

# DEPARTMENTAL DISASTER MANAGEMENT PLAN FOR ENERGY DEPARTMENT



## **1. PREAMBLE**

"Crisis" is defined as an event of acute danger, which can cause sudden disruption of power supply. The event is caused either due to human error / equipment failure or sabotage by anti -social elements.

"Disaster" refers to a catastrophe, mishap, calamity or grave occurrence from natural or manmade causes which are beyond coping capacity of affected community. It brings sudden great misfortune bringing disruption to normal life including that of the power supply. Natural or other disasters can strike suddenly anytime and anywhere. As far as this document is concerned the word 'Disaster' is synonymous with 'Crisis'.

Power sector is one of the important infrastructures which may get affected due to any crisis / disaster leading to disruption in generation, transmission and distribution of electricity. It, therefore, becomes extremely important to evolve crisis / disaster management plan to restore the generation, transmission, and distribution of power to the affected areas in the shortest possible time.

This document deals with the various events, which may cause crisis or disasters in the power sector, preventive measures which need to be adopted to avoid any crisis / disaster, ways and means to tackle a crisis / disaster, if it occurs in spite of preventive measures. It outlines a hierarchical set up of crisis / disaster management at various levels for effectively and efficiently dealing with crises and disasters as well as roles / responsibilities of various Central / State departments and utilities in disaster management as per provisions of Disaster Management Act 2005 and National Policy on Disaster Management 2009.

## **2. Objective and Scope of Disaster Management Plan**

- (i) To improve state of preparedness to meet any contingency
- (ii) To reduce response time in organizing the assistance
- (iii) To identify major resources, man power material & equipment needed to make the plan operational
- (iv) Making optimum use of the combined resources.

## **3. CAUSES OF DISASTERS & CRISIS IN POWER SECTOR**

### **3.1 Disaster in power sector can occur due to natural to natural calamities such as:**

- Earthquakes
- Floods/cloud burst
- Tsunamis
- Cyclones
- Hurricanes, etc

And crisis situation can arise in power Sector in the event of:

- Terrorist threats / attack & sabotage
- Bomb threats & bomb explosions
- Strike
- Fire etc,
- Cyber attack

### **3.1.1 Natural Calamities**

Floods along with tsunamis/cyclone are main water related natural disasters. Landslides / avalanches mainly occur due to geo-technical instability by lubricating and infiltrating water. The water related disasters are climate related, on which mankind has but little control. One can only try to manage them and reduce their severity (mitigate them) only to a certain extent. Floods/ cyclones and their impacts occur in a relatively much shorter time. The impacts of these disasters and their multiplier effects on economy, national development and severity of affected infrastructures are well known but

needs to be adequately quantified to provide financial justification for undertaking mitigative measures. Events like earthquakes, floods, hurricanes, cyclones etc. have been instrumented and studied statistically and scientifically so as to predict their occurrence and intensities with certain degree of confidence. However, there is no certainty that these events would not exceed the predicted values based on past history and cause disaster. However, if various equipment and systems of power generating plant and transmission system are designed after site-specific studies, taking into account stipulations of the various codes / standards on the subjects, the damage to plant and equipment could be greatly averted.

### **3.1.2 Crisis Situations**

#### **3.1.2.1 Terrorist Threats & Attacks**

Power Generating plants, dams, substations, Transmission Lines and Load dispatch centers form prime target for such terrorist groups. These installations need to be protected against acts of terrorism. The terrorist related aspects could be dealt with by making use of advancement of technology in the areas of surveillance and proper intelligence network.

#### **3.1.2.2 Bomb threats, Hoax & Bomb Explosions**

Bomb explosion in Generating stations / sub-stations/Load Dispatch centers, etc., can lead to major crisis through disturbance in grid & disruption in power supply In the event of bomb explosion or a bomb threat, special measures need to be adopted under the expert's guidance.

#### **3.1.2.3 Strikes**

Strike by any section of the employees in a generating station/ substation/load dispatch centers or construction workers could lead to a crisis and can bring the system to a grinding halt if adequate steps to run the generating station/sub-station / load dispatch centers are not taken. This could ultimately lead to black out in areas, which could be as small as a locality or as large as a State or Region.

#### **3.1.2.4 Fire Accidents**

Like natural calamities, fires are big threat and cause loss to human life and property. However, disasters due to fire normally remains localized to a particular installation until and unless tripping of the entire power plant causes disturbance in the transmission grid by way of over loading and leading to tripping of other power stations/ transmission lines connected with the grid.

The most common cause of the fires is known to be electrical short circuits and fire triggered by the inflammable materials. The damages caused by the fire accidents generally take excessive time for restoration.

Analysis of causes of fire incidents reveal that majority of the fires could perhaps be prevented and extent of damage minimized, if fire safety measures were strictly enforced. Early detection of fire and swiftness in fighting it can definitely turn major disaster to minor accidents. In power sector accidents taking place on account of human error or due to malfunctioning of any equipment are also causes of crisis situations.

#### **3.1.2.5 Cyber Attack**

##### **3.1.2.5.1 IT Intervention in Power Sector**

The impact of cyber vulnerabilities is proportional to the criticality of the functions and systems being impacted. The cyber security vulnerabilities in generation sector are localized and its impact can shut down one unit or plant. The affect of vulnerabilities in centralized systems e.g. SCADA etc used in transmission sector is wide and has potential impact on the synchronous operation of entire Power System leading to Grid collapse. As far as distribution sector is concerned, where bulk of Smart Grid activities are visible, the impact of compromise of a centralized SCADA / DMS can lead to disruption of services to critical customers like hospitals, metro etc. which is critical for the units involved but at the same time not global and widespread.

#### **4. STRUCTURE OF DISASTER MANAGEMENT PLAN**

Natural calamities may be broadly grouped into major & minor types depending upon potential to cause damage to human life & properties. While the Central & State Level interventions are necessitated for major calamities, local agency should respond to minor incidents.

##### **4.1. There will be three types of **response elements** involved in this plan**

1. **Operational response** to get the disruption under control as quickly as possible so that normal operation is resumed.
2. **Management response** to allocate resources and making critical decisions needed to resolve the situation.
3. **Communication response** to communicate with employees, their families, officials, other agencies and media.

##### **4.2. Constitution of **Disaster Management group****

###### a) State level Disaster management group

- a) Principal Secretary / Secretary (Energy) of the State
- b) CEOs / CMDs of generating, transmission & distribution companies
- c) Representative of health & welfare agencies
- d) Chief Fire safety
- e) Inspector general Police

###### Responsibilities

- To mobilize resources for restoration
- To ensure that disaster management plans are in place
- To mobilize financial resources
- To facilitate inter-agency support
- To coordinate information
- To facilitate damage assessment

###### b) Plant level Emergency Management Group (EMG)

- a) In charge of the installation
- b) Plant safety manager
- c) Chief Plant Operation Administration
- d) Representative of District Administration

###### Responsibilities

- To direct action within the affected area taking into consideration the priorities for safety of plant personnel, minimize damage to plant property and the environment.
- To direct fire and security personnel for immediate action.
- To ensure that all non-essential workers/staff in the affected area are evacuated to safer places.
- Set up communication points.
- Report all development and requirements / assistance needed
- Preserve all evidences so as to facilitate any inquiry into the cause and circumstances which cause or escalated the emergency
- To coordinate with District Administration for necessary finance, medical law & order etc.

EMG shall maintain the following:

- 1) Safety data pertaining to all hazardous materials likely to cause emergency.
- 2) Procedure of major and special fire fighting materials likely to cause etc.
- 3) Procedures for tackling harmful gases and other chemical leakages.
- 4) Emergency call out list of persons drafted for emergency control, key personnel, fire safety, Fire safety, First aid, Medical, Security, police and District Admin. Authorities.
- 5) Emergency manuals, Blown up area maps, District Public address system. Emergency lights etc.
- 6) Identification of personnel for Mock drills & training Inter-group relationships in Disaster Management System and an overview of composition of these Groups and their responsibilities are depicted on the subsequent page.

## **5. PRE-DIASTER ACTIONS**

This stage occurs when the prior information is available about a situation that may lead to a disaster in near future: Organizing Public Awareness Programmes is very important. The people living around the project can play vital role in event of disaster. For this purpose public Awareness programme should be conducted regularly to make the general public aware about potential hazards likely to occur in project area. Emphasis may be given to the following aspects.

- Pamphlets and booklets constraining details Dos & Don'ts in the event of crisis/emergency situations and hazards associated with electricity generating stations be prepared and be made available to the general public.
- Permanent notice boards be fixed at all the suitable places in the area displaying information maps, escape routes, precautions to be taken and emergency communication details of nodal officers be displayed.
- Help from local youth organizations voluntary organizations educational institutions be sought to conduct educational session to make people aware about the safely measures and rescue operations in the event of a disaster.
- The Emergency' management Group (EMG), depending upon the nature of emergency should be put on high alert. The following actions are required to be taken:

### i) Pre-alert Notification:

This type of notification is mainly used for disseminating an important piece of information concerning slowly developing emergencies which can either be rectified or would take some time before they turn into a crisis/disaster.

### ii) Alert Notification:

An alert notification implies that although a crisis/ disaster is not imminent, aggravation of the situation could lead to crisis unless condition improve / plant Level EMG and Local Officials should be alerted that an unsafe situation is developing.

### iii) Warning Notification

A warning notification implies that a crisis/ disaster is imminent and advance action may be initiated for minimizing the damage / rescue operations. The warning notification indicating the magnitude of crisis/ disaster should be communicated to other power Station in the region and in case of hydropower projects, to the authorities concerned with the important structures located on the downstream stretches of the river.

### iv) Notification Responsibly

In case of developing crisis situation, the project authorities shall be responsible for issuing proper notification to District / state / Central level agencies, depending upon the severity of the crisis / disaster. Advance preparedness For effective preparedness to face the disasters and to avoid last minute arrangements in panic conditions. The following aspects shall be covered as an organizational practice:

- 1) Well-documented emergency plans.

- 2) Data on availability of resources and buffer stock of restoration materials
- 3) Identification of key personnel: with their skills and experience of the disaster management.
- 4) Allocation of budget for emergencies.
- 5) "Delegation of power" at various levels for disaster conditions.
- 6) Mutual assistance agreements signed by all power utilities for sharing men and material resources on demand.

Post disaster Response and Recovery stage:

Following features need to be kept in mind for efficient recovery with clear hierarchy of command system for mobilization of damage assessment teams.

- 1) Mobilization of teams for establishment of base camps / infrastructure.
- 2) Officer for communication with the outside environment / press etc.
- 3) Predefined staff for co-ordination with other agencies on restoration, front.
- 4) Management of funds and resources at the disaster front.

## **6. GENERATING STATIONS**

Odisha has Hydro, Thermal, Solar Power stations which are all prone to various kinds of Disasters & Crisis.

### **6.1 Thermal Power Stations**

There are all together 39 major Thermal Power Stations operating in the state including Central Govt., State Govt. & private power stations. The capacity of generation is ranging from 8 MW to 3000 MW. The detailed list of the Power plants is in annexure -I

#### **6.1.1 Areas Prone to Disaster / Crisis in Thermal Power Stations**

- a) Coal Handling plant
- b) Main plant (Boiler, Turbo Generator, Lube oil Tanks)
- c) Water Treatment plant
- d) Hydrogen Generation plant
- e) Switchyard including sub-station and transformers
- f) Fuel oil handling plant
- g) Cable Galleries
- h) Fuel oil handling plant
- i) Store where hazardous, flammable and explosive material are stored
- k) Balancing Reservoir
- j) Ash Dykes

#### **6.1.2 Areas Prone to Earthquake, Storm, Floods, Fires Terrorists Threats, Strikes** **Earthquake**

- (i) Chimney and other tall structures
- (ii) Boiler & its structures
- (iii) T.G. building, various floors, foundation of various equipments
- (iv) Control room
- (v) Transmission towers & substation Area
- (vi) Coal handling plant crushers, crusher buildings, belt conveyers, Coal bunkers etc.

#### **Storm & Floods**

- (i) Any or all the parts of the power station
- (ii) Basement underground facilities
- (iii) Cable trenches
- (iv) Coal handling plant underground conveyers, coal unloading systems

#### **Fire**

- a) Boiler furnace, Coal burner, Flue gas duct
- b) Coal Handling Plant and conveyor galleries including Transfer points
- c) Cables in galleries and on trays in all plant sections

- d) Fuel oil handling and oil tanks in Main plant
- e) Transformer oil and lub. oil storage facilities
- f) Burners area in boilers & ESP
- g) Central Stores / Godowns
- h) Control Room
- i) Turbine Hall
- j) Any part of the Main Plant
- k) Turbine Oil Tanks in Units
- l) All Power Transformers & Switch Gear rooms
- m) Mill Plant & Milling area

**Terrorist Threats/Bomb Threats**

- (i) Boiler house/chimney
- (ii) T.G. areal control room etc.,
- (iii) Residential complex

**Strike**

Any part of the plant or entire plant

**Explosion Hazard Areas**

- a) Hydrogen Plant
- b) Turbo Generators where Hydrogen is used for cooling of Generator
- c) Transformer (oil cooled)
- d) Boiler (Coal/ Oil fired)
- e) Coal dust in Mills and boilers

**Bursting of Pipe Lines & Vessels - Areas**

- a) Steam pipes due to high pressure / temperature
- b) H<sub>2</sub> Gas lines and Acid lines
- c) Acid / Alkali and tanks
- d) H<sub>2</sub> Gas Cylinders
- e) Compressed air header
- f) Compressed air receivers
- g) H<sub>2</sub> Gas Holder

**Release of Gases / Dust- Areas**

- a) Chlorine in Water treatment plant
- b) Hydrogen in Turbo Generator area of Main plant and H<sub>2</sub> plant
- c) Pulverized Coal dust from mills and associated piping and flue gases
- d) Coal dust in transfer points of CHP. Crushers, Water tipplers and Mill area
- d) Flue gases from the ducts

**Release of Chemicals - Areas**

- a) Chemical tanks and Chlorine toners in water treatment plant
- b) Acid & Alkali storage tanks in WTP
- c) HCL tanks at ETP
- d) Fuel oil tanks in fuel oil handling section
- e) Control fluid in 500 MW turbine systems

**6.2 Hydro Power Stations**

There are all together 9 Hydro Power Stations operating in the state including State Govt. & private small Hydro power stations. The capacity of generation is ranging from 12.5 MW to 600 MW. The detailed list of the Hydro Power plants is in annexure – I

### **6.2.1 Areas Prone to Disaster / Crisis in Hydro Power Stations**

#### **Floods / Cloud burst**

- (i) Underground structures in the power houses
- (ii) Diversion structures like dam, weirs, and barrages
- (iii) De-silting facilities / chambers, associated infrastructure e.g. Access Road, bridges

#### **Landslides**

- (i) Water conductor systems, surge shaft, pressure shaft, penstocks
- (ii) Surface power houses.
- (iii) Diversion structures like dam, barrages, weirs etc.
- (iv) Associated infrastructure e.g. Access Roads, bridges

#### **Fire and Accidents**

- (i) Cable galleries
- (i i) Switchyard
- (iii) Transformer and switchgear rooms.

#### **Earthquakes**

- (i) Structural failures
- (ii) Generator alignment

#### **Terrorist / Bomb Threat / Attack**

- (i) Dam
- (ii) Power house
- (iii) Valve House
- (iv) Control room
- (v) Residential Complex
- (vi) All types of Gates, Access Tunnel

#### **Strikes**

Any part of the plant or entire plant

## **7. ACTION PLAN FOR GENERATING STATIONS**

### **Thermal Station**

Each generating station have slight specific site specific disaster management action plan which inter-alia include:

- Details & contact procedure for key personnel.
- Well defined hierarchy of command & action.
- Identify communication channels and emergency communication system.
- Identify source of disaster and steps to contain the same.
- Isolate remaining plant and keep them in safe condition.
- Organize safe shut down of the plant.
- Organize all support services like fire fighting system etc.
- Emergency maintenance jobs on top priority.
- Arrange required safety equipment.
- Guide authorities on all safety related issues.
- Record the accident details.
- Arrange for evacuation of man and materials from the affected area.
- Arrange for ambulance and emergency first aid.



## **7.1 First Information**

The first source of information may be a local operator's observation or message from state/central government agencies/authorities. The information should immediately reach Emergency Management Group who in turn through chain of command is made known to all personnel such as:

- 1) Fire Station
- 2) Security staff
- 3) Communication System
- 4) Safety Managers

## **7.2 Key Personnel**

Apart from EMG, other works personnel will have key roles to play in providing advice and in implementing the decisions made by the EMG. The key personnel shall include the following:

- 1) Head of Tech. services
- 2) Head of internal security
- 3) Head of safety
- 4) Chief medical officer
- 5) Deputy Commandant, Security Services
- 6) Inspector (Fire)
- 7) Engineer-in-charge of Transport (Auto Base)

A list of key personnel along with their communication details shall be informed to all concerned. Above personnel shall decide the actions needed to evacuate personnel, carry out emergency engineering works, arrange supplies of equipment, personnel, etc, liaison with police, inform relatives of the victims, etc.

## **7.3 Essential Staff**

In plants immediately affected or likely to be affected as decided by the EMG, efforts shall be made to shut down the plant and make the process units safe. This work shall be carried out by the plant supervisors and essential operators. It will be the responsibility of the EMG to identify the above essential staff and form a Task force, which reports at defined locations so that they can be readily contacted. It will also be the responsibility of the EMG to remove all non-essential staff to assembly points.

## **7.4 Responsibilities of Teams**

### **7.4.1 Task Force**

Identify source of hazard and try to neutralize / contain it

- 1) Isolate remaining plant and keep it in safe condition
- 2) Organize safe shut down of the plant, if necessary
- 3) Organize all support services like operation of fire water pumps, sprinkler systems, etc.
- 4) Any other responsibility as decided by Team Leader, looking into the circumstances at the time of the crisis / disaster

### **7.4.2 Maintenance Team**

- 1) Attend to all emergency maintenance jobs on priority basis.
- 2) Take steps to contain or reduce the level of hazard that can create a crisis / disaster.
- 3) Organize additional facilities as required.
- 4) Any other responsibility as decided by Team leader, looking into the circumstances at the time of the crisis / disaster.

#### **7.4.3 Security Team**

- 1) Man all the gates
- 2) Bar entry of unauthorized persons and non-essential staff
- 3) Permit with minimum delay the entry all of authorized personnel and outside agencies, vehicles, etc. who have to provide assistance
- 4) Allow ambulances / evacuation vehicles through without normal checks
- 5) Any other responsibility as decided by Team leader, looking into the circumstances at the time of the crisis / disaster

#### **7.4.4 Administrative team**

- 1) Rescue casualties on priority basis
- 2) Transport casualties to first aid post, safe places or medical centers
- 3) Account for personnel
- 4) Help in search for missing personnel
- 5) Pass information to the kith and kin of fatal and injured persons
- 6) Any other responsibility as decided by Team leader, looking into the circumstances at the disaster.

#### **7.4.5 Safety team**

- 1) Arrange required safety requirement
- 2) Arrange to measure polluted gas concentration in case of gas leaks at various location.
- 3) Record location.
- 4) Collect and preserve evidence in connection with accident, guide authorities on all safety related issues.
- 5) Any other responsibility as decided by Team Leader, looking into the circumstances at the time related of the disaster.

#### **7.4.6 Medical team**

- 1) Arrange first aid material stretcher and reach accident site quickly
- 2) Arrange for immediate medical attention
- 3) Arrange for sending the casualties to various hospitals and nursing homes etc.
- 4) Ask specific medical assistance from outside including through medical specialists in consultation with the EMM.
- 5) Any other responsibility as decided by Team Leader looking into the circumstances at the time of the crises / disaster.

#### **7.4.7 Fire Fighting Team**

In case fire erupts and emergency is due to fire, the fire Team shall be responsible to:

- 1) Rush to the fire spot to extinguish the fire
- 2) Seek help from external fire fighting agencies
- 3) Evacuate persons affected due to whatsoever reasons
- 4) Any other responsibility as decided by Team leader looking into the circumstances at the time of disaster.

#### **7.4.8 Auto Base Team**

- 1) Make the whole auto base vehicles ready to proceed for evacuation or other duties when asked for
- 2) Send at least one mechanic to site of incidence where he may help in attending minor defects in ambulance, fire renders or other vehicles
- 3) Arrange petrol I diesel supply
- 4) Make all arrangements regarding transportation

5) Any other responsibility as decided by Team leader, looking into the circumstance at the time of disaster.

#### **7.4.9 Communication Team**

- 1) Maintain the communication network in working condition
- 2) Attend urgently repairs in the communication system, if required
- 3) Any other responsibility as decided by Team Leader. looking into the circumstances at the time of disaster

#### **7.4.10 Support Teams**

##### ***Head of Personnel***

- 1) Contact statutory authorities
- 2) Arrange for relievers and catering facilities
- 3) Give information to the media
- 4) Arrange shelters for affected in contacting medical centers nursing homes

##### ***Head of Material***

- 1) Arrange for urgently required materials through cash purchase or whatever means
- 2) Any other responsibility given by Station In-charge

##### ***Head of Finance***

- 1) Arrange for funds for various relief measures as well as emergency purchase of-materials, sending his representative for emergency purchase
- 2) Any other responsibility given by station In-charge.

## **8. DISASTER MANAGEMENT PLAN FOR HYDRO POWER PROJECTS**

### **ORGANIZATION PROFILE**

Odisha Hydro Power Corporation Ltd (OHPC) was incorporated under the Companies Act, 1956 on 21<sup>st</sup> April 1995 based on the reforms restructuring of the A state Power sector. OHPC started Business Operation with effective from 01.04.1996 with transfer of Hydro Power projects from Govt. of Odisha and erstwhile OSEB to OHPC. The Present Manpower Strength is 2300.

### **VISION:**

We are driven by the vision of being a leading Power utility in the energy sector through diversified energy portfolio with due care and concern to the environment.

### **MISSION:**

- To develop water resources in the state & elsewhere.
- To adopt state of the art Technology for up gradation of the existing Hydro power stations to achieve highest level of efficiency.
- To establish and operate Thermal Power Plants through Joint Ventures and also explore the opportunities to develop renewable Energy resources.

### **8.1 DETAILS OF INFRASTRUCTURE:-**

<b>Sl . No.</b>	<b>Name of the Power Stations / Location</b>	<b>River</b>	<b>No. of Units</b>	<b>Years of Commissioning</b>	<b>Installed Capacity</b>
01	Hirakud HEP, Burla	Mahanadi	07	1958-63(Unit-1 to 6) and 1990 (Unit-7)	275.5 MW

02	Chipilima HEP, ChiPilima	Hirakud Power channel	03	1962-64	72 MW
03	Balimela HEP, Balimela	Machkund- Sileru	08	1973-77(Unit-1 to 6) and 208-09 ( (Unit-7, 8)	510 MW
04	Rengali HEP, Rengali	Brahmani	05	1985-92	250 MW
05	UIHEP, Mukhiguda	Indravati	04	1999-20001	600 MW
06	UKHEP, Bariniput	Kolab	04	1988-93	320 MW
07	MHE Jt. Scheme	Machkund	06	1955-60	34.5 MW(Odisha Share)
	<b>Total</b>		<b>37</b>		<b>2062 MW</b>

## 8.2 ORGANIZATION STRUCTURE:-

The Board of Directors constituted by the Department of Energy is the apex body for the Management of OHPC.

Top level corporate structure consists of the following Functional Directors and other Functional Heads, who are reporting to the Chairman.

Position	Functions of Department
Chairman	Nominated by GoO to officiate as Chairman of OHPC.
Managing Director	<ul style="list-style-type: none"> <li>Overall head of the Organization &amp; responsible for three functions such as Operation, Finance &amp; HR.</li> </ul>
Director Operation	<p>O&amp;M function is headed by Director (Operation) with following sub-functions:</p> <ul style="list-style-type: none"> <li>Operation &amp; Maintenance of Power stations.</li> <li>Civil Works.</li> <li>Contract &amp; Procurement,</li> <li>Tariff &amp; Regulatory affairs.</li> <li>Electricity billing &amp; Energy compensation billing.</li> <li>Safety, Security</li> <li>Statutory Compliances, Audit, Assembly &amp; Parliament Matters.</li> <li>Store &amp; Inventory Management</li> <li>R, M &amp; U, JV Projects &amp; New Projects.</li> <li>Corporate Planning, Monitoring of Projects, PPP Cell</li> <li>IT &amp; Automation, IT Infrastructure,</li> <li>Matters related to GCC, SLDC and ERPC etc.</li> <li>Standards</li> </ul>
Director Finance	<p>Functions of Finance department shall be :</p> <ul style="list-style-type: none"> <li>Corporate Finance</li> <li>Corporate Accounts</li> <li>Terminal Benefits</li> <li>Internal Audit</li> </ul>

Position	Functions of Department
Chairman	Nominated by GoO to officiate as Chairman of OHPC.
	<ul style="list-style-type: none"> <li>• Capex Monitoring</li> <li>• Regulatory &amp; Tariff</li> </ul>
Director HR	<p>Functions of HR department shall be :</p> <ul style="list-style-type: none"> <li>• Training and development</li> <li>• Manpower planning, Recruitment, Promotion, Transfer, Policy formulation,</li> <li>• Welfare, General Administration, Estate,</li> <li>• Employee benefits, IR Matters, Personnel Matters and Employee Relations.</li> <li>• Corporate Communication and facilities/Service Management.</li> <li>• ERP solutions</li> </ul>
Company Secretary cum Chief Vigilance Officer	All statutory matters, company affairs, Board matters etc including the responsibility of Chief Vigilance Officer.

### 8.3 **HAZARDS, VULNERABILITY, CAPACITY AND RISK PROFILE:-**

Disaster is a calamity from natural or manmade causes which are beyond the coping capacity of the affected community / Organization. It brings great misfortune bringing disruption to normal life including that of the Power Supply.

#### 1) **Nature, frequency and intensity of Disaster to which OHPC is prone to or likely to be impacted in future.**

Power Sector is one of the critical infrastructures which may get affected due to any Disaster leading to disruption in Generation, Transmission & Distribution of electricity. Generation is one of the most important components of power system. Power Station is the first in the long chain system, where the sector will be affected in totality, if any, and disaster happens.

The Power Stations of OHPC are vulnerable to the following disaster / hazards which are likely to impact our Power Plant. The causes of losses / damages in Power Stations are generally due to Fire, Electrocutation, Flooding in Power Station, Black out, Explosion, Accident, Terrorist Attack, Land Slides of power house etc. However, fire is the most prevalent one.

#### 2) **Objective & scope of disaster management plan:**

- (a) To improve State of preparedness to meet any contingency.
- (b) To reduce response time in organizing the assistance
- (c) To identify major resources, manpower, material & equipment needed to make the plan operational
- (d) Making optimum use of the combined resources.

#### 3) **Causes of Disaster & Crisis in Power Station:-**

Disaster in Power Station can occur due to the following:

**i) Fire Accident: -**

Fire is the common hazard in Power Stations. Fire may break out due to bursting of Bushing, Current Transformer and OCB etc. The most credible hazard scenario among all anticipated hazard scenario in our plants is Fire. Oil Filled Equipments viz. Generator Transformer., Station Service Transformer, Unit Auxiliary Transformer, Circuit Breaker, Current Transformer., Potential Transformer., Capacitor Voltage Transformer, Welding Equipments, Oil handling plant, Oil pressure equipments, Oil Drums etc. are more prone to fire. More over electrical hardware / equipment store, Oil store, Battery Room, Cable Gallery etc. are also prone to fire.

This may due to electrical Short-Circuits, Mal operation, Sabotage, Negligence, Heavy Friction, Excessive Heat, External Fire and Fire triggered by the inflammable material. The damage caused by the fire accident generally takes excessive time for restoration.

**ii) Electrocution:-**

Electrocution is also one of the major hazards in power stations. This may due to coming in contact with live part of LT, HT & EHT Lines and Cables, Other Electrical Equipments, and Switch Yard equipments as a result of carelessness, unmindful at working place, non use of Safety Equipments, Electrical Accident and damage to any electrical parts.

**iii) Flooding in Power Station:-**

Flooding is another frequent occurring hazard in low head power stations (Run of Reservoir). The underground structure in the Power House, diversion structures like Dam, WEIRS, & BARRAGES etc. are prone to disaster. Flooding may occur due to (i) failure of power supply causing non-operation of Dewatering Pumps. (ii) Failure of Dewatering Pump Motors in the Turbine Floor & Dewatering Pits (iii) Excess leakage of water from water conducting system (iv) Seepage / Leakage from dam toes.

**iv) Terrorist Attack:-**

Generating Plants, Dams, Sub-Stations are prime target for Terrorist groups. These installations need to be protected against acts of terrorism. Terrorist may attack during any time at Power Houses, Valve House, Switch yard and Transformer Deck causing flooding & fire in both Switch Yard & Power House.

**v) Strikes:**

Strike by any section of the employees in the Power Stations could lead to a crisis and bring the system to a grinding halt.

**vi) Explosion / Bomb Explosion / Hoax: -**

Explosion may occur in Compressor Pressure Vessels, Transformer Tank, Bushings, Oil Barrels, Oil Tanker etc. due to non-functioning of Emergency Release Valve / Safety Valve, Explosion Vents, Sabotage, Excessive pressure development, Ageing of equipments, failure of protection and control system equipments etc.

**vii) Accident: -**

Accident may occur due to dangerous Machines, Unsafe Physical Condition, Moving Objects, Lack of knowledge of Operation and Maintenance of Machine, unsafe working condition and electrical accident/short circuits.

**viii) Land Slides: -**

Land Slide may occur along the penstock pipe lines, valve house upper site etc. due to heavy rain.

**ix) Black Out of Power House:-**

Black out may occur in Power stations due to system disturbances.

**x) Historical / Past Disaster / Losses in Power Stations :-**

There are several cases of bursting of CT / PT / Bushing / Breaker in some of our power stations due to ageing / non-functioning of Protection & Control instruments / Snapping of jumper / conductor etc.

**xi) STRUCTURE OF DISASTER MANAGEMENT PLAN**

1. Constitution of Disaster Management Group:

- a) Organization Level Disaster Management Group:-
  - i. MD / CMD
  - ii. Director (Operation) / Director(HRD) / Director (Finance)
  - iii. Officer in Charge of Welfare
  - iv. Office in Charge of Safety & Security
  - v. Nodal Officer in respect of Disaster Management
- b) Responsibilities:-
  - To mobilize resources for restoration
  - To ensure that Disaster Management Plans are in place of
  - To mobilize financial recourses
  - To facilitate inter-agency support
  - To coordinate information
  - To facilitate damage assessment
- c) Plant Level Emergency Management Group (EMG)
  - Unit Head of the respective Power Stations
  - Technical Wing Head i.e. the Main Controller
  - Finance Wing Head
  - HR Wing Head
  - Power Plant Safety Officer cum-Nodal Officer in respect of Disaster Management of the Unit.
  - Manger Generation i.e. Incident Controller
  - OIC of the Local Police Station
  - Representative of District Administration
- d) Responsibilities:-
  - To direct action within the affected area taking into consideration the priorities for safety of plant personnel, minimize damage to plant property & the environment.
  - To direct fire and security personnel for immediate action
  - To ensure that all non-essential workers / staff in the affected area are evacuated to safer places.
  - Set up communication points.
  - Report all development and requirements / assistance needed
  - Preserve all evidences so as to facilitate any inquire in to the cause and circumstances which cause or escalated the emergency.
  - To coordinate with District Administration for necessary help towards medical/ law & order etc.
- e) EMG shall maintain the following at the Main Control Centre:-
  - Emergency call out list of key personnel / Emergency Services for emergency control such as Unit Head, Technical Wing Head, Manager Generation, Safety Officer, Fire Safety, First aid, Drinking water Tanker, Medical, Security, Police & District Admin. Authorities.
  - Emergency Manuals, Blown up area maps, Public address System, Emergency Lights, Emergency Food Supplies etc.

- Identification of personnel for Mock Drills & training of inter-group relationship in disaster Management System and an over view of composition of these Groups and their responsibilities.

#### **8.4 PREVENTION, MITIGATION AND PREPAREDNESS PLAN:-**

##### **1. Measures necessary for prevention of Disaster:-**

- I. Periodically checking, testing, maintenance etc. of all equipments and regular checking of Protection & Control Instruments as per the Manufacturer's specification as preventive maintenance.
- II. Regular checking of fire extinguishing system fitted in Transformer / Generator / Cable Gallery / Switch Yard etc.
- III. Action is taken to improve the disaster management activities such as Fire Fighting System/ Flood Management / Terrorist Attack with the following provisions / with modern equipments.
  - (a) Installation of adequate number of Fire Extinguishers in fire prone location.
  - (b) Installation of additional hose pipes and nozzles in different locations.
  - (c) Installation of Emulsifier system in Switchyard.
  - (d) Installation of advanced Fire Fighting System to improve the preparedness for fire fighting.
  - (e) Installation of CCTV Camera and HIGH TECH Security System for prevention of Terrorist attack.
  - (f) Provision of DG set of required capacity at each power stations.
  - (g) Provision of required no of De-watering pumps at each power station.
  - (h) Adequate quantity of POL in stock for DG Sets.
  - (i) Arrangement for adequate number of vehicles to ensure movement of personnel and material to safe place(s).

##### **2. Preparedness Plan for Disaster Management.**

- (a) The following Fire Fighting equipments are available at different Power Stations to protect man & material from fire hazard
- 1) Emulsifier system in Transformer Deck for Generator Transformer, Unit Auxiliary Transformer and Cable Room.
  - 2) Centralized CO<sub>2</sub> system (O<sub>2</sub> Banks) for generator barrel.
  - 3) Fire hydrants with hose pipes at different locations of Power House.
  - 4) Smoke detectors & Heat Sensors available in Generators/ Cable Gallery.
  - 5) Portable CO<sub>2</sub> fire extinguishers /ABC powder type fire extinguishers provided at Control Room, Turbine Floor and DC Room of Power House, Switch Yard, Different Stores & Offices, Garage, Workshop, Equipment stores etc.
  - 6) Automatically sprinkler systems are available throughout the Cable Galleries to extinguish the fires.
  - 7) Fire Resistance Barriers are available at the cable entries / Intersection, intermittent places on cable trays.
  - 8) Fire buckets provided in Switch Yard premises and Store.
  - 9) Fire triangles shown at different locations
  - 10) Water hydrant systems provided both inside the power house and near the Generating Transformer of 132 KV Switch Yard.
  - 11) Hydraulic Hoses fitted with required sizes of valves available for spraying of water for extinguishing fire.
  - 12) Fire Brigades are called from nearest fire stations as and when required.



**(b) Flood Control: -**

Dewatering pump motor sets of different capacities are installed for dewatering inside power house. Dewatering pumps at Turbine Top Cover for generating Units, Sump Pits, and Foundation gallery for dewatering of leakage water are run automatically. Spare pumps are also available for emergencies.

**(c) Black Out:-**

(i) One DG set each has been installed at each power station to facilitate the 'Black Start' facility as well as emergency power supply. Further trial run is being held in every six month to authenticate our preparedness to face black outs.

(ii) D.C. illumination System is available in case of power failure.

**(d) Fire Accident, Electrocutation etc.**

(i) Emergency Treatment Facility is available in each power station in case of injury arising out of Fire/Accident/Electrocutation etc.

(ii) First Aid boxes are provided in each shop floor Areas such as:-

- a. Control Room
- b. Near Turbine Floor Operator Table
- c. Switch Yard Workshop
- d. Utility Division Electrical Maintenance Section.

(iii) Emergency Medicine provision in the Dispensary / Hospital.

**(e) Transport Facility:-**

An emergency vehicle remains in the Power House round the clock to meet any emergency to shift the injured person to nearby Hospital.

**(f) Land Slide: -**

Stone Packing has been made in both sides of penstock pipe lines of high head Power Station to avoid damage to the penstock Pipelines in case of Land Sliding.

**(g) Emergency Communication System**

Three Tier Communication Systems which are available in the Main Control Centre are given below:-

- Intercom Telephone facilities provided to all essential / important points of different Power Houses.
- Land Line Telephones facility to some Key Executives such as Unit Head, Technical Wing Head, Finance Wing Head, HR Wing Head, Field Managers (Divisional Heads).
- Video Conferencing Communication System available at different Power Stations (Including Inter Units & Corporate Office).
- Power Line Carrier Communication System (PLCC) managed by M/s. OPTCL (which is an independent communication system) available to all concerned outside the Power Station for communication in case of other system of communication failed.
- Communication to the State Load Dispatch Centre (SLDC), Bhubaneswar through PLCC system available.
- Communication to the Nearest 132 / 220 / 400 KV Grid Sub-Station of OPTCL / PGCIL on PLCC system available.

## **8.5 Mechanism for early warning & dissemination of information thereof:-**

### **1. (STANDARD OPERATING PROCEDURE:-**

The role of Shift Personnel on duty during occurrence of the incident is vital. Because this team will isolate the hazardous area and communicate news to all concerned and is to take initial steps to meet the emergency, till the emergency team members arrive at site.

Measures to be taken by Operation Personnel (Action Team-A) during the disaster are given below:

#### **(A) Fire Alarm (Siren):-**

i) In case of Fire, in any part of the Power House premises,

To put "ON" the SIREN to inform all the personnel including Power House Colony. The siren under such situation is continuous type which is distinguishable from normal shift change siren used during starting of Generating units.

#### **ii) Fire in Cable Gallery:**

In case of fire in Cable Gallery, make all AC / DC system "OFF". Subsequently, the emulsifier system operates automatically. But in case of non operation of auto mode, manually operate from the panel or deluge valve immediately. In case of failure of auxiliary supply to make up Pump, operate the D.G. Set of filter house. In addition to this, use fire breakers in cable gallery to protect from fire.

#### **iii) Fire in Store / Fire in Other Auxiliary Equipments / Panels:-**

- Disconnect all the electrical lines. Isolate the AC / DC supply.
- Apply portable fire fighting cylinders / fire buckets immediately.
- Take out carefully the unaffected portable & costlier materials, while fire fighting is going on.
- Apply hydrant system from the nearest cabinet.
- Call for fire brigade immediately.

#### **iv) In case of Fire in Cable Galleries / Generators, :**

1. Trip all Running Generator Breakers and all line breakers.
2. Trip the Field Breaker
3. Stop the Machine
4. Pull the Fire Button provided at Control Desk or in the Unit Control Board
5. Open the Butterfly Valve near the Shaft Seal Panel at Turbine Floor
6. Switch off all Ventilation Blower and Switch on all Exhaust Blower

#### **v) In case of Fire in Generator Transformer / SST / UAT**

1. Heat Detectors provided in the Transformer for sensing the heat operates the emulsifier system immediately.
2. Stop the machine and isolate the transformer from the bus along with control supply of AC /DC.
3. Run the emulsifier system of adjacent transformers as a precaution along with the burring transformer.
4. Trip all running generator breakers and all line breakers

#### **vi) In case of supply failure from all sources,**

Start DG Set at Power House for operating the Dewatering Pumps

#### **vii) In case of abnormal water leakage in Power House from Spiral Casing, Main Inlet Valve (MIV), on downstream side,**

- a. Stop Running Machine be stopped
- b. Lock up MIV & Guide Vane
- c. Close Bye Pass Valve
- d. Lower the Draft Tube Gate
- e. Start De-Watering

- vii) **In case of heavy leakage from upstream side of MIV, following action need to be taken immediately:**
- (a) Stop Running Machine
  - (b) Lock up MIV & Guide Vane
  - (c) Close Bye Pass Valve
  - (d) Lower the Surge Shaft Gate
  - (e) Lower the Intake Gate
  - (f) Start De-Watering
- viii) **In case of failure in tunnel, following action need to be taken immediately**
- (a) Stop Running Machines
  - (b) Lock up MIV & Guide Vane
  - (c) Close Bye- Pass valve
  - (d) Lower the Surge shaft Gate
  - (e) Close the Intake Gate
  - (f) Start De-Watering of tunnel.
- ix) **In case of heavy flood in the river, following actions needed to be taken immediately**
- (a) Stop the Running Machines
  - (b) Close TRT Gate
  - (c) Close Draft Tube Gate
  - (d) Start De-Watering of seepage / leakage water through main portal

**(B) Trigger Mechanism for Response:-**

- To inform the Safety Officer & Security Officer and all others concerned.
- To stop the Plant quickly, if necessary.
- To isolate the live parts of Electrical equipment, if any.
- To release the pressure from the affected equipments.
- In case of fire, apply / ensure operation of Fire Fighting System till fire is arrested or the Fire Brigade arrives to minimize the effect of fire.
- Treat the affected personnel in case of Electrical Shock.
- Get the Fire Victim immediately laid on the ground when cloths have caught fire.
- Ask the Fire Victim not to role but lie down quietly without any movement.
- Approach the Fire Victim with a wet towel, a thick cloth, mattress or blanket (if available readily) and cover the body.
- Apply First Aid to injured personnel.

**(C) Response Plan for responding effectively & promptly:-**

Following facilities are available in the Main Control Centre i.e. Main Control Room to respond effectively & promptly to any threatening Disaster situation

- (a) On site Emergency Disaster Management Plan.
- (b) The location chart of Emulsifier System, Fire Hydrant, and First Aid box, Exit Places, etc at different floors.
- (c) The list of safety Appliances available with respective Power Stations.
- (d) The list of personnel to be engaged for different type of disaster with their address & phone numbers.
- (e) Emergency vehicle stationed at Power station on regular basis.

**(D) Appointment of Nodal Officer to perform Emergency Support Functions:-**

The Sub-Divisional Officer of Generation Division is the Safety Officer in respect of the Power Station. He also acts as Nodal Officer to perform emergency support function in case of any Disaster happening in any Power Station. He is the most important functionary in respect of Prevention, Mitigation, Preparedness, Restoration & Rehabilitation leading to Disasters.

In case of any Emergency / Disaster / Crisis, SDO Generation will act Emergency Leader / Nodal Officer and will immediately take over charge of Rescue / Restoration work. The control Centre will be opened immediately in the main Control Room in the Power Station building. If the total power house is affected in the incident, then the Chamber of the Technical Wing Head acts as Control Center.

**(E) Constitution of Incident Response Team and delegation of Authority:-**

All the Power Stations have incident response teams as detailed below with specified delegation of authority to take actions for Restoration & Rehabilitation during Disasters.

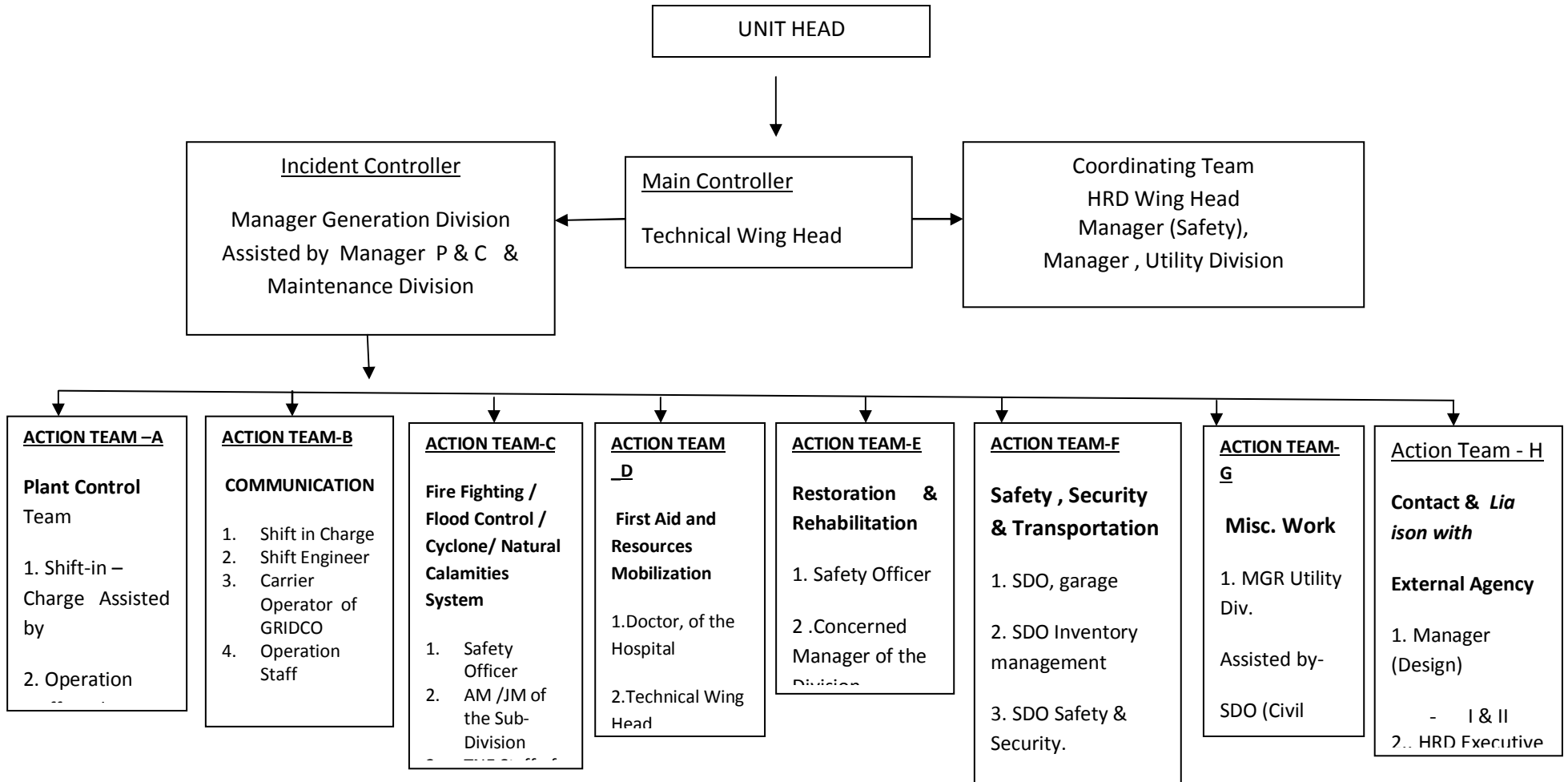
- **Action Team 'A':** - This team immediately rushes to the spot to control the situation till the emergency team members arrive at the site. They communicate the news of incident to all concerned. They isolate all the electrical connections from the affected site including complete shutdown of power plant if necessary. They evacuate persons affected due to Disaster.
- **Action Team 'B':** - Maintain the communication network in working condition. Attend urgently repairs in the communication system, if required. Contact Statutory Authority. Arrange for relievers and catering facilities. Give information to media. Arrange shelters for Affected persons in contact in Medical Centre. Communicate the news of the Disaster to all concerned and liaisons with statutory Authorities and District Administration for help, towards rescue, restoration and rehabilitation. Pass information to the kith and keep fatal & injured persons.
- **Action Team 'C':** - This team is trained in Fire Fighting / Flood Control / Natural Calamity Rescue Operations. The team takes over charge soon after occurrence of any incident due to Fire, Accident, Equipment Failure, Terrorist Attack, Sabotage or any other reason. In case it is not possible to control the fire with the existing system, then they take help of fire brigade and also they seek the help of nearby Power Station.
- **Action Team 'D':** - Arrange First aid material, stretcher and reach accident site quickly. Arrange for immediate medical attention. Arrange for sending the casualties to various hospitals and Nursing Homes etc. Arrange for urgent required materials through cash purchase. Arrange for Funds for various relief measures as well as emergency purchase of materials. Sending employees for emergency purchase.
- **Action Team 'E':** -This team is trained on Restoration & Rehabilitation. Organize all support services. Soon after the emergency, this team takes charge of the affected areas for Restoration & Rehabilitation work and shall be present at site till completion of the work. The concerned Manager of the Division of the affected area leads the team and the Safety Officer coordinates the Restoration & Rehabilitation work.
- **Action Team 'F':** - Man all the gates. Bar entry of un Authorized persons and non-essential staffs. Permit with minimum delay the entry of all key personnel of outside agencies, vehicles, Ambulances, Evacuation vehicles without normal checks etc. who have to provide assistances. Send mechanic to the Disaster site for attending the minor defects in Ambulance & other vehicles. Arrange Petrol & Diesel supply. Arrange Safety requirement. Record location. Account for personnel. Help in search for missing personnel. Collect & preserve evidence in connection with accident, guide authorities on all safety related issues.

- **Action Team ‘G’:** - This team looks after the miscellaneous works i.e. the works not assigned to any team. This team is headed by Manager Utility Division and assisted by SDO, Utility (Civil) Sub-Division and SDO, Utility (Electrical supply) Sub-Division. This team ensures Water Supply, Temporary Electrification and Supply of Food Packets etc. during the Restoration & Rehabilitation period.
- **Action Team ‘H’:** - They inform all executives of the Project and external agencies about the occurrence of the Disaster & Status of Disaster Management activities. This team discusses regarding the reason of occurrence of the disaster and came to a final conclusion on the matter of intimating the outside agencies regarding the Disaster & informs accordingly. The team takes action for opening of the Main Control Center & Sub-Control Centre and to keep constant touch with different incident Response Team and convey the same to the concerned external agencies. While doing so, the members of the Liaisoning team should be careful to get the accurate information.

## **ANNEXURE**

***For specific organization Disaster Management Plan of OPGC, OHPC please visit the link given in the annexure at the end of this plan***

**(F) INCIDENT RESPONSE TEAM AT PROJECT LEVEL:-**



## **9. TRANSMISSION SYSTEM**

### **9.1. Introduction:**

Due to the sub-tropical littoral location, Odisha is vulnerable to multiple disasters like tropical cyclones, storms, tsunamis and floods in and around its 480km coastal belt. Although earthquakes are not so common, their effect can't be ignored as the Brahmani-Mahanadi and their deltaic areas come under Earthquake Risk Zone-III (Moderate Damage Risk Zone).

OPTCL being the only transmission utility of the State owns and maintains the whole transmission network comprising of 728ckt.Km. of 400kV lines, 5,871ckt.Km. of 220kV lines and 5,735ckt.Km. of 132kV lines as well as 100 nos. of Grid S/S along with 17 nos. of switching stations distributed throughout the State and caters to a peak demand of around 3500MW which is expected to increase to 6500MW by this Five Year Plan.

The density of the network is higher in the coastal belt and in industrial areas. As the system deals with only bulk power transmission, EHT towers with associated lines, Inter Connecting transformers, Auto transformers, Power transformers and Grid S/S are evidently the most important infrastructures of the Organization. These infrastructures are likely to be affected by Cyclones, Tsunami and Floods which, if afflicts in large scale, may lead to disaster in terms of disruption of power supply to large areas. Besides these natural calamities whirlwinds, change of course of rivers, land sliding in hilly terrains and fire sometimes create hazards in localized manner. While flooding in plain lands are not so dangerous, high water current in hilly areas pose greater danger to the EHT towers. Statistical data shows that Cyclone has been the single largest culprit for invoking disasters for the Utility.

### **9.2. Vulnerability:**

- i) Sub-stations are less vulnerable to disaster than transmission towers and lines
- ii) Radially connected sub-stations are more vulnerable
- iii) Transmission lines in the coastal belt are most vulnerable
- iv) Sub-stations near the coast are vulnerable to Tsunami e.g. Chatrapur, Ganjam, Puri, Paradeep.
- v) Lines passing through forest areas are prone to tree falling during cyclones & whirlwinds which may cause damage to both lines and towers.
- vi) Towers passing through flash flood zones in hilly terrains are vulnerable e.g. 220kV Jayanagar-Balimela line, 220kV Therubali-Bhanjanagar line, 220kV Meramundali-Bhanjanagar line
- vii) Towers in the vicinity of rivers notorious for changing course are vulnerable
- viii) Suspension towers are more vulnerable than tension towers.

### **9.3. Statistics:**

The transmission sector of Odisha has faced many disasters mostly due to natural calamities as summarized below.

- i) Damage during the Super Cyclone, 1999 : 4 nos. 220kV & 32 nos.  
132kV Towers
- ii) Damage during the Flood, 2001 : 7 nos. 220kV & 2 nos.  
132kV Towers
- iii) Damage during the Flood, 2009 : 2 nos. 220kV Towers

- iv) Damage during Cyclone 'Phailin' 2013 : 71 nos. 220kV & 21 nos. 132kV Towers
- v) Damage due to whirlwinds in diff. occasions : 28 nos. of Towers
- vi) Damage due to sabotage : 2 nos. of 132kV Towers

#### **9.4. Risks (Natural, Man made):**

The risks involved may be classified as under;

1. Tower collapse due to cyclones, whirl winds, sabotage etc.
2. Conductor snapping due to mechanical failure, wind pressure, insulator failure.
3. Insulator failure due to lightning strike, mechanical damage, sabotage, surge voltages.
4. Road blockage on account of conductor snapping or tower collapse near road crossings or road proximity.
5. Failure of transformers, equipment
6. Fire hazards due to transformer oil burning, short circuit in S/Y, control room, battery room, A/C D/C room etc.
7. Electrical accidents
8. Flooding of cable trench due to heavy rain fall.
9. Be-sieging of EHT control room by terrorists.
10. Bomb threat.

But these obstacles have not deterred OPTCL in providing quality and un-interrupted power supply during these calamities due to proper planning, quick response and timely management of material and manpower. Of course a comfortable ratio of Hydro generation to Thermal generation due to abundance of natural resources like rain fed rivers and coal has helped a lot to the state power sector for its stability and help return back to normalcy quickly.

#### **9.5 Power System Stability**

In any sort of disaster leading to partial or total black outs, State Load Dispatch Center (SLDC) has developed a standard operating procedure in co-ordination with Eastern Region Load Dispatch Center (ERLDC) & Eastern Region Power Committee (ERPC) to bring back hydro generation as quickly as possible. For starting of the Hydro Electric Plants (HEP), auxiliary supply is the most important necessity, which is provided by diesel generating sets available at Balimela HEP, Indravati HEP, Rengali HEP and Upper Kolab HEP. This power is gradually extended to start the thermal units and subsequently the local network is synchronized with the Regional Grid.

Besides the above, black start procedures has been developed and mock drills have been conducted by ERLDC for extending power supply from Gazwaka (Southern Zone), bypassing the Back-to-back DC arrangement at Gazwaka as an alternate solution. Mock drills to prepare for such black out situations are being conducted every year by SLDC under close observation of ERLDC.

Further, major CGPs of the State such as NALCO, ICCL, Bhusan Steels Ltd., Bhusan Power & Steel and Jindal Steel Ltd. Etc. are having Islanding schemes for isolation of their system in case of Grid collapse. OPGC have also prepared an Islanding scheme with some area load of Budhipadar-Katapali command area which is under scrutiny. Sterlite Energy, an IPP has come up with such a scheme and presented to ERLDC.



Odisha is in a better position to revive from black outs due to presence of more hydro generators and large nos. of CGP units that can survive as islands. Almost all-important facilities are connected with fiber optic cables and their loads are monitored through SCADA on line at SLDC.

## 9.6 Strategy of risk management

The main aim of the transmission utility is to restore power supply to the affected areas in case of disasters (either natural or man-made) as quickly as possible. This is achieved in various ways like:

- i) In the total network of OPTCL most of the grid s/s are interconnected which means that if one source gets disconnected due to any reason, power continues to flow to that area via another route. But some of the s/s are radially connected which suffer the most during disasters. But out of total 12334ckt.Km. of EHT lines owned by OPTCL, about 15% lines run in radial mode. Plans are formulated to convert these radial network to a complete three stage ring system at 400kV, 220kV & 132kV levels which will eliminate the risk of black-outs during disaster to a great extent.
- ii) As pointed out earlier, the sub-stations are less vulnerable to disaster than the transmission lines owing to the interlinked structures and less height. So more attention is given for safeguarding the EHT lines during disastrous situations.
- iii) Due to large varieties of towers existing in the system having different base parameters, keeping buffer stock for each category will necessitate maintaining large quantities of inventories. This may not be economical in the long run. But still some towers designed for important lines are kept in distributed manner that can help restoration of vital links quickly. For catering to other requirements, some vendors are enlisted specifically for this purpose who can supply the GI structure materials immediately.
- iv) Design of equipment takes care of optimal conditions with certain factor of safety. They are not “Disaster Proof”. So some of the recommendations of the expert group formed under guidance of CEA after “PHAILIN” are now under consideration for design of new lines. Strengthening of the existing lines and reducing the span length by providing interposing towers are also put under agenda for disaster resilience.
- v) If all these precautionary measures are felt to be insufficient or time consuming, power supply is restored by utilising the Emergency Restoration System (ERS) till normalisation.
- vi) There are certain low lying sub-stations where flooding of switchyard / cable trench is possible. These S/S are equipped with de-watering pumps to expel excess water in these situations.

Obviously, it is evident that while essence of items contained in (i) & (ii) (higher weightage group) help lowering the risk of power failure, contents explained in (iii) & (iv) tries to push it upward. When their overall effect is taken into account, the “willingness to take risk” or “Risk Profile” of the organisation can be regarded as “Low” looking at the present scenario coupled with the endeavor for continual improvement in this field.

## 9.7 Emergency Restoration System (ERS)

Emergency Restoration structures are the first line of defence to face power disruption arising out of disasters due to any cause. Till now, OPTCL have the largest fleet of ERS structures in the Eastern Region of India which comprises of 42 nos. of 220kV and 2 nos. of 400kV towers. Looking at the growth of transmission lines another 12 nos. of new 400kV towers are going to be inducted very soon. There is also proposal for increasing the strength by another 30 towers during this five year plan.

This mode of emergency restoration of power supply has helped immensely to handle power crisis arising mainly out of cyclone, whirlwind and flood. Till now these structures have been used in 64 occasions (Detail list of their usage is given in **(annexure-I)** to restore vital links during emergency. These towers are stored at three strategic and easily accessible locations like Bhubaneswar, Chatrapur and Budhipadar with a view to minimize transportation time on the event of any probable disaster.

OPTCL has its own trained gang for erection of these systems. The utility has encouraged some of its Rate Contract holder Firms to gain expertise in this area to fructify quick execution of restorative process in the event of multiple tower failures.

OPTCL Power Training Centre regularly imparts training to its employees on this subject. Mock drills are conducted intermittently to refresh different activities and procedures adopted during erection of these towers. In the recent tender specification for procurement of new design ERS towers, clause for live demonstration of erection of these structures has been included four times during a span of two years by the manufacturer with a view to accumulate updated erection techniques.

## **9.8 Deployment of Emergency Restoration Gang**

Due to retirement and moratorium on fresh employment, scarcity of skilled manpower has been felt in different spheres. It was felt necessary to outsource some of the activities which will help faster restoration of power supply during exigencies. In view of the above, a set of personnel ('Jhula' and 'tower climber' experts) forming "Emergency Restoration Gang" has been deployed in Cuttack, Chainpal, Jajpur Road, Burla, Berhampur and Jaypore Circles to help our existing working personnel. At present the total strength of the Gang consists of 104 nos. of skilled persons.

## **9.9 Emergency inventory stock**

Although OPTCL do not maintain any designated emergency stock at present, some of the major items like Towers, CTs, PTs, Breakers & LAs are usually kept as buffer stock in different stores for utilization during crisis.

Recently the matter regarding maintaining spare stock of transformers of different capacities as a part of crisis management exercise is under discussion at National level. OPTCL is in the fore front in this aspect and have decided to procure 9 Nos. of transformers in different capacities and voltage levels to serve this purpose. These transformers will be kept in distributed locations as mentioned below to meet eventualities in a better manner.

- i) 160 MVA, 220/132kV Auto Transformer – 2Nos. at Chandaka & Lapanga
- ii) 40 MVA, 132/33kV Power Transformer – 5Nos. at Ranasingpur, Jajpur Road, Narendrapur, Katapali & Kesinga.
- iii) 20 MVA, 132/33kV Power Transformer – 2Nos. at Kendrapara & Jayanagar

OPTCL is already in the process of installation of additional transformers and enhancement of transformer capacities at different existing Grid S/Ss to have redundancy in capacity so that n-1 criteria can be fulfilled and maintained for a longer period. Some of the areas coming under international pilgrimage list like Puri, have n-2 criteria fulfilled.

## **9.10 Under frequency relay (UFR)**

UFR safe-guards the generation-demand mismatch in real time scenario. OPTCL have installed these relays at 41 nos. of locations (feeders) that are able to shed an aggregated load of 735MW (details at **annexure-II**), when frequency falls below the specified levels due to any reason. To monitor their health, testing of the relays are carried out annually by trained and expert professionals of the organization.

## **9.11 DG Set**

It is experienced during blackouts for longer duration that three phase DG sets are necessary to maintain air pressure, charge the spring of breakers, charging the battery sets including dewatering facilities. With a view to eradicate such types of problems it has been decided in principle backed by approval from Regulating Authority to install DG sets of appropriate capacities which will be able to operate the equipments, supply power to battery chargers and switch yard lights. The task is scheduled for completion during coming two financial years.

## **9.12 Introduction of new technology**

### **i) Live line maintenance**

Hot Line Technique (HLT) is a very effective method to replace weak clamps, jumpers and insulators without affecting power supply, which subsequently may lead to power crisis. It requires specialized tools and highly skilled manpower, which OPTCL do not possess. But to judge its effectiveness, such type of work has been carried out at two critical locations through a private party. The performance has been satisfactory. On the basis of the successful completion of the project OPTCL is now going to fix some technically qualified vendors under rate contract to do this kind of job. This method is going to be beneficial during power restoration due to snapping of conductors at crossing of lines.

### **ii) Modern Testing Equipment**

E&MR wings of OPTCL carry out DGA and Testing of transformer oil, Tan  $\delta$  testing of equipment and Thermo vision scanning of S/Ss & Lines regularly by modern testing kits to facilitate preventive maintenance which otherwise could lead to large scale damage & interruptions. To have clear and accurate picture on the health of these equipment as well as to get acquainted with modern testing techniques further, CPRI was awarded contract to conduct detailed tests on equipment and analyze the results in some important S/Ss. Their recommendations have been taken care of while scheduling maintenance activities of the respective areas.

### **iii) Implementation of ERP and GIS**

OPTCL has implemented ERP in majority of departments and is hopeful to cover all of its branches very shortly. Pilot project for Geographical Information System (GIS) for Cuttack Circle has been complete and work order for the rest of the network is going to be given soon to Orissa Space Application Center (ORSAC). On integration of both of the above programmes, remarkable benefits can be achieved regarding assessing availability of inventory, visualization of exact location of faults, mobilization of crew and load management etc. Outage analysis shall be much easier and faster which is very essential for planning of crisis management.

### 9.13 Mobilisation of Manpower

Outsourcing being a quick option to counter manpower shortage, the state transmission utility have enlisted following 20 Firms as 'Rate Contract Holders' on biennial basis to carry out different jobs during normal as well as emergency conditions at pre-determined price.

Sl. No.	Name of the firm with address	Work order No & Date
1	M/s ABHISEK CONTECH (INDIA) PRIVATE LIMITED,PLOT NO-MIG-B/18, BRIT COLONY, NAYAPALLI, BHUBANESWAR-751012, email- <a href="mailto:abhisekcontechipl@gmail.com">abhisekcontechipl@gmail.com</a> , <a href="mailto:abhisekcontech@rediffmail.com">abhisekcontech@rediffmail.com</a>	953-000108 (Normal work) 953-000112 (Emergency work)
2	M/s A.K.Das Associates Pvt Ltd, PLOT NO. H-1, SATYANAGAR, Bhubaneswar, email- <a href="mailto:amiyakanta@akdasassociates.com">amiyakanta@akdasassociates.com</a>	953-000115 (Normal work) 953-000134 (Emergency work)
3	M/s Aay Bee Electrical & Construction, A-65,Ground Floor,Saheed Nagar, Bhubaneswar, email- <a href="mailto:aaybeeelectrical@yahoo.com">aaybeeelectrical@yahoo.com</a>	953-000116 (Normal work) 953-000135 (Emergency work)
4	M/s APURBA CONSTRUCTION, INFRONT OF F41/7 BURLA , SAMBALPUR, email- <a href="mailto:pksvss@gmail.com">pksvss@gmail.com</a>	953-000117 (Normal work) 953-000136 (Emergency work)
5	M/S Bharat Kumar Sahoo, at/po/via-rengali dam site, Anugul, email- <a href="mailto:bharatkumarsahoo99@gmail.com">bharatkumarsahoo99@gmail.com</a>	953-000118 (Normal work) 953-000137 (Emergency work)
6	M/s Maa Durga Engineering Associates, AT -Suabarai, Po- Kalayanpur SasanVia- Bhubaneswar-2, Dist-Puri, e-mail: <a href="mailto:dhirendrakumarswain19@yahoo.com">dhirendrakumarswain19@yahoo.com</a>	953-000119 (Normal work) 953-000138 (Emergency work)
7	M/s. Inland Engineers, Plot. No. A/127, Sahid Nagar, Bhubaneswar- 751 007, e-mail- <a href="mailto:inlandengineers127@gmail.com">inlandengineers127@gmail.com</a>	953-000121 (Normal work) 953-000139 (Emergency work)
8	M/s J.D.CONSTRUCTION, AT- BHASKARGANJ-B, NEAR- MUNISAMAJ, SAHADEVKHUNTA, BALASORE, e-mail: <a href="mailto:jdconstructionbalasore@yahoo.com">jdconstructionbalasore@yahoo.com</a>	953-000120 (Normal work) 953-000140 (Emergency work)
9	M/S JAGABANDHU ENTERPRISERS (P) LTD, PLOT NO:- 35/B , SEC-A, MANCHESWAR INDUSTRIAL AREA, RASULGARH , BHUBANESWAR-10, e-mail- <a href="mailto:jepl_bbsr@rediffmail.com">jepl_bbsr@rediffmail.com</a> , <a href="mailto:sunilmuduli@jagabandhuenterprisers.com">sunilmuduli@jagabandhuenterprisers.com</a>	953-000123 (Normal work) 953-000141 (Emergency work)
10	M/S. JAGAMOHAN PRADHAN, AT/PO-KULUMA, VIA-RENGALI DAM SITE, DIST-ANGUL, e-mail- <a href="mailto:pradhanjagamohan@yahoo.co.in">pradhanjagamohan@yahoo.co.in</a>	953-000124 (Normal work) 953-000142 (Emergency work)
11	M/s KBS EL-CONS., Plot No.18, Madhusudan Nagar, Unit-IV, Bhubaneswar-751001, e-mail: <a href="mailto:kbs.elc@gmail.com">kbs.elc@gmail.com</a>	953-000125 (Normal work) 953-000143 (Emergency work)
12	M/s KRISHNA POWER CONSTRUCTION PVT. LTDA: Anandanagar, Po: Hakimpada, Dist: Angul - 759143 (Odisha), e-mail: <a href="mailto:krishna_ashokray@yahoo.co.in">krishna_ashokray@yahoo.co.in</a> / <a href="mailto:krishnapowerconstruction@gmail.com">krishnapowerconstruction@gmail.com</a>	953-000126 (Normal work) 953-000144 (Emergency work)
13	M/s LAKHESWAR ELECTRICAL AND CONSTRUCTION (PROP. SURYAKANTA JYETHI), PLOT NO-96/1549, AT/PO- BHOI NAGAR, UNIT-IX, BHUBANESWAR, e-mail: <a href="mailto:lec.surya@yahoo.com">lec.surya@yahoo.com</a>	953-000127 (Normal work) 953-000145 (Emergency work)
14	M/s Oomkar Technical Services (P) Ltd, Janardanpur, Baripada, Mayurbhanj. Email- <a href="mailto:otsplodisha@gmail.com">otsplodisha@gmail.com</a>	953-000128 (Normal work) 953-000146 (Emergency work)
15	M/S S.B. Electrostructural,A/180, Saheed Nagar, Bhubaneswar, e-mail: <a href="mailto:S.Structural@rediffmail.com">S.Structural@rediffmail.com</a> , Tel phone No- 0674-2543896, Mobile No- 9437010202	953-000129 (Normal work) 953-000147 (Emergency work)
16	M/S SR ASSOCIATES INFRASTRUCTURE PVT LTD, S-2/40, MANCHESWAR INDUSTRIAL ESTATE, BHUBANESWAR - 751010, e-mail: <a href="mailto:info@srai.in">info@srai.in</a> , Phone No- 0674-2585774, Mobile No-	953-000130 (Normal work) 953-000148 (Emergency work)

	9437230865	
17	M/S SUBASH CHANDRA DHAL, AT: SULDIA, PO: EKTALI, JHARSUGUDA, e-mail:subashdhal@yahoo.com, Mobile No-9439664592	953-000131 (Normal work) 953-000152 (Emergency work)
18	M/S TRIBENI ERECTION & RESTORTS(PVT.) LTD, PLOT NO. 69/LP, MAHANADI VIHAR, NAYABAZAR, e-mail:tribenierrection@yahoo.com,CUTTACK-753004, Mobile No-9437070707	953-000132 (Normal work) 953-000149 (Emergency work)
19	M/S VELCRO ELECTRICAL MANUFACTURERS PVT LTD,301-302 MADHAV VIHAR APARTMENT, BOMIKHAL, CUTTACK ROAD, BHUBANESWAR-751010., e-mail:velcroelectrical@gmail.com,Telephone NO- 0674-2571246, Mobile No-9437090013	953-000133 (Normal work) 953-000150 (Emergency work)
20	M/s E. Engineers, SI-150, Gouri Garden, Gouri Nagar, Old town, Bhubaneswar-751002, email- <a href="mailto:eengineersenergy@gmail.com">eengineersenergy@gmail.com</a>	953-000122 (Normal work) 953-151 gency work)

## 9.14 Checklists for Disaster Management

To facilitate locating targets and quick preparedness for power restoration during emergencies, detailed checklists for documentation and reporting purpose have been prepared and circulated to all Grid & Line Sub-divisions. The historical data as well as planning contained within the checklists (differentiated to Flood prone and Cyclone prone categories) are designed in a way to be very much helpful for quick response. The lists highlighting different categories of involvement are enclosed as follows.

- i) **Annexure-A:** Checklist for EHT Lines prone to flood
- ii) **Annexure-B:** Checklist for EHT Lines prone to cyclone
- iii) **Annexure-C:** Sub-division wise History of natural calamities
- iv) **Annexure-D:** Sub-division wise Preparedness for natural calamities
- v) **Annexure-E:** Line wise Details of EHT Towers
- vi) **Annexure-F:** Checklist of inventory, T&P and consumables to carry during emergency.

## 9.15 Futuristic DM Plan:

In the aftermath of Cyclone “Phailin” it was felt necessary to establish Disaster Response Centers (DRCs) with state-of-the-art infrastructure at two strategic locations of OPTCL system to control & coordinate all necessary activities on war-footing basis during the emergency arising out of natural disasters. The project cost was tentatively estimated to be around Rs. 103 Crores.

### i) Project Description:

- a. The Disaster Response Centres (DRCs) are proposed to be established at Chandaka and Meramundali i.e. two strategic points in OPTCL system.
- b. The DRCs are to be housed in multi-storied buildings with state-of-the-art Safety, IT & Communication Infrastructure. One dedicated team with a team leader will be entrusted for each DRC.

- c. Satellite Phone Linkage with concerned Govt. Depts. and District Collectorates is to be provisioned for each DRC.
- d. VSAT communication system is to be established at each DRC for exchange of data with IMD (Bhubaneswar), OSDMA and other concerned Govt. Depts.
- e. All the activities to be carried out during natural disasters / calamities are to be planned, co-ordinated and controlled by the DRCs.
- f. One Vehicle Mounted Transformer with Switchgear (having 220kV, 132kV, 33kV voltage levels) is to be kept ready at each DRC for emergency power supply.
- g. Aerial Survey of the affected EHT network is to be co-ordinated by the DRCs with necessary support from State Govt.
- h. The existing ERS (Emergency Restoration System) Stores will be under the administrative control of DRCs. These Stores will be equipped with adequate inventory of ERS Towers with mandatory spares and sophisticated T&P required for facilitating the restoration works.
- i. Emergency Restoration Gangs are to be deployed by the DRCs at different locations prior to onset of the forecasted disaster.

**ii) Steps towards Disaster Resilience & Disaster Proofing system:**

To achieve disaster resilience as well as disaster proofing to a large extent, a number of projects are going to be implemented in the near future with main focus to the coastal areas which are more prone to natural calamities besides being the host to high density EHT networks. The main objectives of the projects are:

- a. Conversion of Radial system to Ring system.
- b. Ring connectivity by underground cabling in the twin cities of Bhubaneswar & Cuttack.
- c. Elimination of overhead conductors by laying underground EHV cables in coastal urban areas.
- d. Conversion of few old Air Insulated Grid Sub-Stations to Gas Insulated Grid Sub-Stations and using Smart grid technology for remote control and automation enabling better monitoring and operation of the Grids.
- e. Using towers designed to withstand 350Km/hr wind velocity in the new upcoming lines in this belt and strengthening the existing towers.

**9.16 Gaps in existing capacities**

- a. Ageing and gradual diminishing of own technical manpower.
- b. Shortage of skilled workforce with the R/C holders for ERS tower erection.
- c. In case of large scale damage, as it happened during cyclone "Phailin" when 92 nos. of towers got damaged, the enlisted vendors were not able to supply the towers at short notice.
- d. During cyclone or flooding the affected towers become inaccessible by road requiring head loading as the main mode of transportation. Manual shifting of heavy materials, generators etc. causes inadvertent delay in restoration.

## 9.17 Standard Operating Procedures

### Quick response mechanism

In the event of any disaster, all related control rooms, mobile line patrolling units headed by the lines-in-charge, line restoration units and R/C holder gangs will act as Quick Response Units. All officers of OPTCL have been supplied with official mobile SIM cards. Each grid has at least one set of Walkie-Talkie. The line restoration units will carry with them additional walkie-talkies available with nearby grid S/S. The grid sub-stations are linked with PLCC which failure proof hot line communication facilities. These units will remain prepared with necessary T&P and accessories. All these facilities will result in very fast response to act according to demand of the situation.

#### Action Before Disaster

Do's	Dont's
Fill up the checklists at Annexure-A, B,C,D & E to ascertain preparedness.	Do not allow leave to the staff
Communicate with Govt., IMD and OSDMA about the course of disaster and action.	Do not panic
Cover the endangered tower footing with sand bags.	

#### Action During Disaster

Do's	Dont's
Planning for restoration for various kinds of probable damage	Do not charge tripped lines.
	Do not try to engage manpower for restoration activities.
In case of fire due to any fault, the help of automatic water spraying / gas injection technique to be relied upon.	Do not move near GI sheet or Asbestos sheet houses.

#### Action After Disaster

Do's	Dont's
Arrange materials according to information received from different areas affected by disaster on the extent of damage	Do not charge lines without confirmation.
Assess the damage by line patrolling. Help of ODRAF team may be taken for route clearance.	
Take the help of Govt. for aerial survey of the affected lines.	
Try phase wise restoration as quickly as possible and wherever possible.	

Fill up the checklists at Annexure-F to ensure readiness for going to work.	
Mobilise manpower and materials to the affected locations.	
Communication between SLDC, related grid s/s and Management to be maintained.	

## 9.18 Safety Practices, Audit & Training

### First Aid Box:

The control rooms will be equipped with first aid boxes containing the following items for initial treatment of occupational hazards which may vary from small cuts, broken hands / legs, injuries to head or spinal cord, diarrhea, fever to snake bite. The first and foremost necessity at that time is first Aid which may include CPR (Cardio Pulmonary Resuscitation) or heart defibrillator. So all Grid S/S are equipped with first aid boxes containing essential medicines which may be administered before transferring the patient to the hospital.

### Contents of First Aid Box:

1. Combiflam Tablet
2. Cetrizine 10 mg Tablet
3. Colimex Tablet
4. Dispirin Tablet
5. Domstal Tablet
6. Paracetamol 500 mg Tablet
7. Rantac 150 mg Tablet
8. Relispray
9. Band Aid 10 nos
10. Cotton Roll 20 gms
11. Gauze Roller 7.5 cms
12. Sterile Gloves no.7 ½
13. Betadine ointment 20gms
14. Dettol 100 ml
15. Sterlized Gauze Swabs 5x5 cms
16. Tape Micropore 1 inch

These medicines are checked periodically for their expiry date.

### Safety & Fire drill

Electricity is said to be a good servant but a bad master. Onset of shock and ancillary hazards happen too fast to allow any sort of response even by reflex actions. So precaution continues to be the best answer to avert such type of mishaps. But precautions need practicing till it becomes a habit.

On this philosophy, OPTCL organizes safety & fire mock drills regularly to make the employees accustomed to the different procedures involved in carrying out maintenance activities, first aid and fire extinguishing techniques.

Mock Safety exercise programme concentrates on:

- a) Mock First-aid exercise



- b) Mock Fire Extinguishing exercise
- c) Mock exercise of standard operating procedure for Line Clearance (L/C) requisition/issue/return/cancellation along with procedure for maintenance work after availing L/C.
- a) Mock First-aid exercise:

This deals with fundamentals of First-aid, assessment of the condition of one casualty after any accident by D R A B C method, artificial respiration, Cardio Pulmonary Resuscitation, Bleeding management by pressing pressure points, Wound management by Bandaging: type of bandage and bandaging, Reef knot, Fracture management, use of splint, transportation of victim from the spot to the ambulance.

Mock practice of all these activities are done by the participants in four to five groups at a time.

Electric shock treatment, Sun stroke management, Snake bite management, Burn management.

These are educated and practised under the direct guidance of one lecturer from St. John Ambulance, Odisha, Bhubaneswar.

- b) Mock fire extinguishing exercise:

In this exercise types of fire, types of fire extinguishers, maintenance of fire extinguisher, operation of fire extinguisher, mock fire management with different type of Fire Extinguishers are elaborately explained and demonstrated.

- c) Mock exercise of standard operating procedure for Line Clearance (L/C) requisition/issue/return/cancellation along with procedure for maintenance work after availing L/C.

Here, briefing on SoP, process for Line clearance requisition, issue & return in prescribed format as per BIS, use of PPE like helmet, gloves, safety belt, barricading & demarcating the work place by safety ribbon, use of high voltage indicator, earth discharge rod, mock breakdown work using safety belt, standard tool kit etc. before proceeding to the work are explained and practiced.

## **Safety Audit**

The safety department of OPTCL conducts safety audit in grid sub-stations from time to time to have a check and instill awareness about sticking to the safety norms and standards. The latest safety audit format to be complied with by the sub-stations is given below.

### **Safety Audit Questionnaire .....Kv Grid S/S,.....**

Date of Audit : .....

<b>I</b>		General Lay Out	
	<b>1</b>	Year of commissioning	
	<b>2</b>	From which sources power being supply to the Sub-station?	
	<b>3</b>	What is the status of incoming supply and lines? Viz. voltage level , no. of lines etc.	
	<b>4</b>	What is the maximum demand load of the Sub-station?	
	<b>5</b>	What is the average load of the Sub-station?	
	<b>6</b>	Are all lines, equipment and workplaces properly nomenclature?	
	<b>7</b>	Is there boundary wall around grid campus, if so, condition of the boundary wall	
	<b>8</b>	Condition of the main gate	
	<b>9</b>	Condition of the approach road to the to the Grid	
	<b>10</b>	Control room building condition, does it need over all repair / indoor or outdoor painting / repair of door & windows / floor tiling / graded plastering of the roof / repair of false roof ceiling	
	<b>11</b>	Control room furniture	
	<b>12</b>	A.C m/c installed, details: No. of A/C machines installed / in working condition- Window type- Split type- Whether AMC given- Is the Agency regularly attending- Any hindrance in the process -	
	<b>13</b>	Drinking water facility: Having own arrangement- Is it sufficient throughout the year- Is it sufficient for the Colony- Any hindrance-	
	<b>14</b>	First-aid box: Whether available- Is it equipped as per the requirement- Inventory maintained-	
	<b>15</b>	Display of First-aid chart	
	<b>16</b>	Display of important telephone nos. How it is displayed- Is it as per the communicated instruction- Information on Anti Snake Venom (ASV) available-	
	<b>17</b>	Display of update Single line diagram- Separate Key Board available-	
	<b>18</b>	Display of shift duty chart of personnel- How it is displayed-	
	<b>19</b>	Control & Relay Panel identification Is Insulating Mat there in front of the C.R.Panels. Are the mats jointed with insulating adhesive-	
	<b>20</b>	Over all look of the control room	
	<b>21</b>	A.C/D.C room condition	

		A/C is available in it or not in working condition-	
	<b>22</b>	Battery room condition: Is there wash basin with one water supply point available in or adjacent to the battery room-	
	<b>23</b>	Toilet condition:	
	<b>24</b>	Sanitation AMC awarded or not	
	<b>25</b>	Provision of ladies toilet	
	<b>26</b>	Man in position: Executive-  Non-Executive-	
	<b>27</b>	Security position: Control room- Armed / Un Armed Switch yard- Armed / Un Armed	
	<b>28</b>	Gardening / Lawn position	
	<b>29</b>	Over all drainage / de-watering system	
	<b>30</b>	Switch yard cleaning: AMC given or not- Whether Agency is acting properly-	
	<b>31</b>	Cleaning of peripheral 5mts of the switch yard	
	<b>32</b>	Land dispute, if any	
<b>II</b>		<b>Verification of Registers &amp; First-Aid box</b>	
	<b>33</b>	Shift Engineer Log book- Operator Log book- Line Clear Book(Requisition,Issue,Return,Cancellation) - Tripping register- Battery register (daily pilot & monthly all)- Incident register- Accident register- Safety register- Fire register- Fire Extinguisher Maintenance register- Daily maintenance register- Maintenance register of ICT, AUTO TR, Power TR, Breaker, CT, PT, Isolator, LA / Last relay test result - <b>First-aid box-</b>	
<b>III</b>		Hazardous Classified Zones	
	<b>34</b>	Are the prohibited areas, where there is more chances of accident in the Sub-station, demarcated? If not, please mention the action taken in this regard.	
	<b>35</b>	At what regular time intervals the equipments in the prohibited areas are maintained and by whom?	
<b>IV</b>		<b>Maintenance Schedule</b>	
	<b>36</b>	What are the different types of maintenance carried out in the Sub-station and how are they planned?	
	<b>37</b>	Is there a preventive maintenance programme in place?	
	<b>38</b>	Is the programme implemented? Is there any slippage?	
	<b>39</b>	Records of Electrical tests, Test procedures. Is their periodicity maintained?(attach separate Sheet)	
	<b>40</b>	Is there a maintenance manual relevant to the equipment in the Sub-station?	

	41	Is the manual updated/ Reviewed periodically?	
	42	Is the periodicity and scope of maintenance work carried out is as per the maintenance manual?	
	43	Who does the job? Are authorized persons and licensed electrical contractors engaged?	
	44	How prioritization of work is done?	
V		<b>Testing Schedule</b>	
	45	What is the scope and nature of Testing of equipment and Earth resistance	
	46	Which types of tests are carried out?(Check and comment on test results)	
	47	Is trend monitoring being done? If so which action is initiated in case necessary, give some important ones?	
	48	Does periodic calibration done? METERS (ammeters, Voltmeters, energy meters, temperature gauges etc.)- Protective Relays- Testing instruments (Insulation megger, earth resistance megger, multimeters etc.) -	
	49	Who does the job? Are proper records maintained?	
VI		<b>Work Permit System</b>	
	50	Does it take care of full proof electrical isolation and safe guarding?	
	51	Does it cover critical activities such as working at height, confined space, on equipment under electrical isolation?	
	52	Is the authorizing procedure in order?  (Please check the L/C book for requisition, issue & return)	
	53	Any violations noticed?	
VII		<b>New Equipment Integration : (Strike off if it is not applicable)</b>	
		<b><i>Are safety features considered during following stages ;</i></b>	
	54	Concept stage	
	55	Detailed Engineering	
	56	Design and manufacturing stage	
	57	Erection and commissioning stage & operation and maintenance stage	
	58	What is the condition of cable trays, cable dressing, and identification of cables etc., Are they in order?	
VIII		<b>Portable Electrical Equipment (Power Hand Tools)</b>	
	59	What type of hand power tools is used?	
	60	How are they tested and maintained?	
	61	How is the healthiness of portable power tools ascertained?	
	62	Are any records maintained for IR value measured or repairs carried out?	

	<b>63</b>	How are the defective tools taken out and separated?	
<b>IX</b>		<b>PPE / First Aid</b>	
	<b>64</b>	What type of PPE (Personal Protective Equipment) is used for Electrical safety?	
	<b>65</b>	How are they stored? How are they issued? Are they in order?	
	<b>66</b>	How are their healthiness ascertained?	
	<b>67</b>	Are persons within the sub-station aware of first Aid & CPR (Cardio Pulmonary Resuscitation) methods? How are they trained?	
	<b>68</b>	Are adequate display charts provided at proper location?	
	<b>69</b>	Are First Aid trained personnel available in each shift?	
<b>X</b>		<b>Training Programme</b>	
	<b>70</b>	Does this include topics on electrical safety?	
	<b>71</b>	What topics are covered and at what level are they imparted?	
<b>XI</b>		<b>Compliance of IE Rules</b>	
	<b>72</b>	Is the inspection and certification from Electrical inspector carried out every year?	
	<b>73</b>	Are the electrical clearances as per IE Rules?	
	<b>74</b>	Is the earthing done as per requirement?	
	<b>75</b>	Are the appliances / tools used of specified IS mark?	
	<b>76</b>	Have rubber mats, voltage indicating danger notices provided wherever required?	
	<b>77</b>	What are the types of fire extinguishers used? Emulsification, Sprinkler, First Aid type firefighting equipment	
<b>XII</b>		<b>Electrical Accidents</b>	
	<b>78</b>	How many electrical accidents have taken place in past 5 years	
	<b>79</b>	Have all the cases been reported? Were there any fatal cases?	
	<b>80</b>	Have the electrical accidents been investigated?	
	<b>81</b>	If investigated, what action has been undertaken to improve condition? Are the recommendations incorporated in O&M procedures / work permits? Are near miss incident recorded- Are the near miss incident analysed for no re-occurrence	
	<b>82</b>	Have the case studies of accidents been explained in the training sessions with a view to avoid re-occurrence?	
<b>XIII</b>		<b>Contractor Safety</b>	
	<b>83</b>	Is there a system to check the power tools etc. of contractors?	
	<b>84</b>	If so, what are the checking carried out for portable equipment and welding machine etc.?	
	<b>85</b>	Is there a work permit system for contractors?	
	<b>86</b>	Are they appraised and trained on electrical hazards involved in their jobs before commencing the job? Are they trained on First Aid & CPR?	
	<b>87</b>	Are the workmen & Supervisor of the working contractor adhering to Safety Practices? Are they using PPEs scrupulously-	

	<b>88</b>	If not, what action is initiated for the same to ensure Safety at OPTCL work place	
<b>XIV</b>		<b>Protection System</b>	
	<b>89</b>	What are types of protections used?	
	<b>90</b>	What are the primary and backup protections available?	
	<b>91</b>	How often are the relays inspected and tested?	
	<b>92</b>	Are the relay settings audited regularly (on monthly basis)?	
	<b>93</b>	If so by whom? Any registers maintained?	
<b>XV</b>		<b>Compatibility of Electrical Equipment / Interlocking system</b>	
	<b>94</b>	Are the electrical equipment of adequate capacity?	
	<b>95</b>	Are all equipment properly identified and nomenclature?	
	<b>96</b>	Is the cable diagram available? Is it available in the control room? Has it been up dated?	
	<b>97</b>	How are the cables laid in trays and trenches and distributed? Are the power cables been segregated from instrumentation and protection cables?	
	<b>98</b>	How are grounding conductors laid? Are they laid along and across other cables?	
	<b>99</b>	Are heat tracers / smoke detectors provided in the cable trays?	
	<b>100</b>	Has interlock system for the equipment been provided to prevent inadvertent operations?	
	<b>101</b>	Is the interlocking system checked regularly?	
<b>XVI</b>		<b>MCC to DG Set Back Feeding</b>	
	<b>102</b>	What is the D.G set capacity?	
	<b>103</b>	How is it interconnected with present power supply?	
	<b>104</b>	What are the changeover facilities	
<b>XVII</b>		<b>Surge Arrestors</b>	
	<b>105</b>	Where have the lightning arrestors been provided?	
	<b>106</b>	Is the coverage adequate as per statutory requirement?	
	<b>107</b>	Are there any instances where by electric shock and fire hazards have occurred in the sub-station and line for lightning during last 5 years?(attach separate sheet)	
<b>XVIII</b>		<b>Standard Operating Procedure (SOP)</b>	
	<b>108</b>	Are the SOP manuals available for all operation and maintenance practices?	
	<b>109</b>	Are safe emergency shut down during emergency, fire and other hazards clearly documented?	
	<b>110</b>	Are these updated regularly to suit the condition of the system?	
	<b>111</b>	Are these SOPs updated regularly?	
	<b>112</b>	Are safety instructions made available to men working in the sub-station?	
<b>XIX</b>		<b>Lighting / Illumination:</b>	
	<b>113</b>	How emergency lighting is is provided?	
	<b>114</b>	Is the illumination level O.K?	
<b>XX</b>		<b>DC&amp; Battery system.</b>	
	<b>115</b>	Are batteries of adequate Amp Hour capacity?	

	<b>116</b>	How batteries are monitored?	
	<b>117</b>	Records of annual discharge test carried out, available?	
	<b>118</b>	How daily pilot cell monitoring is done? (Monitoring Sp.Gravity , across cell voltage)	
	<b>119</b>	Are all the batteries kept trickle charged?	
	<b>120</b>	Are the battery rooms well ventilated? Are emergency provision such as eye wash and showers provided?	

### **9.19 Important Contact Numbers**

All official landline / mobile phone numbers of important authorities are available with the Shift-in-charge in a register in all Grid control rooms. In addition to the hot line PLCC (Power line Carrier Communication), departmental mobile numbers of all executives are provided in the official diary to facilitate exchange of information in the event of calamities.

## **ANNEXURE**

***For specific organization Disaster Management Plan of OPTCL please visit the link given in the annexure at the end of this plan***

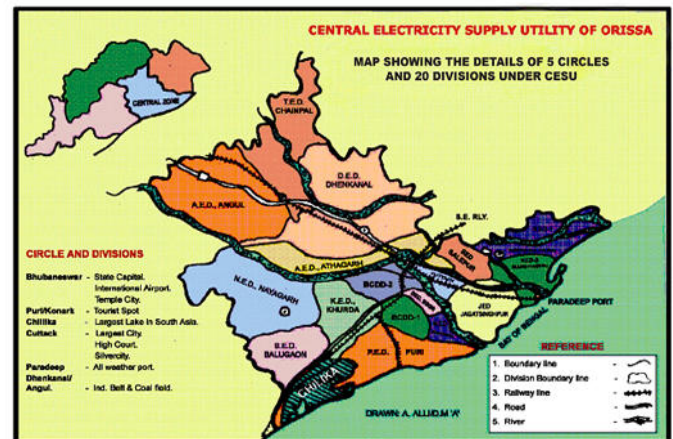
# UPDATION OF DISASTER MANAGEMENT PLAN

## DISTRIBUTION SYSTEM

The distribution systems in Odisha has been fragmented into 4 zones i.e. CESU (Central Zone), NESCO (North-Eastern Zone), WESCO (Western Zone) & SOUTHCO (Southern Zone). The regular occurrence flood, storm & cyclones are very common disasters in Odisha. 1999 super cyclone was considered to be one of the biggest natural calamity that struck Odisha coastal Districts effecting lakhs of people, distribution network & the distribution substations. It had totally perturbed the power supply to the consumers including the capital city Bhubaneswar.

The last very severe cyclonic storm “Phailin” struck Odisha in October 2013. The storm played havoc in Ganjam District specially and also devastated many other coastal districts. The distribution system was the worst affected and the normal life in Ganjam district and other coastal districts under CESU and NESCO was paralyzed for few days to week.

## **10. Central Electricity Supply Utility (CESU)**



### **A. DISASTER MANAGEMENT IN ODISHA**

After the Orissa Super Cyclone of 1999 with the support of United Nations Development Programme, led by the World Bank, the Government of Orissa established Orissa State Disaster Management Authority (OSDMA). This was an institutional innovation for speedy reconstruction, disaster management planning, preparedness, training, and related matters, avoiding the bureaucratic red tape. OSDMA piloted Community Based Disaster Preparedness Programme in 10 most disaster prone blocks, spread over 7 coastal districts of Orissa. The programme basically emphasized on preparation of Disaster Management Plans at Village, Gram Panchayat (GP) and Block levels, with active participation of community / voluntary organizations, PRI and Govt. functionaries. In the subsequent year, the National Disaster Risk Management programme was formulated, Govt. of India, and UNDP reached at an understanding to implement the programme in 169 most vulnerable districts in 17 States of India. Further the programme also aims at sustainable reduction in risks associated with natural disasters in these districts.

Odisha is vulnerable towards natural disasters like; floods, cyclones, droughts, earthquakes, sunstroke, fire accidents and others. These hazards, natural as well as manmade, pose a serious threat to life and livelihood causing loss of life, property and adversely affecting the process of development.



The effective disaster management strategy can often be prevented or at least minimized the probable disaster. Precise actions, procedures and responsibilities have to be laid down well in advance in order to ensure timely response in case of any disaster. Therefore, a mechanism that takes into account multiple hazards and basic preparedness has to be articulated in the form of Quick Response Teams, Quick Assessment Teams, Reporting Procedures, Checklist and Handbooks. The mechanism also lays down crucial parameters, requirements and organizational composition of Emergency Operations Centers and Incident Command Systems.

## **B. AIM & OBJECTIVE**

- To improve state of preparedness to meet any contingency.
- To create the awareness among the people about hazards and to increase their participation in preparedness and prevention.
- To create the awareness among the people about hazards and to increase their participation in preparedness and prevention.
- To reduce response time in organizing the assistance.
- To identify major resources, man power, materials & equipments needed to make the plan operational.
- To provide effective support and resources to all concerned individuals, groups and departments in disasters.
- To develop immediate support to the affected people during the disasters

## **C. PROFILE OF THE DEPARTMENT (CENTRAL ELECTRICITY SUPPLY UTILITY OF ODISHA):**

### ➤ **Area of Operation**

- Total operating Revenue districts-9
- Cyclone Prone Area: Cuttack, Puri, Kendrapara, Nayagarh, Jagatsinghpur, Dhenkanal, Angul, Khurda and Jajpur part.
- Flood Prone Area: Cuttack, Puri, Kendrapara, Jagatsinghpur, Nayagrah and Jajpur part.

### ➤ **Lines and Substations as on 31.03.2015**

- 33KV Lines: – 2995.22 CKm.
- 11KV Lines: – 27491.25 CKm.
- LT Lines:– 48262.9 Ckm.
- 33/11KV Primary Sub-Stations(PSS): – 209 Nos
- 33/11 KV Power transformers: – 479 Nos
- Distribution transformers: – 52746 Nos

## **D. CAUSES OF DISASTER AND CRISIS IN POWER SECTOR**

### ➤ **Disasters:-**

- Storms
- Cyclones
- Floods and Cloud burst
- Hurricanes
- Earthquakes, Landslide
- Fire

➤ **Crisis:-**

- Strike
- Equipment Failure, Mal Operation
- Terrorist, threat, attack & Sabotage

## **Natural Calamities**

Disasters are climate related; on which mankind has but little control. Such situations can only be managed to mitigate their severity only to a certain extent. The impacts of such disasters occur in a relatively much shorter time and have multiplier effects on economies, national development and severity of affected infrastructures but need to be adequately quantified to provide financial justification for undertaking mitigative measures. Events like earthquakes, floods, hurricane, cyclones etc. have been instrumented and studied statistically and scientifically so as to predict their occurrence and intensities with certain degree of confidence. There is no certainty that these events would not exceed the predicted values based on past history and cause disaster.

## **Terrorist Attack**

Terrorism happens to be one of the deadliest forms of crisis in terms of loss of life and damage to the property. Acts of terrorism have grown over a period of time. Power generation stations and transmission and distribution lines, Load Dispatch Centres (LDCs) form the prime target for such terrorist groups. These basic infrastructure in power sector need to be protected against acts of terrorism.

## **Fire**

Like natural calamities, fires are big threat and cause loss to human life and property. However, crisis due to fire normally remains localized to a particular power station until and unless tripping of the said power station causes disturbance in the electricity substation by way of over loading and leading to tripping of other power stations / distribution lines connected with Primary Substation.

The most common cause of the fires is known to be electrical short circuits and fire triggered by the inflammable materials. The damages caused by the fire accidents generally take excessive time for restoration. The Fire safety measures are adopted right at the design stage. Proper upkeep of fire protection equipment / systems would ensure timely availability of the system for putting out the fires before they could result in a disaster.

## **E. IMPORTANT PHASES OF DISASTER MANAGEMENT PLANNING:**

Disaster Management encompasses the activities that enable the various agencies/department to plan for quickly respond to and to recover from unexpected events and situations. It is a tool to provide necessary guidelines for assistance to organizations engaged in generation, transmission and distribution of electrical power for ensuring safety of people, protection of environment, protection of installations and restoration of power supply. Some of the important phases of disaster management planning are: (1) Preparedness Phase,(2)Warning Phase,(3) Response Phase and (4) Restoration Stage

**A. Preparedness Phase:–** Include taking of all necessary measures for planning, capacity building and other preparedness so as to be in a state of readiness to respond in the event of a breakdown/natural disaster.

Though trend on experience of handling during yesteryears cyclones, some vital Long Term Measures have been taken to ensure least damage to the related infrastructure, still vast areas are prone to disaster. Hence following preparedness are done.

- a. All leaves sanctioned earlier to all the officers/engineers and workers shall stand suspended once emergency is declared.
- b. All the engineers responsible for operation shall be on duty round the clock and they will also ensure their subordinate officers to be on duty accordingly.
- c. Verification of all susceptible infrastructures to rectify defects if any including strengthening of weak points.
- d. Educating each Crisis Leader about their role, responsibility prior to and after disaster.
- e. Distinct Control Rooms shall be in operation with Mobile phone under intimation to Govt.
- f. The Switching operation inside the 33/11KV Substations should be known to everyone and working level personnel should operate the equipments without referring to or waiting for management's consent during the crisis.
- g. Shift duty personnel should be detained till the restoration process is completed.
- h. Sufficient generators are to be kept ready.
- i. Arrangement of special squad comprising of Engineers and Workers along with T&P and diversion of working groups from the unaffected area.
- j. To identify major resources like man power, materials & equipments needed to make the plan operational. Accordingly empanelled Contractors with their workers and T&P may be asked to remain ready.
- k. Identification of resources need and their deployment viz, technical experts, manpower, equipment, spare parts & other material.
- l. All required materials are to be mobilized from central store/procured.
- m. Funds to be placed for fooding & petty purchase.

- n. Advertisement in the local newspapers for precautions to be taken during the monsoon season of their installations and service position and the necessary information regarding the contact personnel about the complaints to controls in their respective areas.

#### PREPARATIONS PRIOR TO MONSOON SEASON

As a precautionary measure prior to start of the monsoon season, the various activities are being carried out by Operation & Maintenance Department in order to safeguard the 33/11kv Primary Substation (PSS) and Distribution Substations (DSS) and the equipments therein. The list of such activities is given below,

- Inspection of all PSS and DSS for outline maintenance
- Inspection of HT and LT lines for routine maintenance
- Cleaning of PSS and DSS
- Provisions of tarpaulin, Bakelite sheets above the equipments wherever necessary.
- Providing heaters in PSS where there is a problem of moisture absorption in the bus bar compartment of switchgears to avoid flashovers.

All types of emergencies involving Primary Sub-stations and distribution are conveyed to the **E&MR Engineers** working in all the three shifts. All other breakdowns and problems in the low voltage systems like supply failures; shock, fire, restoration of the off supply areas by giving temporary supply etc. are attended by **Distribution Engineers** who are engaged in all the three shifts. Also, in case of any major incident like explosion or fire, citizens can inform any of our control rooms. The fuse controls deploy **Linesmen** who can attend to supply failures due to blowing of fuses at meter rooms of the consumers, and problems connected with meters. They also take action in case of fire, shock etc. on the meter boards and in the installation. All the control rooms have the system of logging all the messages received and feedback of attending the message is also recorded in the respective controls. There is a system of reporting all the major messages to the senior officers of the Distribution during the working days and holidays round the clock.

#### NODAL OFFICER OF CESU:

All Divisional Engineers are the Nodal Officers of their respective jurisdiction/division. The telephone numbers of various Nodal Officers are given below.

Sl No	Name & Degn of the Divisional Officers	Division	Contact No
1	U.B Khadenga,EE	BCDD-1	9437011276
2	Baibhusan Mohanty, EE	BCDD-2	9437011277
3	Manoj Das, EE	BED, BBSR	9437094246
4	N.K.Mishra, EE	Nimapara	9437094249
5	Manoj Kumar Das, EE	Khorda	9438362932
6	Siba Pr Swain, EE	Puri	9437011295
7	Asit Kumar Ray, EE (I/C)	Nayagarh	9437094252
8	J.K.Patra, EE	Balugaon	9437094259
9	A.K.Bisoi, AGM	CDD-1, Cuttack	9437011302
10	S.B.Mohanty, EE	CDD-2, Cuttack	9437555610
11	S.K.Gauda, EE	CED, Cuttack	9437011317
12	Deepak Ku Rout, EE	Athagarh	9437555771
13	B.P.Padhy, EE	Salipur	9437011321
14	S.S Mishra, EE	Dhenkanal	9437011296
15	Subrata Sahu, EE	Chainpala	9437094262
16	P.K.Jena, EE	Angul	9437094263
17	Pabitra Ku Sahu, EE	Paradeep	9437202188
18	Jagdish Ch Sahu, EE	Jagatsinhgpur	9437094269
19	S.C Jangid EE	Marshaghai	9437028036
20	Amarjit Pattnaik, EE	Kendrapara	9437011300

**B. Warning Phase** – Include all necessary measures to provide timely, qualitative and quantitative warnings to the Control Room to enable them to take preemptive measures for preventing loss of life and reducing loss/damage to the property.

**C. Response Phase** – Include all necessary measures to provide support including disconnection of power supply. However some of the key points are given below.

- In the event of disaster, power supplies to all the disaster prone areas are to be switched off from 33/11KV Substations, or, Grid.
- Hourly feed back to be taken from the 33/11KV Substations by the concerned SDOs/JEs and communicate to the Main Control Rooms.
- As per schedule, concerned Engineers along with working staff shall remain in highly alert condition to safe guard the equipments of the Utilities during the continuance of disaster.
- All the DG sets provided to the Control Rooms are to be in ON condition.
- Main Control Room will collect damaged report from ground staff and public during disaster.
- Field/Site surveys, damage assessment.

Further, in our experience that major floods and cyclones occur in CESU areas once or twice in almost every year, when there will be innumerable breakdowns. In such cases, we divert officials from other non-emergency departments to deal with the situation. The CESU operation and maintenance system is capable of dealing with all the increased breakdowns, though the restoration of supply will take some more time during flood and riot situations. Also, in cases such as floods, fire etc. there will be

two contradictory requirements of switching off supply to the areas affected by shocks, fire etc., and restoring supply when these conditions subside. Hence the nature of actions to be taken varies from situation to situation, and calls for discretion and judgment by experienced engineers. With the present set up of control centers and operating personnel with vehicles, CESU is in a position to deal with these situations, if necessary by diverting additional staff from non-emergency departments. This is possible, because Electric Supply Branch ensures that all the technical personnel are trained to do emergency jobs. For enabling the control centers to arrive at the correct decision on action, it will be highly beneficial if the consumers are in a position to give information on the extent of supply failure, i.e. whether only their building is affected, or more buildings are affected or the entire area is affected. If the consumer gives wrong information, it may delay the restoration, as the different section personnel may get deployed for the job initially. In case of tripping in receiving stations, the controls will automatically get information through relay and switchgear system, and E&MR Engineer will move into action.

**D. Restoration Stage** – Include all necessary measures to stabilize the situation and restore the utilities in the quickest possible time.

- The Main Control Room shall monitor and ensure all the squads are deployed and in operation in the disaster location.
  - i. The Squad leader shall be warned for safe execution of restoration work.
  - ii. The actual damage report shall be collected from the squad leaders and updated.
- From the Main Control Room, senior officers shall be nominated to look after the restoration work in specific area.
- 1<sup>st</sup> priority shall be given for restoration of 33Kv supply to the respective 33/11KV Substations.
- 2nd priority for restoration of supply to the dedicative and emergency feeders like Water works, Hospital, police stations, District administration etc. The help of District administration shall be rendered to avoid any law and order situation during the restoration process.
- Separate gang shall be for HT and LT restoration work.
- The completion report /updated restoration report shall be recorded by the group leader and informed to the concerned JE, SDO and Main Control Room.
- After receipt of “Line Clear” from the respective JE or group leader, each 11Kv feeder shall be charged Phase wise and recorded in the control room.
- DTs in respect to this HT feeder shall be charged after due clearance from the group leader.
- All the damage report and restoration reports shall be updated in the Main Control Room and intimated to the HQ/ Govt in the prescribed format.

**FACILITIES REQUIRED TO TACKLE THE CRISIS SITUATIONS:**

- Recovery Equipment and Spares Inventory
- Communication Facilities.
- Transport and other arrangements
- Financial Resources

- Black Start Facilities
- De-watering Pumps
- Mobile DG Sets.
- Fire alarm and extinguishing system to be checked and its operation by involving the officers and staff.
- There should be perfect interaction on continuous basis between various crisis management groups and state agencies against terrorist attacks.
- State level support groups shall identify the category-wise requirement to solve the huddles in early restoration of power supply.
- Each Utility shall create a fund for meeting the requirement of disaster management plan. The disaster management fund would be 1% of the annual revenue of the station/Utility. The fund would be non lapsable and would be accumulated. The disaster management funds would be at the full discretion of Emergency Management Group once emergency has been declared.
- Carry out comprehensive state wise mock drills periodically (at least once in every six months) to test capabilities. At the end of each exercise an evaluation of the response call shall be carried out to take care of any deficiency noticed.

**E. CRISIS MANAGEMENT PLAN FOR RESTORATION OF DISTRIBUTION LINES AND EQUIPMENTS:**

Transmission lines are the arteries of the Electricity Network and these are most prone to damage due to earthquake, cyclone, terrorist attack, flood, etc. Under extreme wind conditions, the conductors of transmission lines may also get snapped or transmission and distribution line towers/supports may collapse. The floods, landslides and earthquakes cause damage to or failure of foundations of towers/supports, which may sometime lead to disruption of power supply. The floods also cause disruption in power supply in case electricity infrastructures/substations are affected by the floods. In addition to this, terrorist attack, fire accident may also cause damage to transmission and distribution lines, load dispatch centres & sub-stations, which in certain cases may in turn lead to failure of electricity supply.. Possible mishaps in distribution system in the event of disasters due to various natural calamities and crises are as under,

- Snapping of conductor
- Collapse of transmission tower/distribution supports
- Washing away of the foundation of river crossing transmission tower / distribution supports.
- Landslides in hilly terrains affecting towers of the line
- Flooding of sub stations.
- Destruction / Fire in sub stations

CRISIS CAPACITY OF CESU : Looking to the frequent disaster in each year, CESU has developed its capacity to restore power supply by diverting availability of materials immediately from different stock of its departmental store otherwise time to restore becomes prolong.

- i. 33 KV line: 3.0 KM
- ii. 11Kv Line: 3.0 Km
- iii. Different size of conductor: 50Km
- iv. LT Line: 5.0Km
- v. 11/0.4Kv Substation: 20 nos

The restoration could have much faster and more in numbers but restrained as there is very much gap in the existing capacity due to financial constraints in CESU.

## **F. CAPACITY BUILDING FOR DISASTER MANAGEMENT :**

### **1) Disaster Management Cell:**

There is need of setting up of Disaster Management Cell(DMC) in each division and corporate office. Emergency T&Ps and other electrical equipments will be kept in stock under the aforesaid DMCs to meet the crisis. The details of equipments are:

- First Aid Box
- Truck mounted crane.
- Hydraulic Pulling machine.
- Cable crimping Tools
- Chain Pulley block
- Snatch Pulley
- Triofor (2T capacity)
- Gum Boot
- Rain Coat

### **2) Training and Development of Skill:**

As per the CEA guideline relating to Safety and Electric Supply, there is need of Training and Development of Skill level of the human resources. In this regard CESU has developed training cell and conducting training program among all the field engineers and workers on rotation basis. Disaster Management is apart of the said Training programme.

Further Mock Drill on Disaster Management shall be conducted twice in an year as preparedness exercise.

### **3) Arrangement for strengthening the existing infrastructure:**

It can be seen that CESU is an organization well prepared to meet all types of emergencies. One can be sure that Distribution Divisions of CESU will carry out whatever is expected of it, as per the nature of the disaster and the needs of the situation. Since disaster is a natural phenomenon, so following long terms measures have already taken by CESU towards quick restoration of power supply to the essential institutions with good financial support of state Govt.

- i. Dedicated HT line to all the District Head Quarter Hospitals as like, Khorda, Nayagarh, Cuttack, Puri, Jagatsingpur, Dhenkanal, Angul and AIIMS, Bhubaneswar. Thus as soon as 33 Kv feeding line to a 33/11 Kv Substation is restored, power supply can also be restored to the concerned District Head Quarter Hospitals.
- ii. CESU has maintained a minimum stock towards the restoration power supply on account of disaster. Such as
  - 33 KV line: 3.0 KM
  - 11Kv Line: 3.0 Km
  - Different size of conductor: 50Km
  - LT Line: 5.0Km
  - 11/0.4Kv Substation: 20 nos



#### **4) Material procurement and Services during Emergency:**

- Special delegation of power to the officers for the purchase of emergency materials, obtaining services of manpower for execution of the restoration works are to be given from Head Quarter of CESU.
- The Superintending Engineers and Executive Engineers of the respective zone shall be authorized to take into account the materials laying in stock in various store of CESU. Only after the review of the stock of emergency materials, they will take procurement action for the balance required materials. However they will give a certificate to Technical Head of CESU on non available materials in store before taking procurement action.
- A token of emergency budget will be allowed by the General Manager (Finance) CESU to each division/circle.

#### **5) Listing of Empanelled Contractors for Restoration of Power Supply:**

At the time of disaster, there will be a requirement of more number of squads and manpower with T&Ps for quick restoration of power supply. Accordingly CESU has exercised and enlisted the HT contractors' equipped with T&P and sufficient manpower. List of the contractors are given below.

SI No	Name of the Firm / Contractor	Address	Contact No
1	Akhandalamani Electricals & Constr	Plot No:1081, Biswal Complex, Mahanadi Bihar, Cuttack	9437069925
2	M/s Power Friends	Plot No:356, Sahid Nagar, BBSR	9437057884
3	Sibasis Nanda	Plot No:N-2/104, IRC Village, Nayapalli, BBSR	9437004855
4	M/s Alliance Power	Plot No:1381, Bramhanasadangi Chhak, Baliaanta, BBSR	9438021280
5	Gayatri Agency	Plot No:1089, Biswal Complex, Mahanadi Bihar, Cuttack	9438873201
6	Lingaraj Muduli	Plot No:2170/4071, Rabitalkies Road, BBSR	9861345273
7	M/s Bajrang Security Services	Professorpada, Cuttack	9437143104
8	M/s S.K Engineering	Plot No:212, Dharma Bihar, Khandagiri, BBSR	0674-2350119
9	Iswar Ch Parida	Qr No:2RA/97, Road No-7, Unit-IX, BBSR	9437005218
10	M/s Trishul Electricals	Cuttack	9437112832
11	M/s SadhuSundar Electricals,	Jagatpur, Cuttack	9437028545
12	M/s Kamdev Nayak,	Kamalpur, Cuttack	9438330875
13	M/s N.C. Jena,	Mahandibihar, Cuttack	9861030305
14	Paresh Kumar Mahanty	Chauliaganj, Cuttack	9437274562
15	M/s Prachi Electricals	Cuttack	7504926713
16	M/s Frontier Agency	Cuttack	9937176854
17	Coulomb Engineering	Cuttack	9338315511
18	M/S Nirmala Kumar Samantray	Seikh Bazar, Cuttack	9337440466
19	M/S NK Mohanty	Prop- Nalinikanta Mohanty, Kesharpur, Cuttack	9437267989
20	M/S Bright Engineers and Elocors	At-M-48, Nalco - 17, Samanta Bihar, BBSR	0674-2301578
21	M/S Jai Maa Mangala Electricals	At - Aparna nagar, Nuabazar, Cuttack	9437020250
22	M/S Elcon Services	At- Lalasahi, Jagatsinghpur	9437134349

SI No	Name of the Firm / Contractor	Address	Contact No
23	Paresh Kumar Mohanty	At-Kalyani Nagar, cuttack	9437274562
24	M/S AS Electricals	At-Tulasipur, Khristian Sahi	9438306957
25	M/S Eastern Engineering	At - C/9, Industrial Estate, Madhupatna, Cuttack	9437167981
26	M/S Bajarnng Security Services	At-Profesorpada, Cuttack	9437143104
27	M/S Trisul Electrical	At-Patapur, Bahugram	9437112832
28	M/S Sadhusundar Electrical	At-Jagatpur, Cuttack	9437028545
29	M/S Power Link	At-Kalamandap Road, Dolamundai, cuttack	0671 - 2616878
30	M/s Indo Electricals	Plot No.207, Road No.8, Unit-9, Bhubaneswar.	9437275745
31	M/s MCC Associates	At - Tala Sahi, Post - Khordha, Dist - Khordha.	06755-220258
32	M/s Rudra Prasad Sahoo	Plot No-1163, Ratnakarbag, Tankapani Road, BBSR	9437185688
33	M/s Premier Security Service	Ravi Talkies Road, Bhubaneswar-2.	9861345273
34	M/s Famous Security Service	Plot No.B/1507, Hansapal Canel Road, Naharkanta, BBSR.	06784-241265
35	M/s Chittaranjan Das	Itamati, Dist - Nayagarh.	9937715900
36	M/s United Engineer Pvt. Ltd.	Plot No.22/A, Chanda Industrial Complex, BBSR	9937025509
37	M/s AAY BEE Electricals	Plot No. A/65, Ground Floor, Saheed Nagar, BBSR.	0674-2542329
38	M/s T. Rabin Kumar Patra	Plot No. 204, IRC Village, Nayapalli, BBSR.	986107446
39	M/s Akhandalmani Electricals & Constructions	Plot No. 1089, Mahanadi Vihar, Nayabazar, Cuttack.	91671 - 2442191
40	Manoranjan Pradhan	At - 1st Lane, Debattor Colony, Nayagarh.	Ph. No. 9437111637
41	Bikram Keshari Pattnaik	At - Badasankha, Puri.	9437185956
42	M/s Power Friends	At - Plot No. 356, Saheed Nagar, BBSR.	9437007884
43	Golakh Bihari Aich	At - Basundhara Apartment, Flat No.215, Rasulgarh, BBSR.	9937474631
44	Inland Engineers	At - Plot No.- A/127, Saheed Nagar, BBSR.	0674-6649002
45	M/s D.K. Sahoo	At - Kaijanga, Post - Sialia, Dist - Khordha.	9861150848
46	Eastern Engineering	At Plot No. C-9, Industrial Estate, Madhupatna, Cuttack.	9439370661
47	M/s Maa Durga Engineering Associates.	At - Lingaraj Nagar, Jaypore, Dist - Koraput.	943763372

SI No	Name of the Firm / Contractor	Address	Contact No
48	Ethnic Enterprises	At Plot No. 2198, BJB Nagar,	. 0674-2311330
49	M/s Utkal Electricals	Plot No. 2400, Mancheswar, Bhubaneswar.	9437026515
50	M/s Adya Urja Solution Ltd	Flat No. 105, Shyam Residency, Bhubaneswar.	9437020559
51	M/s S.M Trading & Co.	At - Bagicha Sahi, Boud.	9437412581
52	Kiran Electrical Works	At - Kurunti, Kothapatna.	9438670349
53	M/s Chandan Electrical Works	At- Plot No. LC-111/8, Sailashree Vihar, BBSR.	9437684040
54	Sri S.K. Ratha	Plot No. 103, Saheednagar, BBSR.	9437167888
55	M/s Pai Construction & Consultancy.	At - Banarpal, Dist - Anugul.	7077717307

### **G. APPROACH AND MITIGATION MEASURES FOR RECONSTRUCTION PLAN - LONG TERM PROJECT:**

#### **APPROACH**

- First priority is on strengthening of the 33Kv Distribution network, i.e, focus on trunk line and critical areas/institution like hospital, water works, railway, communication network and district level offices.
- Infrastructure strengthening in Urban areas, i.e, Bhubaneswar and Cuttack.
- Provision of towers in reviver crossing locations.
- Provision of H type pole in low lying area.
- Second priority is on strengthening of the 11Kv trunk lines and 11Kv lines feeding power supply to critical areas/institution as above.
- Elevation and Strengthening of Distribution Substations.
- Strengthening of LT infrastructures.

#### **MITIGATION MEASURES:**

- Construction of 33Kv NBL Tower (D.C) in Bhubaneswar and Cuttack City.
- Construction of 33Kv line (D.C) with H type pole narrow areas in Bhubaneswar and Cuttack City and in all districts Head Quarter.
- Construction of 33Kv UG cable line (D.C) in Bhubaneswar and Cuttack City.
- All 33Kv and 11Kv lines river crossing river in CESU zone need to be converted to tower structure with higher size of conductor.
- Elevation of plinth in high flood prone area.
- Conversion of bare conductor in LT line flood prone area with ABC.

### **H. PROPOSAL FOR FUNDING FROM GOVT FOR STRENGTHENING ELECTRICAL NETWORK -LONG TERM PROJECT:**

Although the entire electricity Distribution network of CESU is exposed to Cyclone and Flood and other natural calamities, so there is a need for construction of robust structures to face such disasters in future. So Govt should take an initiation for arrangement of funds as per the abstract given below.

<b>STATEMENT OF FUND REQUIREMENT</b>		
<b>SI No</b>	<b>Particulars</b>	<b>Amt in Lakhs</b>
1	Reconstruction Plan in Bhubaneswar	7233.60
2	Reconstruction Plan in Cuttack	3485.83
3	Reconstruction Plan-Districtwise	
a	Puri	27754.00
b	Nayagarh	30502.00
c	Khorda	20656.00
d	Jagatsinghpur	45614.00
e	Kendrapara	20135.00
f	Cuttack	16859.00
g	Dhenkanal	13869.00
h	Angul	14967.00
i	Jajpur Part in CESU	379.00
4	Reconstruction Plan for river crossing	2105.32
5	Reconstruction Plan in low laying Areas	5312.36
6	Disaster Response Equipments	5910.00
7	Training and Skill Developments	400.00
	<b>TOTAL ESTIMATE COST FOR RECONSTRUCTION PLAN</b>	<b>215182.11</b>

## **ANNEXURE**

***For specific organization Disaster Management Plan of CESU please visit the link given in the annexure at the end of this plan***

## 11. North Eastern Supply Company (NESCO)

### 11.1. About NESCO UTILITY

The unbundling of Odisha State Electricity Board (OSEB) through Orissa Reform Act 1995 separated entities for the functions of generation, transmission & distribution of power. Further during the process of privatization of the distribution sector, NESCO became one of the 4 distribution licensees in the state to undertake retail supply and distribution of electricity in the North East parts consisting 5 districts having **47000** sq km area. The company was incorporated as a public limited company under the company act 1956 and privatized w.e.f. 01.04.1999 with divestment of 51% shares to erstwhile BSES Ltd.( now Reliance Infrastructure Ltd). From 04.03.2015 it is known as NESCO UTILITY and its management is under CMD GRIDCO -Cum- Administrator, NESCO,WESCO & SOUTHCO UTILITY after revocation of license by OERC.

The main functions of NESCO are:

1. Distribution of power to consumers at the rates as approved by OERC in the Tariff Order from time to time and complying to the Regulations.
2. Providing Power Supply at specified voltage and frequency.
3. Operation & Maintenance of 33/11 KV Sub-stations, 33 KV & 11 kV lines, Distribution transformers & LT lines, equipments.
4. Up-gradation & Augmentation of infrastructure.
5. Ensuring safety of human and animal life and public property from electrical accidents.
6. Planning of activities towards demand and supply of power.

NESCO has its Corporate Office at Balasore and providing Power supply in the following districts of Odisha:

1. Balasore	2. Bhadrak	3. Jajpur	4. Keonjhar	5. Mayurbhanj
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### 11.2. NESCO Geographical Areas of Operation



### 11.3. Summary of Statistics about NESCO UTILITY

Area covered:	28000 Sq. km.
No. of Districts covered:	5
No. of Blocks covered:	<b>68</b>
<b>No. of NACs/ULBs covered:</b>	<b>18</b>
<b>No. of Gram Panchayats covered:</b>	<b>1431</b>
<b>No. of census villages covered:</b>	<b>11298</b>
No. of 33/11 KV Sub-stations:	144
No. of 33 KV Feeders as on 31.3.2015: including GRIDCO interface	72
No. of 11 KV Feeders as on 31.3.2015:	510
Power Transformers as on 31.3.2015:	314
Distribution Transformers as on 31.3.2015:	48227
Length of 33 KV Line as on 31.3.2015:	2263 Circuit km
Length of 11 KV Line as on 31.3.2015:	26440 Circuit km
Length of LT Line as on 31.3.2015:	45481 Circuit km
No. of employees as on 31.3.2015:	3731
Sanctioned:	5859
Working:	3050
Total no. of Consumers as on 31.03.2015:	13.02Lakh
<b>Category of consumers As on 31.03.2015</b>	
<b>LT Category :</b>	
Domestic:	12.15 Lakh
Commercial :	0.60 Lakhs.
Irrigation Pump sets:	13087 nos.
Industrial:	4906 nos.
Others:	8102 nos.
<b>LT Total :</b>	<b>13.01 Lakh</b>
<b>HT category :</b>	
Industrial, Commercial, Lift Irrigation and Residential:	402nos.
<b>EHT category :</b>	
Industrial, Commercial, Traction:	37 nos.
<b>Grand Total:</b>	<b>13.02 Lakh</b>

Geographical Regions	East coastal plain, Balasore, Bhadrak ,Jajpur & hilly area like Mayurbhanj & Keonjhar.
Connected States/UTs	West Bengal & Jharkhand
Major Rivers	Subarnarekha , Budhabalanga, Baitarani & Brahmani
Forests	Open , Dense forest & Reserve forest .
Coast line	Balasore,Bhadrak

#### **11.4 Objectives of this Document**

This document lays down the framework, puts forth guidelines and lists standard operating procedures (SOPs) to be followed by the North Eastern Electricity Supply Company of Odisha Limited (NESCO) in the event of a natural or man-made disaster.

The primary objective of this DMP is to ensure the safety of life and protection of property. Other major objectives of the DMP can be summarized as follow:

- To improve state of preparedness to meet any contingency
- To identify major resources, manpower, material and equipments needed to make the plan operational.
- To make optimum use of combined resources.
- To set up effective command and control structure for handling disasters.
- To reduce response time in organizing the assistance.
- To identify the training needs for personnel engaged in handling disaster and its implementation.
- To promote self-help and recovery,
- To reduce the frequency of occurrence of such disasters.
- To minimize any adverse impact on environment.
- And, to facilitate quick business recovery.

The strategic objectives of this plan are to ensure that:

- (1) NESCO has the capability and resources to be prepared for and to respond to any disaster or calamity,
- (2) NESCO can exceed expectations of service and quality as desired by the designated authorities in the event of a disaster being declared in areas served by SOUTHCO, and
- (3) NESCO is in complete and total compliance with the provisions of National Disaster Management Act, 2005.

This document follows precisely the applicable portions of the structure and guidelines laid down by the National Disaster Management Authority (NDMA) in the draft framework for a District Disaster Management Plan (DDMP). It also considers salient and applicable aspects from the suggested guidelines and outline for Preparation of the Departmental Disaster management Plans at the State Level (Reference: Section 23 (7) & Section 39 of the Disaster Management Act, 2005) by Odisha State Disaster Management Authority (OSDMA) as well as best practices currently followed by electricity distribution companies elsewhere in the country.



## **11.5 Activation Plan**

In the event of forecasting/declaration of a disaster by the state/district administration, the disaster management plan will be activated on the receipt of disaster warning/on the occurrence of the disaster. The occurrence of disaster may be reported by the concern monitoring authority to the State Government /OSDMA/District Administration by the fastest means. The State Government/OSDMA will activate emergency response. Instructions will be flown in the following form:

- 1) Exact quantum of resources (in terms of manpower, equipments and essential items from key departments/stakeholders) that is required.
- 2) The type of assistance to be provided
- 3) The time limit within which assistance is needed
- 4) Details of other Task/Response Forces through which coordination should take place

The control rooms at the corporate office level as well as division control rooms shall be activated with full strength. NESCO shall subsequently widely publish in the print & electronic media for sensitizing the general public/consumers regarding the impending disaster, probable consequences, preventive action plan by SOUTHCO & alternate arrangements etc. This plan will be in effect and all the directives, rules and Standard Operating Procedures (SOPs) it refers to shall be followed.

Once the situation is totally controlled and normalcy is restored, the State Government/OSDMA will declare End of Emergency Response and issues instructions to withdraw the staff deployed in emergency duties.

The plan also describes the various Mitigation, Preparedness and Training activities that may be performed during normal times for effective response at time of disaster.

## **11.6 Plan Review and Update**

The Disaster Management Plan would be regularly reviewed and updated to reflect learning from past disasters, current policies, assets and procedures. Details on how to review and update the plan are provided in Chapter 10.

## **11.7 Limitations**

- Funds as Discoms are having huge regulatory losses, the Disaster responses are largely dependent on State Govt funding
- Resources (Men & Materials) arrangement in huge quantum in a short time.
- Shortage of skilled manpower
- Shortage of automated machines

## **11.8 Hazard, Vulnerability, Capacity and Risk Assessment**

### **11.8.1 Disaster Categories referring to Power Distribution**

The term 'disaster' may be categorized as below from the point of vulnerability scale to the power distribution infrastructure under SOUTHCO.

Category 1 Water and Climate disasters	Category 2 Geological disasters	Category 3 Man-made disasters
Cyclones & Storms	Earthquakes	Fire
Flood	Tsunami	Terrorist Attack

## 11.8.2 Analysis of Past Disasters and Future Disaster Possibilities in NESCO Operational Areas

### 11.8.2.1 Water and Climate disasters.

#### a) Cyclone and High wind:

As may be seen from the Map below developed by BMTPC, from the point of view of wind and cyclone hazards, 60 Km area from the coast line is more vulnerable. In NESCO operating areas,

Further, with regards to deciding about the resiliency towards wind pressure in different parts of the State, following IS are relevant;

- 1) IS 802 Part 1 Section 1 1995 specifies 6 basic wind zones; Out of which coastal Odisha falls under Wind Zone – V where basic wind speed is 50 m/s
- 2) IS 5613 Part 1 Section 1, 1995 specifies 3 wind pressure zones in the country i.e. 100, 150 & 200 Kg/m<sup>2</sup> and coastal Odisha is specified under 200 Kg/m<sup>2</sup> wind pressure zone.

## 11.8.3 Disaster History & Damage Assessment

(Rs. in Lakhs)

Year	Disaster	Damage Type	Damage Magnitude	Damage Assessment in Lakhs	Remarks
2006-07	Flood	High	11 KV line -72 Km, DTR - 64 Nos., LT line-73 Km	250.00	In the 5 affected districts- Balasore, Bhadrak, Keonjhar, Jajpur, Mayurbhanj
2008-09	Flood	Medium	33 KV line-2 Km, 11 KV line-24 Km, 11/0.4 KV S/S-12nos, LT-115 Km	126.34	In the 5 affected districts
2011-12	Flood	Medium	11 KV- 3.68 Km, 11/0.4 KV S/S-152, LT- 1.3 Km, 11KV line-3.68Km, 33/11 KV PTR-9nos, 33 KV VCB-9 nos	742	In the 5 affected districts
2013-14	Very Severe Cyclone	Very high	33 KV line – 1.72 Km, 11 KV line -36 Km, 11MTR PSC pole-148, 9MTR PSC pole-1279nos, 8MTR PSC pole-1924 nos, DTR - 36Nos. PTR-4	1400.00	In the 5 affected districts

## 11.8.4 Hazard Risk assessment and vulnerability mapping

### 11.8.4.1 Risk mapping - Cyclone

Districts	Installations	Total Quantity	Very High Risk	High Risk	Medium Risk	Low Risk
Balasore	33/11 KV S/s	42	14	18	10	0
	33 KV Line	530	212	159	109	50
	11 KV Line	6790	3250	1920	1400	200
	DTRs	13878	5690	4247	3461	480
	LT line	11125	4290	2798	2715	1322
Bhadrak	33/11 KV S/s	22	8	10	3	1
	33 KV Line	326	134	66	96	30
	11 KV Line	3127	1258	935	730	214
	DTRs	8380	3348	2216	2400	416
	LT line	4662	1848.8	1222.6	1300	292
Jajpur	33/11 KV S/s	23	9	5	3	6
	33 KV Line	325	130	98	60	37
	11 KV Line	3856	1507	1031	1118	210
	DTRs	9853	3700	2900	2671	582
	LT line	9489	3607	2882	2140	860
Mayurbhanj	33/11 KV S/s	35	5	10	5	15
	33 KV Line	642	256	246	100	40
	11 KV Line	6665	2900	1710	1660	395
	DTRs	8066	4251	2300	1215	300
	LT line	12462	4300	4168	2194	1800
Keonjhar	33/11 KV S/s	22	9	7	4	2
	33 KV Line	444	204	150	70	20
	11 KV Line	6000	2130	1950	1266	654
	DTRs	8050	3000	2332	1650	1068
	LT line	7741	3240	2122	1559	820
NESCO Total	33/11 KV S/s	144	45	50	25	24
	33 KV Line	2267	936	719	435	177
	11 KV Line	26438	11045	7546	6174	1673
	DTRs	48227	19989	13995	11397	2846
	LT line	45479	17285	13192	9908	5094

### 11.8.4.2 Risk mapping - Flood

Districts	Installations	Total Quantity	Very High Risk	High Risk	Medium Risk	Low Risk
Balasore	33/11 KV S/s	42	14	18	10	0
	33 KV Line	530	212	159	109	50
	11 KV Line	6790	3250	1920	1400	200
	DTRs	13878	5690	4247	3461	480
	LT line	11125	4290	2798	2715	1322
Bhadrak	33/11 KV S/s	22	8	10	3	1
	33 KV Line	326	134	66	96	30
	11 KV Line	3127	1258	935	730	214
	DTRs	8380	3348	2216	2400	416
	LT line	4662	1848.8	1222.6	1300	292

Jajpur	33/11 KV S/s	23	9	5	3	6
	33 KV Line	325	130	98	60	37
	11 KV Line	3856	1507	1031	1118	210
	DTRs	9853	3700	2900	2671	582
	LT line	9489	3607	2882	2140	860
Mayurbhanj	33/11 KV S/s	35	5	10	5	15
	33 KV Line	642	256	246	100	40
	11 KV Line	6665	2900	1710	1660	395
	DTRs	8066	4251	2300	1215	300
	LT line	12462	4300	4168	2194	1800
Keonjhar	33/11 KV S/s	22	9	7	4	2
	33 KV Line	444	204	150	70	20
	11 KV Line	6000	2130	1950	1266	654
	DTRs	8050	3000	2332	1650	1068
	LT line	7741	3240	2122	1559	820
NESCO Total	33/11 KV S/s	144	45	50	25	24
	33 KV Line	2267	936	719	435	177
	11 KV Line	26438	11045	7546	6174	1673
	DTRs	48227	19989	13995	11397	2846
	LT line	45479	17285	13192	9908	5094

#### 11.8.4.3 Risk mapping - Vital Installations

Sl. No.	Name of the Vital Installation	Concerned Division Office	Supply Voltage	Source of Supply (Name of the GRID S/s- 220/132/33KV, 33/11 KV S/s)	Incoming Feeder length	Type of Risk
1	Bhadrak Railway Traction	BNED	132	Bhadrak		
2	Dhamara port company ltd-II	BNED	132	Bhadrak		
3	Jaleswar Railway Traction	JED,JLS	132	Jaleswar		
4	Senior Divisional Electrical Engineer	JRED	132	Duburi		
5	Jakhapura Tranction sub-station	JRED	132	Duburi		
6	Senior Divisional Electrical Engineer(TRD)	KED,KNJHR	132	Palaspanga		
7	Divisional Railway Manager, SERLY,CKP	JED ,Joda	132	Brajasundara(Nalda)		
8	Divisional Railway	JED ,Joda	132	Joda		
9	Balasore Railway Traction	BED,BLS	132	Balasore		
10	DHQ Hospital, Balasore	BED,BLS	33	Balasore		
11	DHQ Hospital,Bhadrak	BNED	33	Bhadrak		
12	DHQ Hospital, Jajpur	JTED	33	JajpurTown		
13	DHQ Hospital, Keonjhar	KED	33	Palaspanga		
14	DHQ Hospital, Baripada	BPED	33	Baripada		
15	District Administration office, Balasore	BED,BLS	11	Balasore		
16	District Administration office,	BNED	11	Powerhous		

	Bhadrak			e		
17	District Administration office, Mayurbhanj	BPED	11	Baripada		
18	District Administration office, Jajpur	JTED	11	JajpurTown		
19	District Administration office, Keonjhar	KED	11	Keonjhar		
20	PUMP HOUSE GRID COLONY	BED	11	Sovrampur		
21	PUMP HOUSE THERMAL COLONY	BED	11	Sovrampur		
22	P.H.D BADA KHURI	Soro	11	Soro		
23	ASSISTANT ENGG.R.W.S.S.SUB-DIVISION	BNED	11	Chandbali		
24	P.H.D. PUMP HOUSE THAKURANI THANA	BPED	11	Baripada		
25	PUMP HOUSE NO.1	UED	11	Udala		
26	ASST. ENGINEER PH SUB DIVISION	JODA	11	Joda		
27	E.E.RWSS KEONJHAR	AED	11	Anandapur		
28	BSNL, Balasore	BED	11	Sovrampur		
29	BSNL, Bhadrak	BNED	11	Power House		
30	BSNL, Baripada	BPED	11	Baripada		
31	BSNI , Jajpur	JRED	11	JajpurRoad		
32	BSNL,Keonjhar	KED	11	Palaspanga		

### 11.8.5 Pre-Disaster Preparedness

For effective preparedness to face the disasters and to avoid last minute arrangements in panic conditions, the following aspects may be covered as an organizational practice:

- Well-documented emergency plans.
- Data on availability of resources and buffer stocks of restoration materials.
- Identification of key personnel: with their skills and experience on the disaster management.
- Allocation of budget for emergencies.
- “Delegation of Power” at various levels for disaster conditions.
- Mutual assistance agreements signed by all power utilities for sharing men and material resources on demand.
- Risk assessment and up-gradation of Disaster Management Plan to be carried at least once a year.
- Maintaining the information about the suppliers of the equipments/store items.
- Availability of emergency plan and training to every employee..

Accordingly, NESCO constitute a Disaster Management Cell (SDMC) with following provisions;

### 11.8.6 NESCO UTILITY Disaster Management Cell (SDMC)

The SDMC shall consist of the Chairperson and such number of other members, not exceeding seven, as may be prescribed by the District Authority, and unless the rules otherwise provide, it shall consist of the following, namely:-

1. A.O , Chairperson;

2. C.O.O.
3. Sr. GM (Comm.)/DGM/AGM (Technical),
4. GM Finance
5. GM/DM/AM (Operation)
6. GM (Project & EMS).
7. SE of the affected Circle(s)
8. EE of the affected Division(s)

#### **11.8.6.1 Powers of the Chairperson of SDMC**

1. The Chairperson of the SDMC, in addition to presiding over the meetings of the SDMC, shall exercise and discharge special powers related to emergency procurement etc. and functions to be taken up by the SDMC.
2. The Chairperson of the SDMC may, by general or special order, delegate such powers and functions, specified above to C.O.O to ensure smooth and effective operations with appropriate conditions and limitations, if any, deemed fit.
3. Following is the guidelines of operations:

#### **11.8.6.2 Responsibilities of SDMC personnel**

The following table lists the functions and responsibilities of each of the members of the SDMC during, and in preparing for, a “State of Disaster”

*(Note: A partial list of teams that must be formed by the officials listed below to allow them to fulfill their responsibilities is given under).*

#### **11.8.6.3 Composition, Responsibilities and list of Functions of NESCO Disaster Management Cell (SDMC) – at Corporate Office**

Designation	Designation for SDMC	Functions
1) A.O of	Chairperson	<ol style="list-style-type: none"> <li>1) Declare a “State of Disaster” within NESCO and ensure immediate activation of this plan.</li> <li>2) Coordinate with State Govt./OSDMA and present detailed reports and updates to State Govt./OSDMA.</li> <li>3) Request District, State or Central resources as necessary from appropriate authorities.</li> <li>4) Declare “Closure of State of Disaster” within NESCO and ensure completion of activities related to closure, including certification and audit, closure of financial documents, implementation of any feedback reports from</li> </ol>

NESCO UTILITY

OSDMA, issues of compensation etc.

2) GM/DGM/AGM  
(Technical)

- 1) Establish a team for certification/ audit of work undertaken, after the disaster is declared closed.
- 2) Implement procedures specifically for DM, including but not limited to
  - a) Authorization of emergency powers,
  - b) Rules related to leaves and overtime,
  - c) Procedures for transport and communication (including alternatives to telephones/mobile telephones, cranes, boats, trucks)
  - d) Procedures for purchase or leasing of equipment, etc.
  - e) Procedures for purchase, leasing, maintenance and inventory of equipment and vehicles only to be used in disasters
  - f) Procedures for capacity building and training specifically for disaster management [**Note:** Sample procedures for “emergency management” activities as provided in Chapter 11 may be followed for Disaster Management. Further procedures may be developed as required].

3) General Manager Member  
(Operations)

- 1) Activate and monitor NESCO Disaster Management Control Centre.  
  
This centre can be hosted from the NESCO Corporate Office but should handle inputs/requests must be collated, analyzed and priorities assigned for all requests.
- 2) Coordinate with OPTCL/GRIDCO/SLDC etc.) on all issues.

4) Sr. GM Commerce

- 1) Convene the SDMC meetings at the request of the Chairperson and update the schedule of future meetings after consultation with Chairperson.
- 2) Collect status updates on a regular basis from other members and report to the Chairperson

and SDMC.

- 3) Implement the protocols (or SOP) for communicating that a disaster has been declared to all NESCO employees in affected districts [for example: formulating the text of the SMS/Email message, list out instructions to be conveyed in a phone call etc.]
- 4) Supervise the communication of any information necessary as decided by the SDMC to all stakeholders including priority consumers (hospitals, blood banks, police and fire) and media.

5) GM (Project) Member

- 1) Ensure security of installations and equipment, and safety of workers.
- 2) Ensure officers and men neglecting duty are held accountable under the DM Act, 2005.
- 3) Ensure officers and men are not succumbing to undue political pressure, corruption and are not taking undue advantage of citizenry.

6) General Manager (Finance) Member

- 1) Implement budgets designed specifically for DM (for example related to expenditure in purchase/lease of equipment and that incurred for transport).
- 2) Implement procedures for quick and easy transfer of funds to personnel as specified by the GM (Tech.).

**[Note:** Both the above tasks must be completed prior to any disasters, and continuously revised. As an example, procedures are provided in the Chapter 11].

- 3) Review compensation and similar claims.
- 4) Ensure proper closure of accounts.



- |   |        |  |
|---|--------|--|
| 7) SE of affected District                    | Member | <ol style="list-style-type: none"> <li>1) Activate and monitor a NESCO Control Centre for citizens only at the Circle level.</li> <li>2) Coordinate constantly (before, during and after) with early warning agencies and special groups (like weather department or civil defense groups) and advise the Chairperson, SDMC accordingly.</li> <li>3) Make contingency plans for meetings of the SDMC during a disaster (for example, in case the standard meeting location is unavailable).</li> <li>4) Any other activity that the MD assigns.</li> </ol> |
| 8) External Consultant in Disaster Management | Member | <ol style="list-style-type: none"> <li>1) Provide the SDMC with inputs and domain expertise and help to update the SDMP as described in Chapter 10.</li> <li>2) Any other activity that the MD assigns.</li> </ol>   |

#### 11.8.6.4 Responsibilities of Disaster Management & Control Centre personnel

##### Functions and Responsibilities of the Control Center personnel

	Designation	Functions	
1)	GM (Operation)	1)	In-charge of Control Center
		2)	Identify and draft personnel to work in the Control Center
		3)	Train personnel in handling disaster specific responsibilities.
		4)	Coordinate with other departments for operational needs and operate the Control Center in absence of GM (Operation)
3)	Asst. Manager (IT/MIS)	1)	Maintain all IT and communication infrastructure at Control Center.
		2)	Assist the GM (Operation).
4)	Asst. Manager / Dy. Manager (Operation)	1)	Coordinate with all circles (including equipment suppliers and contractors).
		2)	Assist the GM (Operation) in all operational aspects .
5)	AGM/Manager (Finance)	1)	Assist the GM (Operation) in all financial aspects like facilitating financial resources.
		2)	Execute any plans as notified by the GM (Finance).

6)	External Consultant	1)	Assist the GM (Operation)
	on Disaster	2)	Coordinate with the district/state administration on all
	Management for		operational issues behalf of the MD/SDMC/Control Center.
	Electric Utilities		
	(appointed through		
	standard procedures)		

### 11.8.6.5 Circle Level Disaster Management Cells (DMCs)

At each level of the NESCO operational hierarchy, a DMC may be formed along the lines of the SDMC. These will allow NESCO to handle emergencies that are not massive in scale and thus do not require direct intervention from the SDMC. The composition of a DMC at Circle Level is provided below for illustrative purposes:

Designation	Appointed Officer	Functions
1) SE(DGM/AGM(EI.)	Designated	Nodal Officer of Circle level-DMC, reporting to GM(Operation)
2) DM (Office of SE Circle)	Designated	CEO & Convener
3) EE (from any division)AGM/Manager/DM(EI.)	Nominated by SE	1) Identify and draft personnel for handling Circle-Level DMC 2) Train personnel for handling Circle-level DMC 3) Handle IT and communication infrastructure
4) AEE (Office of SE Circle)	Nominated by SE	Responsibilities as required by SE during disasters
5) AEE (from any division/sub-division)	Nominated by SE	Responsibilities as required by SE during disasters
6) AFM (from any division)	Nominated by SE	Facilitate any and all financial transactions as required by SE

## 11.7 Prevention and Mitigation

### 11.7.1 Reduction in Risks Associated with Disasters

All NESCO field personnel should follow the steps outlined in the procedures explained in Chapter 11 to mitigate effects of potential disasters.

#### 11.7.1.1 Protocol of Load shedding:

Load shedding schedule during cyclone in 33KV feeder wise will be implemented accordingly.

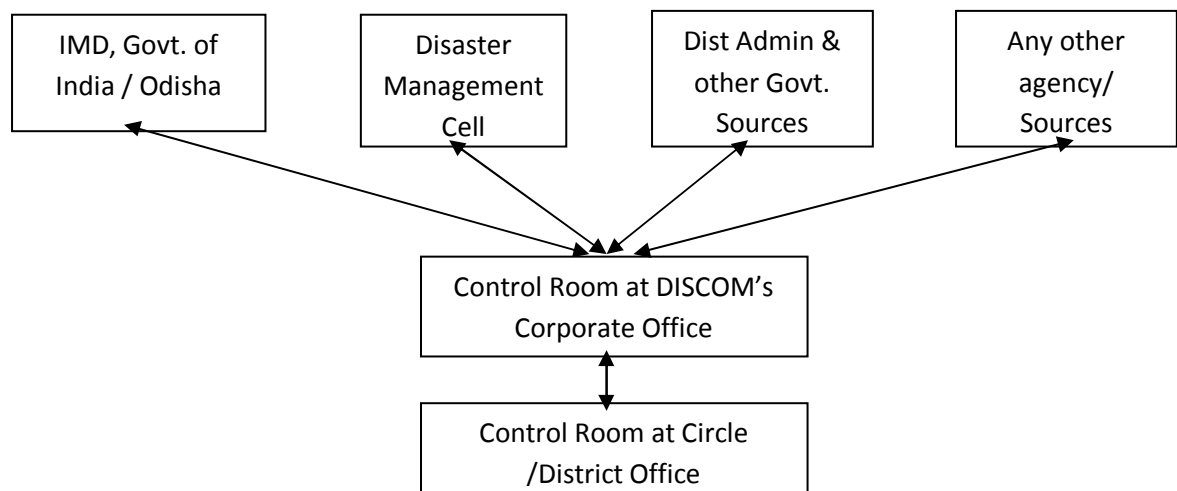
Sl. No	Name of feeder	Cyclone		Flood	
		60Km/hour & above	80KM/Hour & above	Warning level	Danger level
1	Balasore-I				
2	Balasore-II				
3	Balgopalpur		YES		
4	Basta(Fuladi)	YES	YES	YES	YES
5	Chandipur		YES		
6	Emami(Mitrapur)		YES		
7	Industrial		yes		
8	Nilagiri		YES		
9	Srijang	YES	YES		YES
10	Basta (Balasore Grid)	YES	YES	YES	YES
11	Kamarda	YES	YES	YES	YES
12	Jaleswar		YES		YES
13	New Bhograi	YES	YES		YES
14	Basta	YES	YES	YES	YES
15	Baliapal	YES	YES	YES	YES
16	Jamsuli	YES	YES	YES	YES
17	Bahanaga		YES		
18	Gopalpur	YES	YES		YES
19	Dungura		YES		
20	Dhamara(Basudevpur)		YES		YES
21	Soro		YES		
22	Asurali	YES	YES	YES	YES
23	Bhadrak				
24	Chandabali	YES	YES	YES	YES
25	Dhamnagar	YES	YES	YES	YES
26	Markona		YES		
27	Orali	YES	YES		YES
28	Bangriposi	YES	YES		YES
29	Baripada				YES
30	Betnoti-I		YES		YES
31	Betnoti-II		YES		YES
32	Industrial				

33	Shamakhunta		YES		YES
34	Udala	YES	YES		YES
35	Bahalada	YES	YES		
36	Baripada (Rairangpur Grid)	YES	YES		
37	Karanjia (Old) Kusumi	YES	YES		
38	Rairangpur		YES		
39	Karanjia		YES		
40	Jashipur	YES	YES		
41	Express		YES		
42	Keonjhar-I		YES		
43	keonjhar-II	YES	YES		YES
44	Remuli(Champua)	YES	YES		
45	Barbil-I		YES		
46	Barbil-II		YES		YES
49	Ghasipura		YES		YES
50	Ramchandrapur	YES	YES		YES
51	Dhabalgiri		YES		
52	Jajpur Road		YES		
53	Kuakhia	YES	YES		YES
54	Panikoili	YES	YES		
55	Bari	YES	YES		YES
56	Binjharpur	YES	YES		YES
57	Mangalpur	YES	YES	YES	YES
58	Town		YES		
59	Daitari Mines(Duburi)	YES	YES		
60	Sukinda(Khurunti & IDCO)		YES		
61	kabatabandha	YES	YES		YES
62	Jaraka		YES		YES

## 11.8 Procedure for Action during a Disaster

### 11.8.1 Flow of Information

Source of occurrence of disaster information are collected from IMD/TV/Govt. of Odisha/ Govt. of India/Collectors. Flow of information shall be basically as below -



### **11.9 Plan of action (POA) for Restoration**

- On testing, if the lines & equipments are found healthy, then they are to be charged step by step from 33 KV line to LT line.
- For rest of the lines/Sub-stations, after completion of restoration/repair work at affected locations, the same shall be checked & charged as per the procedure.
- In case of availability of power in nearby area from same source and from where supply restoration is easy than from restoring the original network, the work of extending power temporarily from available source shall be taken up.
- Wherever required temporary transformers shall be installed to restore the supply.
- If required, Work Order or LOI (Letter of Intent) shall be issued to enlisted contractor(s) to gear up the work at affected areas for early restoration of power supply. If necessary, number of contractors/gangs shall be increased depending upon increased volume of devastation.
- Materials shall be arranged & released on war footing basis for use in the field.
- Plan to be prepared for early restoration of power supply in respect of District Head Quarters, Block Head Quarters, Gram Panchayats & for all the villages affected. Accordingly action shall be initiated for restoration of power supply.
- Details of reports pertaining to restoration is to be prepared and sent to State Govt./ District Administration/OSDMA through Control Room.

### **11.10 Restoration Protocol**

- 220/132/33KV grids S/s are to be kept in touch to restore 33 KV feeders which are cleared for restoration.
- Immediately after the disaster, priority shall be given to restore 33 KV power supply up to 33/11KV Substations.
- Subsequently priority should be given for restoration of 11KV feeders, DTRS and then LT lines.
- Priority should be given for resumption of power supply to emergency units like Hospitals, Water Supply, Communication & Broadcasting Station/Network, District Headquarters, Sub-division Headquarters, Railways, Relief camps, Fire Stations, etc.
- If the intensity of damage is more, then staff will be diverted from nearing Division and Sub-division/ elsewhere for early restoration of power.
- Minimum relevant materials along with T&Ps shall be kept ready at all the stores / sub stores / temporary emergency store for immediate mobilization after disaster.

### **11.11 OERC observation on implementation of Disaster Mitigation Plan (DMP) in ARR & RST Order 2014-15**

Relevant paras of ARR & RST Order 2014-15 passed by OERC are reproduced below;

*“255. All the DISCOMs have proposed some measures for execution of disaster mitigation plan (DMP). For execution of DMP, the utilities require huge investments. Hence, DISCOMs have planned to execute the DMP in a phased manner and to execute additional they have proposed to levy a charge of 5 p/u in electricity bill.*

256. Objectors have stated that the proposal of a cess of 5 p/u sold to all consumers was not justified and hence unacceptable. CESU in its rejoinder pointed out that the Disaster Mitigation Plan contained the following activities: namely, Infrastructure strengthening through underground Cabling, NBL Towers etc in urban areas of Bhubaneswar and Cuttack, Provisions of Towers in River Crossing Locations, Provision of H-Pole in low lying areas, Institutional Set up as a capacity building measure etc. The three DISCOMs have claimed that to provide better and immediate service to the consumer in the event of Force Majeure condition, the organizational set up is required to face the unforeseen events.

257. We feel that Disaster Mitigation is an important objective of modern governance and Govt. has major role to play with proactive support from DISCOMs. However, the natural disasters happen casually and sporadically over geographical regions. Therefore, taxing all consumers of the State @ 5 Paisa/Unit for implementation of DMP in certain calamity-prone locations is not a wise proposal and also not equitable.”

However, NESCO will propose in the ensuing year tariff petition to approve the factorization of additional expenditures on account of implementation of disaster mitigation plan/activities before OERC.

## **11.12 Standard Operating Procedures (SOPs) and Checklists for Emergency and Disaster Management**

SOPs and checklists should be prepared for various personnel for effective response to emergencies and disasters. These SOPs and checklists must be maintained and updated to reflect any changes in procedures, technology and equipment.

The following are some SOPs currently being followed/to be followed in NESCO for Emergency Management.

### **11.12.1 Administrative Procedure to be adopted at the time of Emergencies**

1. All leaves sanctioned to the officers and workmen shall stand suspended once emergency is declared. The officers and workmen on leave shall report back to their respective controlling officers immediately.
2. All officers responsible for operations shall be on duty for 24 hours and shall ensure their subordinate officers/officials to be on duty round the clock, required for the emergency.

### **11.12.2 Material procurement and services in Emergencies**

1. Special delegation of powers to the officers for purchase of materials, obtaining services of man power and execution of works are given as per clause 11.2.2 & 11.2.3 below, to Administrative Procedures for Emergency Operation.
- 2 The Superintending Engineers (Ele.) of Circles and Executive Engineers (Ele.) of Divisions shall take into account the materials in stock in various stores and make necessary arrangement to exercise mobilization of materials in their jurisdiction. Only after review of stock of materials at

stores and mobilization of materials, balance materials required shall be procured by the respective officers. However, the officers who are empowered to procure materials shall certify that no materials are available at stores for emergency work and hence, procured while issuing the purchase orders.

3. Material procurements are to be made at the CAPEX Procurement Rates from the same suppliers by placing repeat orders.
4. Procurement may be made through OSIC, NSIC, from Open market as per the OERC approved cost data rate.
5. If procurement of materials could not be taken up in the above two categories, then it may be from the suppliers/ manufacturers who have recently supplied the same to other Government agencies Distribution Utility at the latest rates.
6. Once the NESCO declares closure of emergency, the field officers have to furnish necessary certificate regarding purchase of material and non-availability of the same in the stores, work executed etc., and the Accounts Officers who are responsible for passing of bills, closure of accounts and making payment shall ensure to complete the same within 15 days from the date of closure of emergency.
7. The expenditure incurred shall be booked under appropriate heads of account.
8. After 15 days from the date of closure of emergency, field officer shall furnish the certificate for the works carried out during the emergency period. If any officer fails to do so or deviates from set procedure, the action shall be initiated against the delinquent after giving show cause notice to explain the reasons and following due procedure.
9. The SEs/EEs (Ele.) shall seek declaration of emergency by GM (Tech) through telephonic talk/SMS followed by a written requisition duly indicating the area for which the emergency to be declared.
10. After declaration of emergency by GM (Tech.), the emergency restoration work shall be carried out and expenditure booked against the newly created heads of account with caption "Emergency restoration of power supply-calamity".

Sample 1 - incurred towards Capital Expenditure nature.

Sample 2 - incurred towards R&M expenses nature.

11. After restoration of power supply, the SEs/EEs (Ele.) shall seek for closure of emergency by GM (Tech) through telephonic talk/SMS followed by a written requisition.
12. The SEs/EEs (Ele.) shall send a report within 3 days duly indicating the quantum of damages and the estimated amount after closure of emergency declared.
13. A token budget per Circle/Division will be allocated by the GM (Fin) in consultation with GM (Tech) for utilization in carrying out power supply restoration work during the period of emergency.
14. The Circle Superintending Engineers (Ele.), are authorized to re-appropriate the special budget grant per division allotted within its jurisdiction during emergency period in case of expenditure incurred during the restoration work goes beyond the earlier allocation in any division.
15. The GM (Operation) are authorized to re-appropriate the special budget grant per Circle if the expenditure incurred in particular O&M circle goes beyond the total special allocation made to

each division in that circle.

16. After re-appropriation of the special grants during the emergency period by the Superintending Engineers (Ele.) of O&M circles and after the closure of accounts (within 15 days from the date closure of the emergency) they shall send the accounts to the Head of Emergency Operations/GM (Fin) duly seeking recoupment of the same. The Head of Emergency Operations/GM (Fin) shall release this amount as recoupment to the respective Superintending Engineers (Ele.) of O&M circles for reallocation among the divisions in their jurisdiction depending upon the requirement.
17. In case, the Superintending Engineers (Ele.) of O&M circle encounter another emergency declaration before closure of the earlier emergency, / before finalization of accounts, he/she shall seek recoupment of the budget grant towards expenditure incurred duly furnishing a certificate accordingly.
18. The Superintending Engineers (Ele.) of O&M circles shall submit the statement of accounts on the 16th day from the date of closure of emergency to the General Manager (Fin)/Head of Emergency Operations positively.

### **11.12.3 Responsibility Matrix for emergency response functions**

D-24 hours: Alert from GM (Technical) must go to all NESCO personnel. Testing and availability of emergency equipment must begin.

D-12h: All communication equipment must be tested at this time.

D-4h: All personnel must be at their designated positions, and all required response equipment must be assigned to the teams.

D+ zero: Turn off power of the "Line" based on reported failure complaints and local knowledge (usually by Unit Officer or higher).

D+2h: Based on the seriousness of the event, continue execution of response effort, including isolating vulnerable points, detecting problems and mobilizing relief efforts.

## **ANNEXURE**

***For specific organization Disaster Management Plan of NESCO please visit the link given in the annexure at the end of this plan***



## **12. Western Electricity Supply Company (WESCO)**

### **12.1 Utility Profile :**

WESCO is an Power Distribution utility distributing electricity to the consumers of western part of Odisha covering 9 revenue District namely Sambalpur, Bargarh, Jharsuda, Deogarh, Sundargarh, Subarnapur, Bolangir, Kalahandi and Nuapada etc. For smooth functioning of Utility activities is divided in 5 circles comprising different revenue Districts.

- |  |                  |
|--|------------------|
| 1. Sundargarh District-                      | Rourkela Circle  |
| 2. Jharsuguda, Deogarh & Sambalpur District- | Sambalpur Circle |
| 3. Bargarh District-                         | Bargarh Circle   |
| 4. Subarnapur & Bolangir District-           | Bolangir Circle  |
| 5. Kalahandi & Nuapada District-             | Kalahandi Circle |

The head quarter is situated at Burla.

### **12.2 Statistical prolife**

- |                                |             |
|--------------------------------|-------------|
| 1. No. of consumers            | : 11,76,506 |
| 2. No of 33/11 KV Sub-Stations | : 147       |
| 3. 33 KV Lines in Km.          | :3479       |
| 4. 11 KV Lines in Km.          | :28960      |
| 5. L.T. Lines in Km.           | :19657      |
| 6. Total Staff                 | : 4653      |

### **12.3 Organizational Structure:**

The organizational structure is annexed.

### **12.4 Hazard, Vulnerability, Capacity and Risk Profile in Power Distribution Utility:**

Risk Assessment Methodology

The effects of the hazards are analyzed on the basis of the Probability and Severity of damage. Probability is based on past history and on the likelihood of occurrence and is classified as HIGH, MEDIUM & LOW.

Severity is based on its impact on :

- |   |          |
|---|----------|
| 1. Loss of Life.                            | : HIGH   |
| 2. Loss of Property due to damage.          | : HIGH   |
| 3. Damage to Equipment due to high Voltage. | : MEDIUM |
| 4. Disruption of Electric Supply.           | : LOW    |

### **12.5 Possible Disaster experienced:**

There are number of natural disasters which effect power supply to a great extent for which an effective disaster management plan is necessary to restore power supply.

The following types of disasters are experienced in WESCO areas:

1. Cyclone.
2. Flood.
3. Drought etc.

### 12.5.1 Cyclone:-

This is a major cause of breakdown of power supply in WESCO. Damages due to cyclones are the following:

Sr. No	Damage in cyclone affected area	Probability	Severity
1	Breaking of poles	High	Medium
2	Snapping of conductor	High	Low
3	Failure of insulator	High	Low
4	Breakage of jumpers	High	Low
5	Falling of trees on o/H lines	High	Medium
6	Failure of Power Transformer	Medium	Medium
7	Failure of Distribution Transformer	Medium	Medium

### 12.5.2 Flood:-

Flood is a major cause of breakdown of power supply in WESCO area ,mainly in Sambalpur, Bhabanipatna, Rourkela, Jharsuguda etc.

Damages due to floods are the following:

Sr. No	Damage in flood area	Probability	Severity
1	Breaking of poles	H	M
2	Snapping of conductor	H	L
3	Failure of insulator	H	L
4	Breakage of jumpers	H	L
5	Falling of trees on o/H lines	H	M
6	Failure of Transformer	H	M
7	Failure of Distribution Transformer	H	M
8	Damage to Equipment due to flooding	H	H

### 12.5.3 Drought:-

The effect on power supply is minimum in drought. However, special initiatives are to be taken to cater power supply to the drinking water supply points, irrigation purposes etc.

### PREPAREDNESS:

**Preventive maintenance:** (April to May-15<sup>th</sup>)

- Double Jumpering of feeder cut points.
- Replacement of broken Pin, Disc Insulator and post insulator
- Repairing of AB switch
- Restranging of conductors at alarming/dangerous locations.
- Pruning of Tree branches

NB: If required the works are taken up through licensed contractors.

**Inventory:**

- Stores located at Burla, Rajgangpur, Kesinga and Bolangir
- Stock position of major materials:

Item	Quantity
Poles(Nos)	1034
Conductor(Km)	4045
DTR(All Capacities)	2123
Power Transformer	12
AB Cable(in km)	1266
Insulator(All Types) nos.	5096
Lightning Arrestor nos.	1242
VCBnos.	58

The materials available under different heads used to be diverted to O&M head during exigency on replenishment basis subsequently. Store Stock Position of major materials are mentioned above in annexed.

**Breakdown maintenance:**

For providing immediate restoration of power supply to District Headquarters, major towns , PHD points and Medicals etc with the help of Licensed contractors available in different areas of WESCO on turnkey basis, major materials like pole, conductor, cable, Transformer being supplied by the Utility.

**Precautionary Measures:**

- i) During high wind blow, cyclonic storm & flood the 11 KV and even 33 KV feeders are switched off to avoid any casualty due to snapping of live conductor.
- ii) The sub-station and electricity lines are isolated in the low level areas where there is possibility of flood water coming in contact of live wires.

**Man Power Management:**

During any disaster like storm & flood etc. WESCO Utility used to deploy its own staff and if required engage licensed electrical contractors for early restoration of power supply on priority basis.

**Emergency Cell:**

Each of the 17 Electrical Divisions and 5 Electrical Circles, act as the Emergency cell. An Emergency cell operates at Head quarters in DSOCC Cell headed by GM Operation.

**Safety Measures:**

- i) **Personal protection Equipments (PPE)** like hand gloves, helmet safety belts etc. have been provided to all the workers in the field.
- ii) The contractors & their workers use their own **PPE** during disaster.
- iii) **Vehicle provided to section, sub-division, HT (maint.) & MRT wing can be used during disaster.**

## **ANNEXURE**

***For specific organization Disaster Management Plan of WESCO please visit the link given in the annexure at the end of this plan***

### 13. Southern Electricity Supply Company (SOUTHCO)

#### 13.1 Summary of Statistics about SOUTHCO

Area covered:	47,000 Sq. km.
No. of Districts covered:	8 (K. Prasad Block of Puri District)
No. of Blocks covered:	87
No. of NACs/ULBs covered:	34
No. of Gram Panchayats covered:	1514
No. of census villages covered:	14520
No. of Habitations/Hamlets covered:	6030
Population:	94.38 Lakhs
No. of 33/11 KV Sub-stations as on 31.3.2015:	144
No. of 33 KV Feeders as on 31.3.2015: including GRIDCO interface	165
No. of 11 KV Feeders as on 31.3.2015:	510
Power Transformers as on 31.3.2015:	289
Distribution Transformers as on 31.3.2015:	35848
Length of 33 KV Line as on 31.3.2015:	3096 Circuit km
Length of 11 KV Line as on 31.3.2015:	31631 Circuit km
Length of LT Line as on 31.3.2015:	25814 Circuit km
No. of employees as on 31.3.2015:	
Sanctioned:	5301
Working:	2845
Total no. of Consumers as on 31.03.2015:	13.59 Lakh

Geographical Regions	South Coastal plain, Nabarangpur-Jeypore plateau
Connected States/UTs	Andhra Pradesh, Chhattisgarh
Major Rivers	Rushikulya, Bahuda, Vansadhara, Kolab, Tel
Mountains	Mahendragiri, Devgiri,
Forests	Open & Dense forest
Coast line	

The vast power distribution infrastructure laid over the coast line as well as districts which are prone to the cyclone & flood etc. posing threat to the mass level supply disruption and inconvenience to the public in case of any disaster. A super cyclone in 1999 and recent very severe cyclone in Oct. 2013 (Phailin) and also frequent floods in almost every year in many parts of the SOUTHCO warrants for preventive action against the disasters and its mitigation in case of occurrence.

### 13.2 Composition, Responsibilities and list of Functions of SOUTHCO Disaster Management Cell (SDMC) – at Corporate Office

	Designation	Designation for SDMC	Functions
1)	Authorised Officer of SOUTHCO	Chairperson	1) Declare a “State of Disaster” within SOUTHCO and ensure immediate activation of this plan.  2) Coordinate with State Govt./OSDMA and present detailed reports and updates to State Govt./OSDMA.  3) Request District, State or Central resources as necessary from appropriate authorities.  4) Declare “Closure of State of Disaster” within SOUTHCO and ensure completion of activities related to closure, including certification and audit, closure of financial documents, implementation of any feedback reports from OSDMA, issues of compensation etc.
2)	GM/DGM/AGM (Technical)	Chief Executive Officer	1) Establish a team for certification/ audit of work undertaken, after the disaster is declared closed.  2) Implement procedures specifically for DM, including but not limited to  g) Authorization of emergency powers, h) Rules related to leaves and overtime, i) Procedures for transport and communication (including alternatives to telephones/mobile telephones, cranes, boats, trucks) j) Procedures for purchase or leasing of equipment, etc. k) Procedures for purchase, leasing, maintenance and inventory of equipment and vehicles only to be used in disasters l) Procedures for capacity building and training

specifically for disaster management [**Note:** Sample procedures for “emergency management” activities as provided in Chapter 11 may be followed for Disaster Management. Further procedures may be developed as required].

- |                                 |          |  |
|---------------------------------|----------|--|
| 3) General Manager (Operations) | Member   | <ol style="list-style-type: none"><li>1) Activate and monitor SOUTHCO Disaster Management Control Centre.<br/>This centre can be hosted from the SOUTHCO Corporate Office but should handle inputs/requests must be collated, analyzed and priorities assigned for all requests.</li><li>2) Coordinate with OPTCL/GRIDCO/SLDC etc.) on all issues.</li></ol>   |
| 4) Head of Commerce             | Convener | <ol style="list-style-type: none"><li>1) Convene the SDMC meetings at the request of the Chairperson and update the schedule of future meetings after consultation with Chairperson.</li><li>2) Collect status updates on a regular basis from other members and report to the Chairperson and SDMC.</li><li>3) Implement the protocols (or SOP) for communicating that a disaster has been declared to all SOUTHCO employees in affected districts [for example: formulating the text of the SMS/Email message, list out instructions to be conveyed in a phone call etc.]</li><li>4) Supervise the communication of any information necessary as decided by the SDMC to all stakeholders including priority consumers (hospitals, blood banks, police and fire) and media.</li></ol> |
| 5) Head of HR                   | Member   | <ol style="list-style-type: none"><li>1) Ensure security of installations and equipment, and safety of workers.</li></ol>  |

		<ul style="list-style-type: none"> <li>2) Ensure officers and men neglecting duty are held accountable under the DM Act, 2005.</li> <li>3) Ensure officers and men are not succumbing to undue political pressure, corruption and are not taking undue advantage of citizenry.</li> </ul>
6) Head of Finance	Member	<ul style="list-style-type: none"> <li>1) Implement budgets designed specifically for DM (for example related to expenditure in purchase/lease of equipment and that incurred for transport).</li> <li>2) Implement procedures for quick and easy transfer of funds to personnel as specified by the GM (Tech.).</li> </ul> <p><b>[Note:</b> Both the above tasks must be completed prior to any disasters, and continuously revised. As an example, procedures are provided in the Chapter 11].</p> <ul style="list-style-type: none"> <li>3) Review compensation and similar claims.</li> <li>4) Ensure proper closure of accounts.</li> </ul>
7) SE of affected District	Member	<ul style="list-style-type: none"> <li>1) Activate and monitor a SOUTHCO Control Centre for citizens only at the Circle level.</li> <li>2) Coordinate constantly (before, during and after) with early warning agencies and special groups (like weather department or civil defense groups) and advise the Chairperson, SDMC accordingly.</li> <li>3) Make contingency plans for meetings of the SDMC during a disaster (for example, in case the standard meeting location is unavailable).</li> <li>4) Any other activity that the MD assigns.</li> </ul>
8) External Consultant in Disaster Management	Member	<ul style="list-style-type: none"> <li>1) Provide the SDMC with inputs and domain expertise and help to update the SDMP as described in Chapter 10.</li> <li>2) Any other activity that the MD assigns.</li> </ul>



### **13.3 Information and Communication Activities**

#### **a) Acquisition of required communication equipment**

SOUTHCO will acquire devices that may be used during a disaster to aid in the communication between personnel responding to a disaster. Beyond the current, commercial mobile network, used during routine emergencies, provision for wireless communication devices, not reliant on commercial mobile networks, should be made (for. E.g. Walkie-talkies, Terrestrial Trunked Radio -TETRA).

#### **b) Communication from SDMC to SOUTHCO personnel**

As per the responsibilities assigned in Chapter 3, the standard messages for communication of disasters must be defined. These messages must convey the severity of the disaster and the expected response from the personnel. In addition, messages for declaring the closure of the emergency must also be defined.

An example of a standard text message is: *“The AO SOUTHCO declares a state of Disaster in <dist.> district as of <time>”*

#### **c) Communication from all SOUTHCO personnel**

A reporting mechanism via messages must be defined that will convey (1) the safety and (2) the availability of any and all personnel to their immediate supervisor. This will allow for the SDMC to make a quick assessment of man-power available within a short time of a disaster. As per Chapter 3, the GM (Operation) will establish and maintain a special disaster management & control centre where all personnel (regardless of rank) should be able to report problems and be offered directions and advice. The information to be reported must follow a standard well-defined format in order to be specific and accurate to allow prompt response.

### **13.4 Capacity Building Plan**

#### **13.4.1 Institutional Capacity Building**

- a) SOUTHCO shall ensure that it has sufficient manpower/resources at different skill levels and thereby reducing the dependency on third parties during disasters.
- b) All SOUTHCO personnel shall be trained on at least one essential function apart from their core responsibility in a phased manner and a list of the same shall be maintained.
- c) Every Divisional officer shall have list of resources under his division and also corresponding competency/skill list
- d) Skill and inventory up gradation activities shall be carried out on regular basis

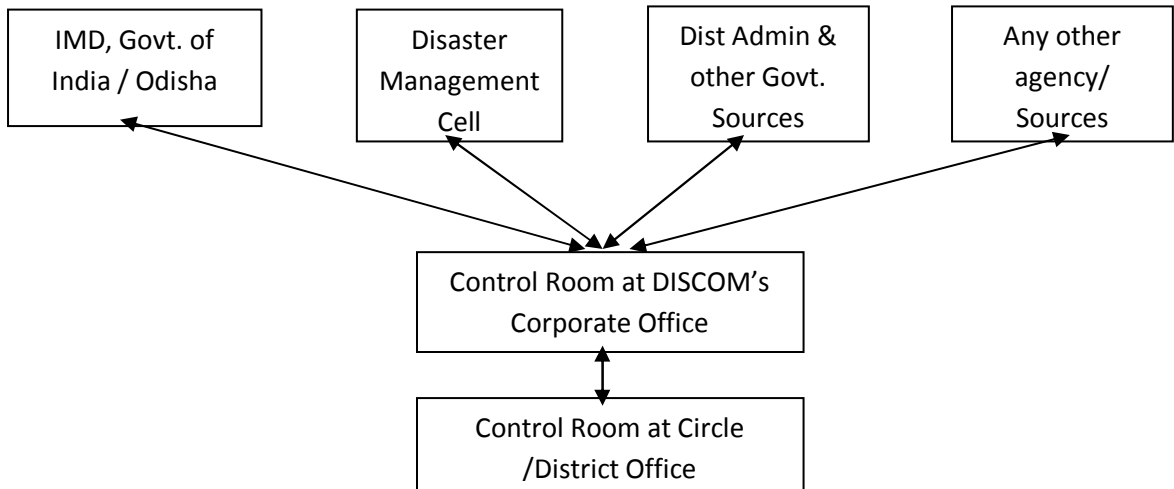
#### **13.4.2 Community Capacity Building**

SOUTHCO shall conduct exercises with civic authorities such as the Police, Fire, Municipalities, Hospitals and Waterworks to establish coordination and communication protocols to be used during a disaster.

### 13.5 Procedure for Action during a Disaster

#### 13.5.1 Flow of Information

Source of occurrence of disaster information are collected from IMD/TV/Govt. of Odisha / Govt. of India / Collectors. Flow of information shall be basically as below -



### **ANNEXURE**

***For specific organization Disaster Management Plan of SOUTHCO please visit the link given in the annexure at the end of this plan***

**ANNEXURES**