and **F stability class** at Oil Jetty-I (OJ-I).

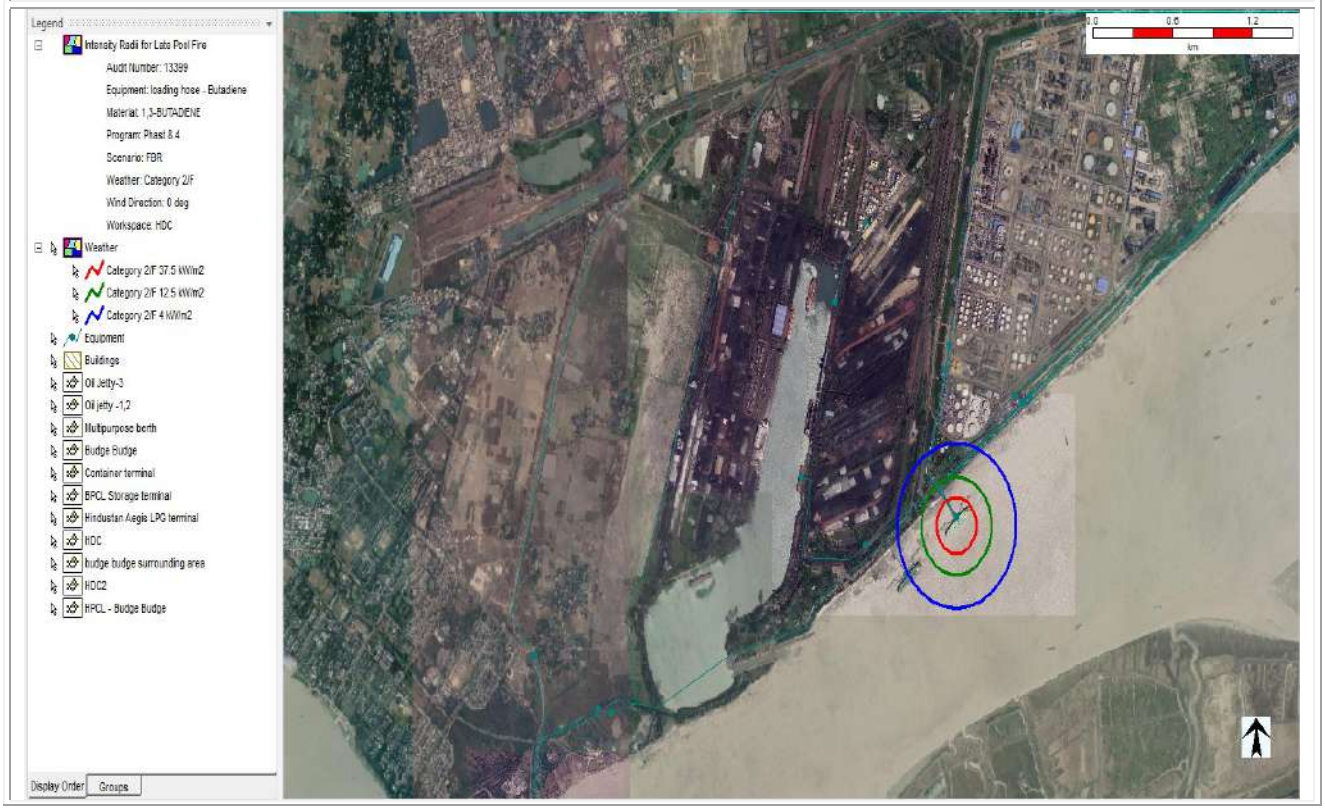
6. **Pool fire** from Full Bore Rupture of **Butene** unloading hose with wind speed **2 m/s** and **F stability class** at Oil Jetty-I (OJ-I).

7. **Flash fire** from Full Bore Rupture of **Butene** unloading hose with wind speed **2 m/s** and **F stability class** at Oil Jetty-I (OJ-I).

8. **Vapor Cloud Explosion** from Full Bore Rupture of **Butene** unloading hose with wind speed **2 m/s** and **F stability class** at Oil Jetty-I (OJ-I).

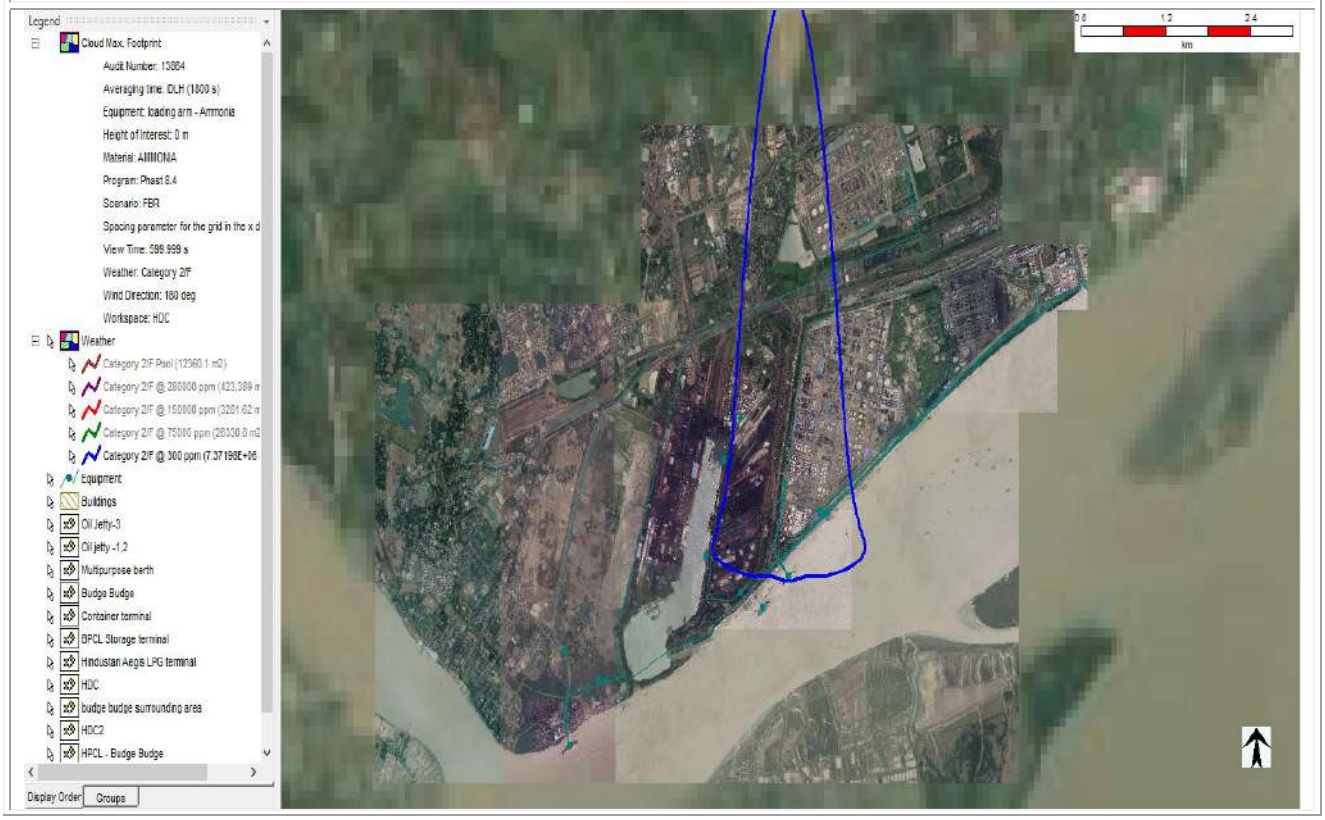
9. **Jet fire** from Full Bore Rupture of **Butadiene** unloading hose with wind speed **2 m/s** and **F stability class** at Oil Jetty-I (OJ-I).

10. **Pool fire** from Full Bore Rupture of **Butadiene** unloading hose with wind speed **2 m/s** and **F stability class** at Oil Jetty-I (OJ-I).



11. **Flash fire** from Full Bore Rupture of **Butadiene** unloading hose with wind speed **2 m/s** and **F stability class** at Oil Jetty-I (OJ-I).

12. **Toxic Dispersion** from Full Bore Rupture of **Ammonia** unloading arm with wind speed **2 m/s** and **F stability class** at Oil Jetty-I (OJ-I).



13. **Jet Fire** from Full Bore Rupture of **Propane** unloading arm with wind speed **2 m/s** and **F stability class** at Oil Jetty-II (OJ-II).

14. **Flash Fire** from Full Bore Rupture of **Propane** unloading arm with wind speed **2 m/s** and **F stability class** at Oil Jetty-II (OJ-II).

15. **Vapour Cloud Explosion** from Full Bore Rupture of **Propane** unloading arm with wind speed **2 m/s** and **F stability class** at Oil Jetty-II (OJ-II).

16. **Pool Fire** from Full Bore Rupture of **Butane** unloading arm with wind speed **2 m/s** and **F stability class** at Oil Jetty-II (OJ-II).

17. **Vapor cloud explosion** from Full bore rupture of **Butane** unloading arm with wind speed **2 m/s** and **F stability class** at Oil Jetty-II (OJ-II).

18. **Jet fire** from Full bore rupture of **Propane** unloading arm with wind speed **2 m/s** and **F stability class** at Oil Jetty-III (OJ-III).

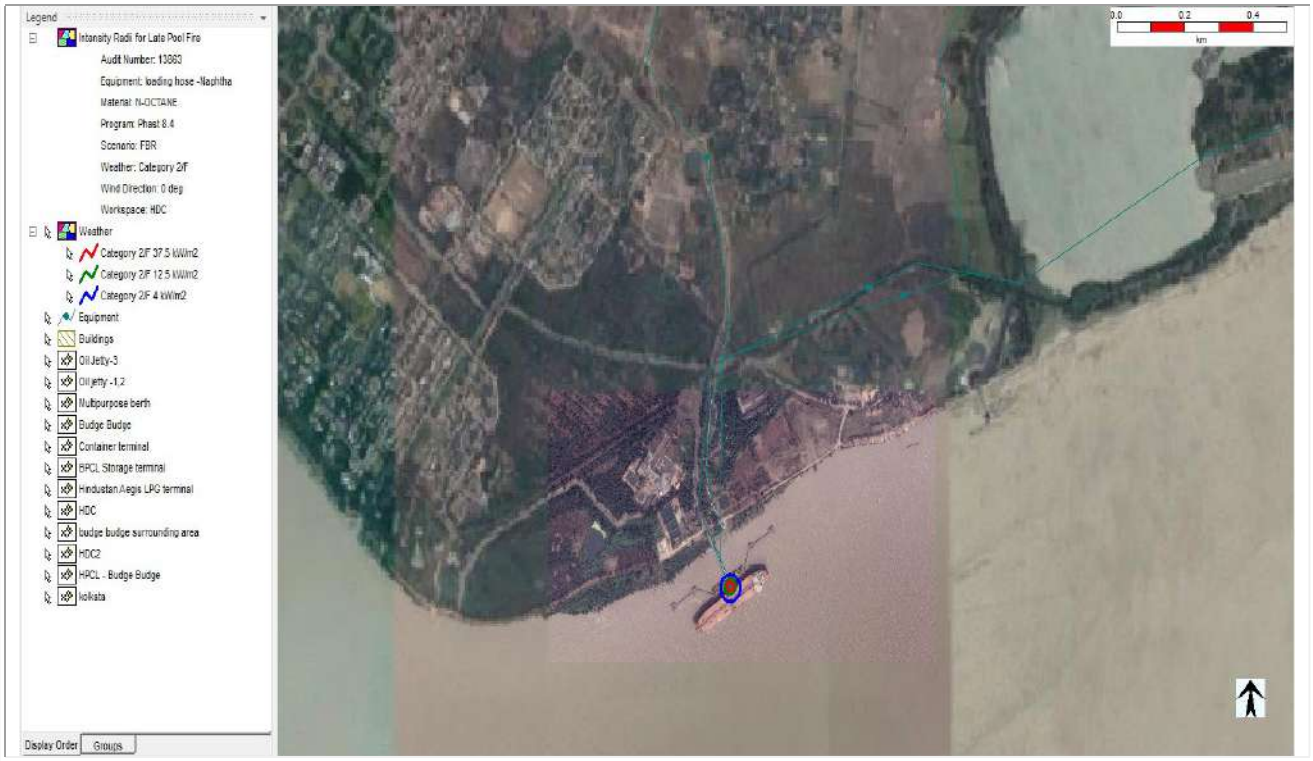
19. **Flash fire** from Full bore rupture of **Propane** unloading arm with wind speed **2 m/s** and **F stability class** at Oil Jetty-III (OJ-III).

20. **Vapor cloud explosion** from Full Bore Rupture of **Propane** unloading arm with wind speed **2 m/s** and **F stability class** at Oil Jetty-III (OJ-III).

21. **Flash Fire** from Full Bore Rupture of **Butane** unloading arm with wind speed **2 m/s** and **F stability class** at Oil Jetty-III (OJ-III).

22. **Vapor cloud explosion** from Full Bore Rupture of **Butane** unloading arm with wind speed **2 m/s** and **F stability class** at Oil Jetty-III (OJ-III).

23. **Pool Fire** from Full Bore Rupture of **Naphtha** unloading hose with wind speed **2 m/s** and **F stability class** at Oil Jetty-III (OJ-III).



24. **Pool Fire** from Full Bore Rupture of **Xylene** unloading hose with wind speed **2 m/s** and **F stability class** at Berth 2.

25. **Vapor cloud explosion** from Full Bore Rupture of **Benzene** unloading hose with wind speed **2 m/s** and **F stability class** at Multipurpose Berth.

26. **Jet fire** from Full Bore Rupture of **Propane** pipeline from Oil jetty-I with wind speed **2 m/s** and **F stability class**.

27. **Pool fire** from Full Bore Rupture of **Propane** pipeline from Oil jetty-I with wind speed **2 m/s** and **F stability class**.

28. **Flash fire** from Full Bore Rupture of **Propane** pipeline from Oil jetty-I with wind speed **2 m/s** and **F stability class**.

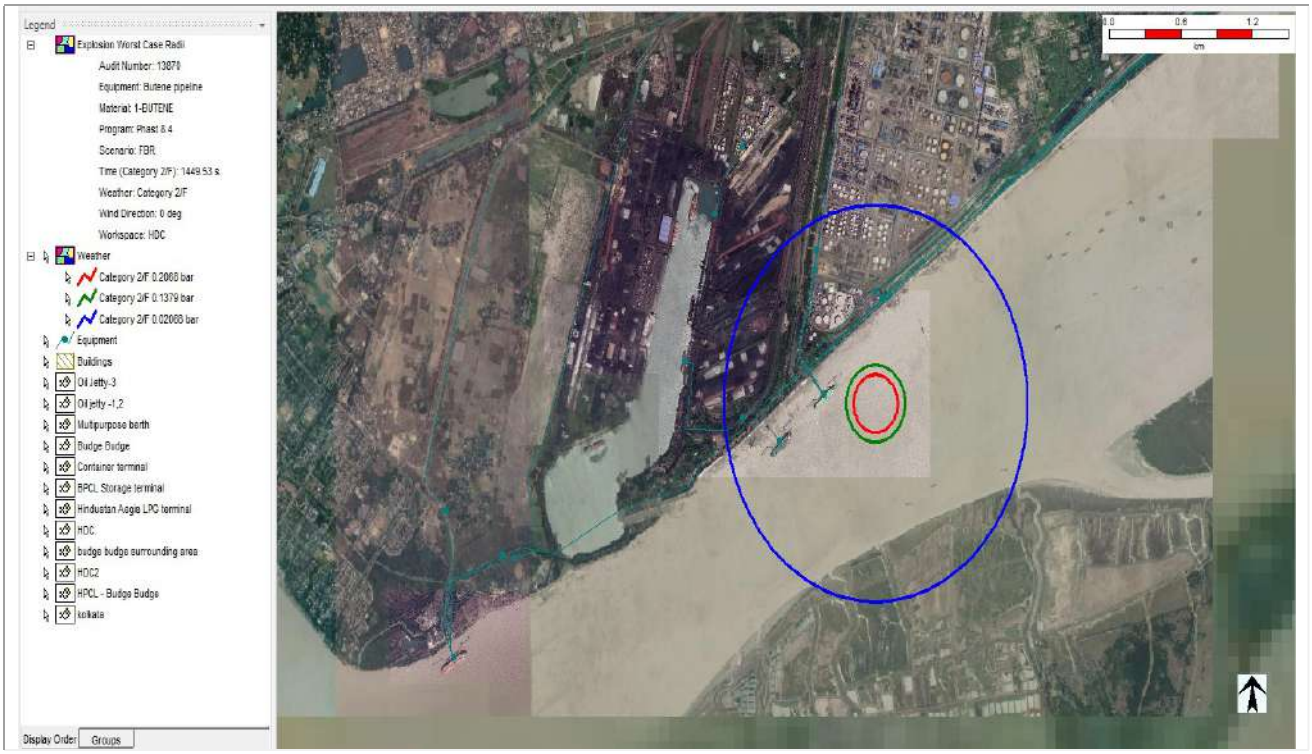
29. **Vapour Cloud Explosion** from Full Bore Rupture of **Propane** pipeline from Oil jetty-I with wind speed **2 m/s** and **F stability class**.

30. **Pool fire** from Full Bore Rupture of **Butane** pipeline from Oil jetty-I with wind speed **2 m/s** and **F stability class**.

31. **Vapor cloud explosion** from Full Bore Rupture of **Butane** pipeline from Oil jetty-I with wind speed **2 m/s** and **F stability class**.

32. **Toxic Dispersion** from Full Bore Rupture of **Ammonia** pipeline from Oil jetty-I with wind speed **2 m/s** and **F stability class**.

33. **Vapour cloud explosion** from Full Bore Rupture of **Butene** pipeline from Oil jetty-I with wind speed **2 m/s** and **F stability class**.



34. **Jet Fire** from Full Bore Rupture of **propane** pipeline from Oil jetty-III with wind speed **2 m/s** and **F stability class**.

35. **Vapour cloud explosion** from Full Bore Rupture of **Propane** pipeline from Oil jetty-III with wind speed **2 m/s** and **F stability class**.

36. **Vapor cloud explosion** from Full Bore Rupture of **Butane** pipeline from Oil jetty-III with wind speed **2 m/s** and **F stability class**.

37. **Pool fire** from Full Bore Rupture of **Xylene** pipeline from Berth 2 with wind speed **2 m/s** and **F stability class**.

38. **Pool fire** from Full Bore Rupture of **Benzene** pipeline from Berth 5 with wind speed **2 m/s** and **F stability class**.

39. **Pool fire** from Full Bore Rupture of **HSD** pipeline from Berth 2 with wind speed **2 m/s** and **F stability class**.

Part II

ENSURING BUSINESS CONTINUITY

1. OBJECTIVES

- Port resuming business operations as quickly and efficiently as possible.
- Preservation of cargo transport and supply chains.
- Developing partnerships between the public and private sector to improve the resiliency.
- Assessing and determining resources required and available to mitigate economic impacts of an incident on the port and its businesses.
- Determining how to create redundant and resilient power, water, sanitation, and data storage systems.

2. BUSINESS IMPACT ASSESSMENT

In the case of Level 2 and Level 3 disasters where serious disruptions in port business is possible due to collapse and damage to infrastructure and services in addition to human casualties, the process of recovery is conducted by undertaking a Business Impact Assessment (BIA). The following table lists the responsibilities of various authorities in case of major disasters.

SCENARIOS	LEVEL 2 & 3 – ACTION BY
Vessel- Collision/Grounding-Evacuation	Dy. Dock Master + CMG + Salvage efforts + Navy + Coast Guard
Casualties	Port + District + State
Fire & Explosion on Vessel or Berth/Jetty	Fire Officer + District (Fire wing) + CMG
Fire & Explosion at Transit Shed	Fire Officer + District (Fire wing) + CMG
Fire in Administration building, VTMS, control room, CHP and IOHP control center etc.	Fire Officer + District (Fire wing) + CMG
Oil or Chemical Spill	Dy. Dock Master + CMG + outside agencies
Toxic Gas Leakage	Dy. Dock Master + CMG +District/state assistance + outside agencies
Cyclone, Tsunami, Flood, Earthquake	Dy. Dock Master + National Disaster Management Group + CMG + District + State
Human related – Bomb threat, War and terrorism	CISF (Security) + CMG + National Disaster Management Group + District + State
Electric Supply breakdown	Dy. Manager (P&E) + CMG + District + State

Table II-1: Responsibilities of action for Level 2 and 3 type disasters

3. TOLERABLE RECOVERY TIME

The Port EOC will provide the initial response to a major disaster and stakeholders will have assigned unique function on their respective parts for recovery and restoration efforts. Each stakeholder is expected to maintain their respective business recovery plan for use and activation.

It has to be kept in mind that the business impact of the identified disasters will be in accordance the vulnerability profile of the port. Thus, a concept of "tolerable recovery time" for resuming business operations after an emergency is an important part of business continuity plan. The maximum tolerable recovery duration for some of the emergencies will be as follows:

1. 2 days for transport accident scenarios (rail and road);
2. 2 days for utility functional failures;
3. 4 days for disasters in service and administration facilities;
4. 4 days for collision, grounding and fire related disasters;
5. 21 days for Natural disasters;
6. 30 days for disasters during cargo storage or transfer.

The following table list the tolerable recovery times for the port for various identified scenarios as per HRVCA (Refer Table 2.5).

EVENT / SCENARIO SPECTRUM	**Time to Restore Facilities**
DISASTER DURING CARGO STORAGE/TRANSFER	
Fire /Explosion due to LPG/ POL / Chemical leakage at Oil Jetties	2-30 days
Toxic gas (Ammonia) leak during operation – on Ship or Ashore at Oil Jetty	2-7 days
Corrosive acid (Phosphoric/Sulphuric) leakage at berth	2-4 days
Fire/leakage due to Crane Accidents (Container drop/crane fall) - secondary event	2-7 days
Fire in Coal Stackyard	2 days
Fire in the conveyor system carrying coal	2-30 days
NAVIGATIONAL DISASTERS	
Collision with small craft – Tanker/ Container /BC/Heavy lift vessel (Area B)	4-96 hours
Collision between two vessels (Area A, B)	4-96 hours
Collision – Anchor dragging (Area A)	4-96 hours
Grounding – Tanker/Container/ BC/Heavy lift vessel (Area A, B)	4-96 hours
Vessel – Contact with berth/jetty/shore installation/lock gate (Area B, C)	4-96 hours
Contact with channel marking buoys / Riding over the buoy (Area A, B)	4-96 hours
Fire on vessel in Port Limit	12-96 hours
DISASTER IN SERVICE AND ADMINISTRATION FACILITIES	
Fire in Transit Sheds / Electrical substation/s	12-48 hours
Fire in the Admin building/ VTMS/ CHP/IOHP control center/Hospital	12-96 hours
NATURAL DISASTER	
Cyclone/Floods/Tsunami/Earthquake	7-21 days

TRANSPORT ACCIDENT	
Rail	1-48 hours
Road Accident	<1 hour
UTILITY FUNCTION FAILURE	
Electrical sub station	12-48 hours
Pump house	12-48 hours
Control room at lock gate and bridges	12-48 hours
Communications	12-48 hours

Table II-2: Time to restore for identified scenarios

4. PLANNING CONSIDERATIONS FOR BUSINESS CONTINUITY

In actual practice, deviations may occur due to reasons beyond control and same can be recorded so as to gain from experiences and work towards a "Build Back Better" approach. The recovery planning outlined for short, medium- and long-term measures will therefore need to be objective enough to meet these timelines. The lessons learned from earthquake damage to Kandla Port during Bhuj earthquake 2001 reveals damage to jetties, piles and RCC structures such as warehouse, the signal control tower and office building. In such an eventuality occurring at HDC steps to restore the functioning of the affected cargo berths and control stations will need extensive repair and rehabilitation measures.

In case of major incident or following a natural disaster resulting in stoppage of port operations, a BIA will be undertaken. Priority areas will be identified for short term recovery amounting to approx. 30 % capacity of cargo handling, medium term recovery amounting to approx. 70 % capacity of cargo handling and long-term recovery for 100 % capacity cargo handling.

Port will consider short-, medium-, and long-term priorities to better organize and improve recovery.

- Local priorities would be taken into account when determining where to focus recovery efforts.
- Assess the port functions, both internally and externally, to determine which manpower, materials, procedures and equipment are absolutely necessary to keep the port operating.
- Create a contact list for existing critical business contractors and others that the port can use in an emergency.

4.1 SHORT-TERM RECOVERY PLANNING

4.1.1 Damage Assessment and Prioritization of Restoration Work

Tasks during initial damage assessment will include the following.

- Assessment of Engineering Assets,
- Assessment of Current Condition of Facilities,
- Assessment of Utility Infrastructure.

4.1.2 Actions that assist in damage assessment will include the following.

- Documentation of Replacement Costs,
- As-Built Building Plans, Specifications and Other Facility Records,
- Determining, positioning, and planning for assistance to obtain Critical Recovery Resources.

Note: In relation to Oil Spill following an incident the OSCP will be brought into effect and immediate containment and recovery of oil will be undertaken.

4.1.3 Scope of inspection may include the following:

- Assessment of facilities by civil engineers to ensure compliance with local building and architectural codes and to ensure that damaged or repaired buildings are safe for occupancy.
- An underwater inspection by divers to check for possible demolition damage or deterioration of footings.
- An inspection of the piling at low water from a boat to check for damage. The stringers and deck are examined from below to determine the need for repair.
- Lock gate, berths/jetties, or seawalls are inspected for damage.

4.2 MEDIUM-TERM RECOVERY PLANNING

In medium-term recovery planning, the port will engage in contracting and setting up for reconstruction and resumption of operations at the affected site. This may include financial planning, contracting and the formation of mutual aid agreements to assist in business continuity.

4.2.1 MUTUAL ASSISTANCE

The port may include the recovery operations plans, provisions for the pooling of recovery and business resources (heavy lift equipment, for example), and pre-positioning where needed.

Port may require developing an alternate operational logistics support plan for cargo diversion in an incident at the port. It may also explore the agreements with Railways regarding goods movement in the event of an incident.

In case of damage to road infrastructure, port may also consider examining alternative transportation routes to and from the port and also within the port itself.

4.2.2 MEDIUM-TERM RECONSTRUCTION PROJECTS INCLUDE:

- Expedient repair of existing structures.
- Repair of unloading facilities e.g. quay cranes, loading arms etc.

4.2.3 MARKETING AND COMMUNICATIONS

Post-incident, port may consider publishing press releases and advertisements to demonstrate to the public that the port is open for business and still functional.

4.3 LONG-TERM RECOVERY PLANNING

This may include assessment and short- and medium-term measures as discussed earlier to provide temporary relief and alternate sites for cargo handling and VTMS. For full recovery steps including as listed below will be required.

- Determining the financial impact of the emergency on the port and the budget needed for recovery, including insurance reimbursement and non-reimbursement issues, and central govt. assistance;

- Building relationships with emergency management and first responders based on unmet coordination needs;
- Initiating public relations activities to rebuild confidence in the transition period on the part of customer and the community in its entirety.
- Administering recovery policy;
- Provide support for Construction & Maintenance, repair, alteration and reconstruction of port facilities and infrastructure;
- Laying out of plans and specifications and other contract documents necessary for the construction of new facilities and for any modifications to existing port facilities by engineering dept.;
- Repair of extensive damage to port buildings and properties and its maintenance;
- Assessment of environmental impacts of reconstruction projects and determining mitigation measures as appropriate by Environment dept. of port.