

हाइड्रो पावर स्टेशनों की संकट और आपदा प्रबंधन योजना
तैयार करने के लिए सामान्य दस्तावेज़

**GENERIC DOCUMENT FOR DEVELOPING
CRISIS AND DISASTER MANAGEMENT PLAN
FOR HYDRO POWER STATIONS**



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**GOVERNMENT OF INDIA
MINISTRY OF POWER
CENTRAL ELECTRICITY AUTHORITY
NEW DELHI
DECEMBER 2016**

(Prepared by Central Electricity Authority in fulfilment of provisions of DM Act 2005)

(DM अधिनियम 2005 के प्रावधानों की पूर्ति में विद्युत मंत्रालय द्वारा तैयार)



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FOREWORD

India has been traditionally vulnerable to natural disasters on account of its unique geo climatic conditions. Floods, droughts, cyclones, earthquakes and landslides have been a recurrent phenomenon. Generation, Transmission and Distribution of Electricity is also affected due to these natural disasters.

Electrical energy is the major input for the social and economic welfare of the society and for the economic development of the country. Any disruption in the supply of electricity caused due to crisis or disasters not only causes loss to the economy, but also creates hardship to human beings, as every aspect of human life is connected with electricity. Therefore, it becomes extremely important to evolve crisis & disaster management plan to restore the generation, transmission, distribution and supply of electricity to the affected areas in the shortest possible time. Building resilience in electricity infrastructure is also very important, to enable the infrastructure to withstand the natural disasters which are likely to occur in a particular region.

A document on Crisis & Disaster Management Plan for Power Sector was prepared by CEA in the year 2004 and revised in the year 2012. A committee to review/update the document on Crisis & Disaster Management Plan for power sector was constituted in October, 2015, to update the previous document, keeping in view the developments in the power sector and the guidelines issued by NDMA, from time to time. During the deliberations of 1st meeting, it was decided to prepare a document on Crisis & Disaster Management Plan for power sector and sector specific generic documents for Hydro, Thermal, Transmission, Distribution, Renewables and Grid Safety & Cyber Security. Accordingly, a generic document on 'Developing Crisis & Disaster Management Plan for Distribution Sector' was prepared in CEA.

I hope that this generic document on '**Developing Crisis & Disaster Management Plan for Hydro Power Stations**' would serve as a guiding tool for all the power sector utilities associated with Hydro Power Stations to prepare the Crisis & Disaster Management Plan to which their installations are vulnerable.

(S.D. Dubey)

स्वहित एवं राष्ट्रहित में ऊर्जा बचाएं
Save Energy for Benefit of Self and Nation



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PREFACE

Power Sector is one of the most important infrastructure of the country, as growth of this sector is directly correlated with the economic growth of the country. Therefore, any disruption in Power Sector due to Crisis / Disaster creates hardship to the human beings, as every aspect of human life is directly or indirectly associated with the electricity.

The country has experienced many natural disasters such as drought, flood, earthquakes and cyclones during the past. It has also experienced many manmade crises such as terrorist attacks, bomb explosions, strikes, fires etc. The natural disasters / man-made disasters almost always involve huge losses / damage to infrastructure in the country. In order to minimize damage/disruption in generation, transmission and distribution of electricity sector, it becomes extremely important to evolve crisis / disaster management plan for this sector.

Therefore, the very purpose of preparation of this document is to evolve more proactive, holistic and integrated approach for strengthening disaster preparedness, mitigation and emergency response in event of disaster taking place. The 'Generic Document for Developing Crisis & Disaster Management Plan for Hydro Power Station' provides a framework and direction to all the utilities owning Hydro Power Generating Stations for all phases of disaster management cycle.

I am sure that 'Generic Document for Developing Crisis & Disaster Management Plan for Hydro Power Stations' containing valuable information shall be of immense utility to all those associated with the crisis & disaster management activities of power sector of the country. I welcome any comments / observations / suggestions for improvement of this publication. The same would be taken care of in review of this document.

DECEMBER, 2016

(SHRI T.K.BARAI)

स्वहित एवं राष्ट्रहित में ऊर्जा बचाएं
Save Energy for Benefit of Self and Nation



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NEW DELHI-110066, Dated :

01/12/2016

ACKNOWLEDGEMENT

Central Electricity Authority has prepared the publication 'Generic Document for Developing Crisis & Disaster Management Plan for Hydro Power Station' which contains details of various tools and techniques to deal with the crisis and disaster situation in Hydro Power Station sector. This document has been prepared in accordance with the provisions of Disaster Management Act 2005 and the Guidelines issued by NDMA from time to time and the established practices. It would facilitate to achieve target of making Indian Power Sector disaster resilient by maximizing the ability to cope with disasters at all levels of administration as well as at the field level. This publication has been prepared to provide a framework and direction to the utilities of the sector for all phases of pre and post disaster management. The very purpose of this publication is to evolve integrated approach for strengthening disaster preparedness, mitigation and emergency response in event of disaster / crisis situation.

'Generic Document for Developing Crisis & Disaster Management Plan for Hydro Power Stations' has been prepared in association with **National Hydro Power Corporation Limited** and would provide broad guidelines for all the utilities associated with Hydro Power Sector. I am happy to place on record my sincere appreciation to all the officers of National Hydro Power Corporation Limited who have assisted in formulation of this document.

The specific contribution made in preparation of this document by Shri Ishan Sharan, Director, Shri J.K.Rathod, Director, Shri Sovaran Singh, Dy. Director, Shri Shivcharan Chhirolia, Dy. Director, Shri Ramendra Yadav, Assistant Director-II, Shri C.S.Ravindramani, PPS, and Shri Rajesh Kumar, Professional Assistant is well appreciated and acknowledged with thanks.

DECEMBER, 2016

(SMT. ANJULI CHANDRA)

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STRUCTURE OF A DISASTER MANAGEMENT PLAN

To effectively deal with disaster situations in power sector, Ministry of Power has formulated a document on “Crisis & Disaster Management Plan for Power Sector” with intervention and response depending on the severity of the disaster / calamity. According to this document, a 4-tier structure for DM Plan has been put in place i.e. at Central level, Regional level, State level and Plant level. This generic document is prepared for disaster management plan of hydro power station (plant level). The structure of a Disaster Management Plan (DMP) at Hydro Power Station (Plant Level) is described in this chapter prepared in line with suggestions of NDMA. This will ensure uniform, comprehensive and consistent disaster management planning in all the hydro power stations.

The hydro power station mainly consists of power plant, dam and other associated structures. For disaster management of the dam, Central Water Commission, MoWR, Govt. Of India has issued “Guidelines for developing Emergency Action Plan (EAP) for Dams”. Further Standard Operating Procedures (SOPs) are also prepared for “protection of people living in downstream area for emergency such as sudden release of water from dam”. The EAP of dam prepared on the basis of these guidelines and SOPs shall also be the part of DMP and will be referred for dam related issues.

The suggested structure of DMP of a hydro power plant is as below:

0.0 TITLE PAGE

The title page must include the following information:

- “Logo” of the Corporation
- “Disaster Management Plan” title heading
- A photograph related with the power station
- Official name of the power station followed by its location
- Date (Month, year) on which the DMP was published or revised (along with number of revision).

1.0 INTRODUCTION:

Introduction shall briefly describe the purpose of the DMP and cover the general information about overview of the power station, authorities, institutional arrangement & Plan Management.

1.1 Over view of the Power Station:

1.2 Purpose of the DMP:

Purpose of this plan is to define the actions and roles necessary to prepare for and respond to any disaster situation in a coordinated manner. DM plan is intended to provide guidance to all agencies within the department with a

general concept of potential emergency assignments before, during and following emergency situations.

1.3 Scope:

This section shall explicitly state the scope of emergency and disaster response to which the plan applies, and the entities (agencies within the power station) and geographic areas to which it applies.

1.4 Authorities, Codes, Policies

In DMP, according to the degree and level of crisis and disaster, an authority has been created comprising the officials to act as Main Controller, Site Controller, Incident Controller-I & Incident Controller-II, which will function in the event of crisis and disaster situation.

The DMP shall be prepared keeping in mind the following acts, policies and plans:

- Disaster Management Act, 2005
- National Policy on Disaster Management, 2009
- Suggested structure for DMP by NDMA (Apr, 2015)
- Emergency Action Plan for Dams as per CWC guidelines (Available at website “www.damsafety.in”)
- SOP for sudden release of water from dam to d/s areas.

1.5 Institutional arrangements for Disaster Management:

At power station level emergency management group (EMG) shall be formed to effectively deal with disaster situations.

1.6 Plan Management (Development, Approval, Implementation, Review and Revision):

It is always good to identify by position the individuals in the department responsible for developing, maintaining, revising, reviewing, approving and updating the DM Plan, annexes and supplementary documents, such as EAP, SOPs, etc. Once planning documents are developed, a system of maintenance must be established to ensure they are updated.

2.0 HAZARD, RISKS AND VULNERABILITY ANALYSIS (HRVA):

2.1 Mapping of HRVA:

Under this section, all kinds of potential hazards will be defined which might impact people, property and functioning of departments adversely. Hazards in

the power station may happen due to occurrence of the various events or their combinations. The likely potential hazards are as below:

- Fire/ explosion and accidents
- Floods
- Landslides/ snow falls
- Earthquakes
- Terrorist Attack, Bomb Attack / Threat, Strike, Violent Agitation, Sabotage, Hindrance in power supply, Cyber Attack

2.2 History of Disasters at Power Station:

A brief description of disasters happened in the past shall be enclosed as annexure including the lesson learnt.

3.0 PREVENTION AND MITIGATION:

This section should describe, in general, the capabilities and processes the department has in place to select preventive action strategies. Indicative steps for preventive action selection are as follows.

- Analyze the hazard
- Determine prevention / protection action
- Determine public warning
- Determine prevention / protective action implementation plan

Each Kind of hazards should be analysed in details and prevention & mitigation measures should be described accordingly.

3.1 Prevention & Mitigation for Fire and Accidents

3.2 Prevention & Mitigation for Floods

- Flooding in power house : This shall include preventive measures and action plans for flooding in power house in case of Abnormal Water Leakage in Power House from Spiral Case/ Main Inlet Valve (MIV) on downstream side; heavy leakage from upstream side of MIV/Failure in tunnel and heavy flood in the river.
- Flooding due to dam : Prevention and mitigation measures due to dam conditions shall be followed in accordance with the “Emergency Action Plan for the Dam”.

3.3 Prevention & Mitigation for Landslides/ Snowfalls

3.4 Prevention & Mitigation for Earthquakes

3.5 Prevention & Mitigation in case of bomb/ terrorist threat, terrorist attack, strike, violent agitation, sabotage, hindrance in power supply, cyber attacks

3.6 Public Warning:

This section should describe, in general, the capabilities and processes the department has in place to information collection and disseminate warning messages to the stakeholders (including public in the vicinity areas) as to the nature of the hazard, the timing, and the recommended or required protective / preventive actions.

Various kinds of public address system and sirens shall be installed at strategic locations and shall be monitored periodically by PH/Dam Control Room. DMP shall also include standard operating procedures (SOPs) for sudden release of water from dam/ power house for safety of habitations residing in d/s areas.

4.0 MAINSTREAMING DM PLAN IN DEVELOPMENTAL PROJECTS□

Devise appropriate policy for “Sustainable development” by factoring disaster risk concerns, can help reduce disaster losses, protect existing developmental gains and avoid new risks. Following consideration should be adhered to:

- Development works like bridges, buildings suggested to be taken up as per inundation plan
- Design data of PS shared with new projects coming up in u/s & d/s areas
- Building resilience in new projects as per experience gained
- New technologies for resilient projects

5.0 PREPAREDNESS

This section should describe, in general, the capabilities and processes the department has in place to implement the range of preventive / protective actions that may be required for various hazards. The preparatory activities listed below are examples of activities that may be required to implement preventive / protective actions in response to certain types of hazards.

- Emergency Operation Centre (EOC) facility for monitoring the progress of preventive / protective action implementation
- Preparedness Mechanism in case of fire/ explosion
- Preparedness Mechanism in case of flood
- Preparedness Mechanism in case of Landslides
- Preparedness Mechanism in case of Earthquake
- Preparedness Mechanism in case of Terrorist/ Bomb Threat, Terrorist Attack, Strike, Violent Agitation, Sabotage
- Mechanism for Medical support
- Search and rescue mechanism
- Resources Management
- Mechanism for alternate Source of Power Supply
- Training & capacity Building
- Mechanism for Communication System

6.0 RESPONSE

A response plan constitutes a part of disaster management cycle which takes place immediately after an incident/ disaster which could emanate from either human induced or nature induced factors.

7.0 RECOVERY

The following activities would be carried out in this phase:

- Declaration of End of Disaster Situation
- Coordination of Resources
- Implementation/ Assistance for recovery
- Coordination with Local Administration regarding implementation of rehabilitation programme
- Documentation of the disaster and revision of the DMP based on experience.

8.0 FINANCIAL ARRANGEMENTS

Fund provision for Disaster management be kept in Annual Budget for:

- DM plan implementation and management in Project area & d/s.
- Fund provision for Disaster Management
- Implementation of Disaster Risk Reduction (DRR) works

9.0 ANNEXURES

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ΗΨΔΡΟ ΠΟΩΕΡ ΠΡΟΘΕΧΤΣ



DISASTER MANAGEMENT PLAN

Edition- [# #]



[Name] POWER STATION

[Place Name], Distt [Name] (State Name)

(A sample cover page)

DISASTER MANAGEMENT PLAN [Name] POWER STATION

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DISASTER MANAGEMENT PLAN
[Name] POWER STATION
DMP DISTRIBUTION LIST

A copy of the DMP has been provided to the following people:

Copy No.	Authority	Name, Title, Phone	Address
1			
2			
3			
4			
5			
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10			

DISASTER MANAGEMENT PLAN
[Name] POWER STATION
REVISION STATUS

Rev No.	Date	Revision Description/ Change made	Signature
0			
1			
2			
3			

DISASTER MANAGEMENT PLAN
[Name] POWER STATION
Approval and Implementation

Prepared by

[Signature]

[Name and Title of Appropriate Authority of Owner]

Date

This Disaster Management Plan is hereby approved. This plan is effective immediately and supersedes all previous editions.

[Signature]

[Name and Title of Appropriate Authority of Owner]

Date

DISASTER MANAGEMENT PLAN

[Name] POWER STATION

1. INTRODUCTION

1.1 Overview of Power Station:

[Name] Power Station is owned and operated by [PS owner]. It is situated in [Name] District of [State] and was commissioned in [year]. The installed capacity of Power Station is [# # #] MW, it consist of [# # #] m high, [# # #] m long [Type] Dam, HRT [# # #] Km long dia [# # #] m and [underground/ surface] Power House and TRT [# # #] Km long, dia [# # #] m Project was designed to generate [# # #] MUs in a year.

[Name] Power Station is located at [Place], [Distt Name]. Name] is nearest railhead and distance is [# # #] KM. Nearest Airport is [Name] and distance is [# # #] Km.

The salient features, vicinity map, project layout map and layout map of township are enclosed as annexure – I, II, III & IV respectively.

Organization Chart of Power Station is as per Annexure-V. The generation processes are shown in the flow chart attached as Annexure-VI.

1.2 Purpose of the DMP:

The purpose of this plan is to establish a system / plan necessary for proactive and effective management of an accident/ incident/ emergencies leading to any disaster and to minimize losses to people and property.

The disaster management plan is intended to provide guidance to all concerned with a general concept of potential emergency assignments before, during and following emergency situations.

1.3 Scope:

This Plan describes the emergency preparedness of [Name] Power Station and is applicable to deal with various types of emergency situations that could occur within the premises of Power Station area, including the residential colony area.

This document defines the functions and responsibilities of all concerned, managerial, operational & supporting services, fire services, medical services, Security Forces and Civil Administration for effective management of the on-site-emergency situations.

1.4 Authorities, Codes, Policies

Disaster Management Act 2005 lays down institutional, legal, finance and coordination mechanism at the National, State, District and local unit levels. Under the act, National Disaster Management Authority (NDMA) is constituted, which is an apex body for disaster management. Disaster Management Act, 2005, has also mandated the constitution of a National Disaster Response Force (NDRF) for the purpose of specialized response to a threatening disaster situation or disaster emergencies both natural and manmade.

The DMP has been prepared keeping in mind the following acts, policies and plans:

- Disaster Management Act, 2005
- National Policy on Disaster Management, 2009
- Suggested structure for DMP by NDMA (Apr, 2015)
- Emergency Action Plan for Dams as per CWC guidelines (Available at damsafety.in)
- SOP for sudden release of water from dam to d/s areas.

In DMP, according to the degree and level of crisis and disaster, an authority has been created comprising the officials to act as Main Controller, Site Controller, Incident Controller-I & Incident Controller-II, which will function in the event of crisis and disaster situation. The details in this regard are enclosed at Annexure-VII.

The roles and responsibilities of the authorities are described as below:

Main Controller	<ol style="list-style-type: none"> 1. Determine and identify the condition(s) or triggering event(s) that initiate or require emergency actions. 2. Assess the magnitude of the situation 3. Decide regarding declaration of emergency. 4. Provide instructions to Site Controller for the operation of the power station during the anticipated emergency.
Site Controller	<ol style="list-style-type: none"> 1. Co-ordinate with the Main Controller, Incident Controller and with Security personnel for relief and rescue operation. 2. Liaison with outside and Govt. Agencies, Civil Administration. 3. Take specific actions at the power station in accordance with the established procedures.
Incident Controller – I	Support the Site Controller
Incident Controller – II	

The contact numbers of key officials and other Important Numbers are given in Annexure-VIII.

1.5 Institutional arrangements for Disaster management

To effectively deal with disaster situations in power sector, Ministry of Power has formulated a document on “Crisis & Disaster Management Plan for Power Sector” with intervention and response depending on the severity of the disaster / calamity. According to this document, a 4-tier structure has been put in place i.e. Central level, Regional level, State level and Plant level. Here at plant level emergency management group (EMG) shall comprise of the following members:

- (a) In-charge of the power station
- (b) Chief Engineer/DGM/Sr. Manager
- (c) Plant Safety Manager
- (d) Representative of District Administration

This tier shall coordinate with the upper tiers as and when required.

1.6 Plan Management (Development, Approval, Implementation, Review and Revision):

Incharge of the power station will be responsible for developing, maintaining, revising, reviewing and updating the Disaster Management Plan, annexures, and supplementary documents, such as EAP, SOPs, etc. in consultation with O&M Division. These documents shall be reviewed every year in January or whenever required to update the names and contact details of officers concerned. The document shall be reviewed in the third year for updation of contents.

The In-charge of the power station shall approve the Disaster Management Plan.

2. **HAZARD, RISK AND VULNERABILITY ANALYSIS (HRVA)**

Hazards in power stations may happen due to occurrence of the following events:

- Flood/cloud burst
- Fire/ explosion
- Earthquake
- Landslides/ slide prone area
- Terrorists threats/ attacks & Sabotage
- Bomb threat and bomb explosion
- Strikes/ violent agitation
- Cyber attack
- Disruption in power supply,
- Leakage in power house and other underground structures, etc.

Due to these events, following hazards/ risks may occur:

2.1 **Hazards – Fire/ explosion & Accidents**

The power house is more prone to high hazards due to fire owing to storage of large volume of oils, lubricants etc., suffocation and limited outlets (for smoke & human being). The cause of fire may be due to failure of protection system of generator or failure of insulation.

The transformers are also prone to hazard like fire & explosion. The cause of fire may be due to failure of transformer winding, high oil temperature or failure of protection system of transformer.

Other likely prone areas are switchgear rooms, cable galleries, GIS, switchyard, etc.

2.2 **Hazards – Floods**

- Average inflow of last 24 hrs is calculated based on Power House Generation and change in reservoir level plus spillage.
- In addition, information regarding *[Name]* River discharge is also being monitored regularly from G&D site at *[Name]*.
- Information regarding any sudden change in discharge in u/s tributaries is also collected.

2.2.1 **Flooding in Power House**

Following are the possible situations that can lead to flooding of Power House:-

- ❖ The Highest Flood Level of *[Name]* River in the vicinity of power house is EL [# #] m and invert of main access tunnel / road of Power House portal is EL [# #] m. It is feared that flood water may enter the Power House through *[Access Tunnel / road]* from river or any other source.

- ❖ The turbines of the Power House are designed for [# # #] PPM of silt content in water. Beyond this limit, excessive silt in the water may damage shaft seal resulting in back flooding of the turbine pit.
- ❖ Heavy leakages from any point connected with water conductor system.
- ❖ Failure of pumps/ Power Supply to the pumps for longer duration.

2.2.3 Flooding at Dam

[Name] river on which the dam is located is originating from [Name]. This river is prone to floods in the monsoon season commencing from end of June to end of September, due to various reasons viz. heavy rains, occasional cloud burst, landslides, etc.

2.3 Hazards – Landslides/ Snow falls

The [Name] Power Station lies in the Himalayan area, as the area is prone to heavy rain falls/ snow falls, especially during the monsoons and earthquake, the occurrence of landslides at different locations is a common phenomenon.

Damages due to landslides

- Landslide in reservoir areas causing flood
- Road blockade due to landslides or snow falls

The various roads viz the Power House to Dam site and other sites are prone to damages often leading to road blockades and thereby cutting off essential supplies.

2.4 Hazards – Earthquakes

[Name] Power Station lies in seismic zone- [# # #] and is prone to earthquake.

It is well known that damages due to earthquake at a location depend not only on the earthquake size and distance of the earthquake source, but also on the local site conditions. Hazard maps are essential for the comprehensive understanding of spatial and temporal occurrences of natural calamities. When an area is exposed to hazards, a map helps the planning team to analyze it for vulnerability/risk and will be useful in the decision-making process. The hazard maps play a vital role in planning of new development projects as well as in incorporation of hazard reduction technique into existing developments.

Disaster Management Plan aims at minimizing the damage and restoration of the normal life at the earliest. However, over some natural calamities like earthquake, mankind has no control on the occurrence of this natural phenomenon. These happen so suddenly that there is no time of any preparedness or even for gasping.

Bureau of Indian Standards [IS-1893 – part – 1: 2002], based on various scientific inputs from a number of agencies including earthquake data supplied by IMD, has grouped the country into four seismic zones viz., Zone-II, III, IV and V. Of these, zone V is rated as the most seismically active region, while zone II is the least.

Seismic Zone	Intensity
II	Low intensity zone
III	Moderate intensity zone
IV	Severe intensity zone
V	Very severe intensity zone

Provisions have been made in BIS: 1893 for earthquake resistant design of various structures including structures for power station. Power Stations are normally designed based on the above code.

Seismic studies of the power station area are normally carried out by establishing seismological observatories for observing and recording micro earthquake as well as major earthquake events in the power station area and other geological features. Based on site specific seismic studies, design seismic parameters are adopted for the hydroelectric power projects.

2.4.1 History of Earthquake Occurrence in Project Area:

Power Station site lies in an active seismic zone and has been affected by earthquakes occurring in various parts in Himalayas at frequent intervals. A number of earthquakes resulting in great damages have occurred in the region, in the past.

Seismological observatory is set up at [Name] having Latitude [# # #], Longitude [# # #], MSL [# # #] and digital seismic telemetry system is installed at [Name] having Latitude [# # #], Longitude [# # #], MSL [# # #] by India Meteorological Department, Govt. of India. There was a cluster of earthquake occurrences in the vicinity of power station as listed below:

History of Major Earth quakes (Over Magnitude 5) in Nearby Regions

[Name] Power Station: Latitude [# # #], Longitude [# # #]

DATE	TIME		LAT.	LONG.	MAGNITUDE
	HH	MM			

Courtesy: USGS

website: http://earthquake.usgs.gov/earthquakes/eqarchives/epic/epic_global.php

2.4.2 Seismic Design Parameters for Power Station:

The seismic design parameters for *[Name]* power station have been adopted after detailed study of information on the tectonic models of the Himalayas and past history of earthquakes in the power station area.

Based on the data of earthquake occurrence and geological and tectonic set up of the area, the seismic risk at power station area in terms of peak ground acceleration from has been evaluated and the following values have been adopted for the design of the power station:

- a) Horizontal Peak ground acceleration of [# # #] g.
- b) Vertical Peak ground acceleration of [# # #] g.

2.5 Hazards – Bomb/ Terrorist Threat, Terrorist Attack, Strike, Violent Agitation, Sabotage, Hindrance in power supply, Cyber Attack

[Name] Power Station is situated in the district *[Name]* of the State of *[Name]*. Looking forward to the security conditions of the National interest, there is a constant threat to the electricity producing installations by the anti-national elements, etc. Hence, there is a necessity to have a Crisis and Disaster Management Plan. The main aim to have this plan is to prepare the installation to counter the possible danger, so that different agencies within the power station function in full co-ordination.

Below mentioned emergency conditions are possible in the installation:

1. Terrorist attack or attack on the security personnel.
2. Bomb attack & bomb threat.
3. Strike by the employees
4. Violent agitation.
5. Destruction due to any reason and subsequent hindrance in the power supply.
6. Local law and order problem.
7. Cyber attack.

3. PREVENTION AND MITIGATION

3.1 Prevention and Mitigation of Hazards – Fire & Accidents

For prevention and mitigation of fire hazards, Safety wing is in place. This wing is responsible for operation of fire control room 24x7, handling of any fire situation. Other duties of the Safety wing will be as under:-

- Refilling of different types of fire extinguishers as and when asked by any departments
- To check the fire buckets filled with the sand.
- Availability of fire gadgets and apparatus
- Fitness and operational check of fire tenders with the help of central workshop

The detail of Fire Extinguishers is given in 'Annexure-X'.

3.1.1 Discovering a Fire

At all times, when following any fire procedure, ensure that you are out of danger before trying to complete any emergency tasks.

If a fire or other emergency is identified:

1. Pull/ operate the nearest fire alarm immediately.
2. Move to a phone away from any fire, smoke or emergency.
3. Call the fire department number, advise the operator that there is a fire/emergency (of approximate) size and location; building, floor, room no. etc.
4. Exercise the appropriate evacuation plan.

If the fire is smaller in magnitude, contained (not spreading) and you have been properly trained in the use of a fire extinguisher:

1. Call to the nearest person to retrieve the nearest charged fire extinguisher. Do not leave the fire unattended. If the size of the fire grows beyond containment, follow the appropriate evacuation procedure.
2. Upon receiving the fire extinguisher, use the procedures associated with acronym.

PULL pin from extinguisher and hold extinguisher 6 to 8 feet from the fire.

AIM the nozzle at the base of the fire.

SQUEEZE the trigger.

SWEEP the extinguisher hose back and forth until the spray puts the fire out completely, with no smoke left, or until the extinguisher is emptied.

3. If the fire fails to extinguish:

- a) Exercise the appropriate evacuation plan.

- b) If the fire is extinguished notify concerned person to request Fire safety deptt. To investigate the cause/extent of the situation. All fires will be reported.

3.1.2 Emergency Plan against Fire

Fireman and its team are employed in the Safety Division of the power station. Apart from fire tender drivers, fire tools are available in the power station. The following action is to be taken by the security personnel in case of emergency:

1. As a trained security personnel, it is expected that the action at their own is taken up and with the available fire extinguisher try to put off the fire.
2. To alarm everyone by shouting Fire-Fire.
3. To inform the Safety department.
4. By the time Fire Brigade arrives, keep on trying to put off the fire and as the Fire Brigade arrives help them to put off the fire.
5. To remove the masses from the incident site.
6. To inform your control room and higher officials.
7. To control the traffic in the incident area and to keep away the vehicle from the site.
8. To clear the road for fire tender.
9. To be alert at the incident site so that due to the crowd around, anyone does not try to enter the area un-authorized.
10. After taking control of the fire, do not allow anyone to touch anything at the incident area, may be by the time investigation committee arrives, the evidence is destroyed.
11. Ban on entry of match boxes, lighters and such other inflammable items into installations handling oil/gas.

3.1.3 Safety Measures available at the Power Station:

The following are some of the essential safety measures to be implemented in the power stations:

1. Provision for smoke and heat sensors and other modern electronic aids in the sensitive and fire prone areas.
2. Installation of integrated CCTV system to monitor and untoward happening in the cable gallery and other fire prone areas.
3. Regular checking of fire headers and fire alarms.
4. Provision of portable fire extinguishers at fire prone places.
5. Identification and display of escape routes.
6. Periodic review of the fire fighting arrangements by an independent and qualified fire fighting authority to plug loopholes if any.

3.1.4 Preventive measures for Power House in case of Fire

Fire prone areas in the powerhouse are identified and the following preventive measures are being taken to avoid major fire accidents:

- Regular checking of smoke & fire detectors and Emulsifier system. Automatic oxygen level measuring devices are to be installed at the various locations in the underground area (if applicable).
- Provision of portable fire extinguishers at different control panels, relay panels and other fire prone places. List of fire extinguishers at various locations in the Power Station is enclosed as 'Annexure X'. In addition, sufficient Nos. of sand buckets, water tanks and hose reels have been provided at various locations in the Power House for easy access to meet any on-site emergency.
- Maintaining of adequate spares, inventory of items which are most likely to be destroyed in case of minor fire, identifications of spares which cannot be procured in short duration, identifications of spares which can be procured from local markets. Availability of spare cable specially jointing kits has to be ensured.
- Identification of escape routes and assembly areas at different critical places like transformer gallery, knee liner floor, cable tunnel and machine floor area, have been displayed at different locations of the Power House and Switchyard etc. The escape routes displayed are essentially done using glow sign boards which are visible in darkness (in case of power failure).
- Details of various types of fire detection, alarm and protection system installed within Power House and Switchyard premises are given in Annexure-XI.
- Minimum oil quantity is stored inside Power House. From time to time, cleaning of the storage area of oil in the power house is being ensured. Only bare minimum inflammable gases are being kept in the power house at designated locations. First Aid Box is kept in stock in a proper/ open place for use in emergency.
- In case of Fire, lift is not to be used. Further all Air Conditioners & Ventilation System should be switched off in case of Fire.

3.1.5 Preventive action plan for fire at different locations in fire prone areas of Power House.

Generator

Periodic testing of generator, its protection relays and Sprinkler Fire System are being done.

Transformer

Periodic testing of transformers and its protection system are done.

3.1.6 Do's & Don'ts for Handling Fire Hazards:

Sl. No.	Do's	Don'ts
1.	Keep all inflammable materials away from sources of fire	Don't allow inflammable oil/ other materials to come in contact with electric cables/ sources of fire.
2.	Ensure proper ventilation in areas storing flammable/ hazardous fluids. Display of " No Smoking " signboards near such fire prone areas.	Don't allow vehicles without fire/ smoke arresters in the close vicinity of flammable/ hazardous fluids. Don't allow smoking in fire-prone areas.
3.	Carry out periodic inspections of all wires and electric joints to prevent short-circuiting	Don't allow joints/cross connections in the power line.
4.	Ensure that the electric switches and fuses have the correct rating of circuits/circuit breakers etc.	Don't use sub-standard electric fixtures. Don't allow temporary or naked joints on electric wiring.
5.	Switch off appliances after use	Don't leave electric appliances in working condition. When not in use.
6.	Closely supervise welding/cutting jobs	Don't allow welding/cutting jobs in close vicinity of flammable fluids/materials.
7.	Switch off electric supply to the fire affected area in the event of an electrical fire.	Don't use electric appliances during fire.
8.	Do ensure emptying of waste materials at regular intervals.	Don't allow waste papers to be accumulated.
9.	Do keep smoke/fire check doors closed.	Don't store old furniture/miscellaneous articles near fire doors/ fire exits.
10.	Keep water source for fire extinguishers etc. at fire prone areas.	Don't leave spray/ aerosol cans on or near heater or in direct sunlight.
11.	Do raise a fire alarm in case of fire, shouting " Fire; Fire"; to alert other.	Don't shirk your responsibility in fighting fire, however, minor, it may be.
12.	Do provide a clear passage so that the fire engine/fire brigade is able to reach the place of fire.	Don't crowd around the fire brigade/fire fighting staff as it may affect their operation.

13.	Use fire escape routes during fire. Fire escape stairs should be free from obstructions.	Don't operate lifts during fire.
14	Use Oxygen mask in case of Suffocation.	Don't operate Air Conditioner and Ventilation system in case of fire.

3.1.7 Action Plan in case of fire in Main Electrical Equipment:

- Emergency shut down all generating units.
- Trip, all running generator breakers, all line breakers and field breakers.
- Stop the machine mechanically by applying brakes.
- Emulsifier system as provided for fire extinguishing of transformers & Generator must be operated manually if not operated automatically.
- Follow Evacuation guidelines
- In case of emergency, the main controller shall declare emergency. The evacuation, head count and other necessary arrangements will be performed under the guidance of Security in-charge. Alarm (sirens) will be raised by the switch board operator (security) on the main gate after receiving instructions from main / incident controller. Besides, to alert other people during the emergency, people have been instructed to run to various departments shouting voices relating to the type of emergency situation.

3.1.8 Continuous Surveillance of Operations:

- All operations are continuously kept under surveillance and mock drills of fire extinguishers & fire hydrant system, hose reels etc. are done regularly once in two month & records are maintained by Safety /Security Officer.
- MSDS (Material Safety Data Sheet) of chemicals has been displayed at respective sites.
- Mock drill of Potential Emergency Situation is conducted on the frequency specified in Emergency Preparedness Plan Annexure-III.
- Technical Inspection & Safety inspection is carried out by the experts on regular interval and its recommendations are complied.

3.2 Prevention and Mitigation of Hazards – Flood

3.2.1 Flooding in Power House

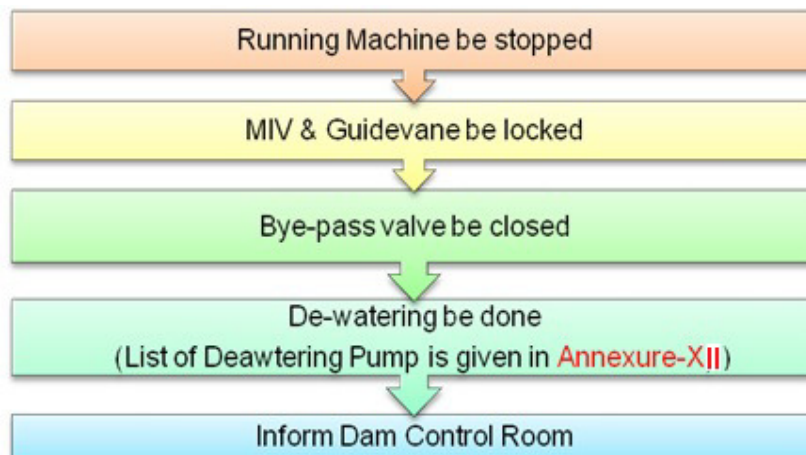
I. Preventive Measures for Flooding in Power House

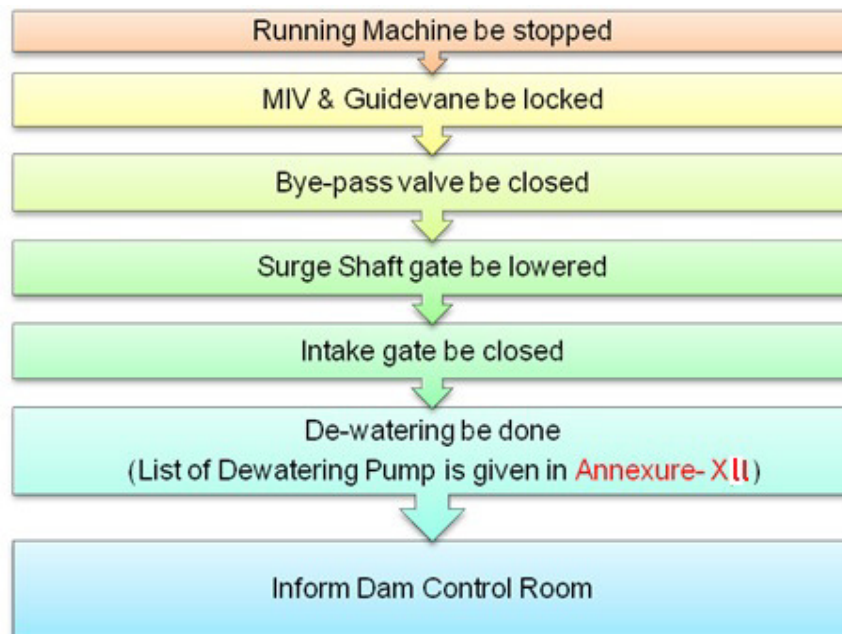
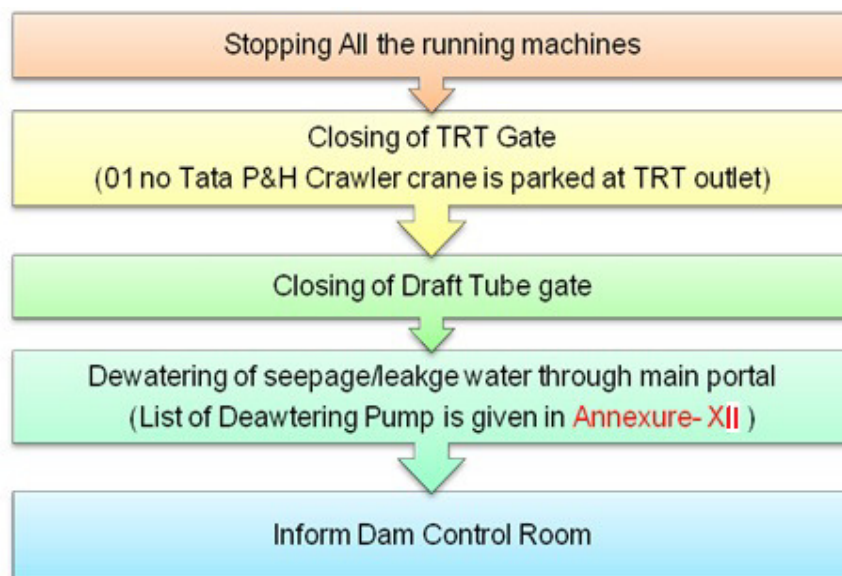
- ❖ Silt content in water at intake at Dam during floods is to be checked regularly. In case of continuous flood, if silt content exceed permissible limit ([# # #] PPM), the machines are to be stopped.
- ❖ It is necessary that all spillway gates and mechanical equipments for operating the gates be thoroughly inspected before the start of monsoon every year.
- ❖ Inflow data should be strictly monitored.
- ❖ Dedicated dewatering pumps of adequate capacity are installed in the power station. The list of dedicated dewatering pumps & spare pumps are given in Annexure-XII.

II. Preventive Action Plan for Flooding in Power House

Following cases have been identified for preventive actions for flooding in power house. Some of the steps of these cases may not be applicable according to the existing layout of the power house.

Case 1 : Abnormal Water Leakage in Power House from Spiral Case/ Main Inlet Valve (MIV) on downstream side



Case 2: Heavy leakage from upstream side of MIV/Failure in tunnel**Case 3: Heavy Flood in the River**

3.2.2 Flooding at Dam

I. Flooding due to Heavy Rainfall /Storm in the Catchments

[Name] Dam has been designed for a probable maximum flood of [# # #] cumec. The [# # #] nos. of gates at dam are designed for passing a continuous flow of [# # #] cumec each.

As and when the river discharge crosses the limit of [# # #] cumec and sustains for a considerable period with rising trends, the river shall be considered under flood. It has also been observed that during the peak summer period i.e. in May & June due to snow melt coupled with weather disturbances, the river discharge increases suddenly, often leading to flood like situation.

II. Roles and Responsibility – Refer EAP

III. Action Plan at various discharges during Flood Situation at Dam – Refer EAP.

3.3 Prevention and Mitigation of Hazards – Landslides/ Snowfalls

I. Preventive Measures

Retaining & Breast Walls, Cross Drainage, Nallah Training Works and Cause Ways have been provided to take care.

II. Road blockade due to Landslides or Snow Falls.

Infrastructure (Road) division shall be responsible for restoration of road blockade due to landslides and snowfalls. Resources like Portable Air Compressor, Dumpers, Wheel Dozer, Wheel Loader all should be parked at Central Workshop or other designated locations which can be used for restoration of road communication. (This may be changed as per availability).

3.4 Prevention and Mitigation of Hazards – Earthquake

Don'ts in case of Earthquake:

1. If someone is inside the house during the earthquake, do not rush outside the house in hurry.
2. If one's house or any other construction is hurling during the earth quake, don't try to climb down the staircase.
3. Try not to lose sense, it may disturb the family members.
4. Don't stand besides the windows, fire place, chimney and heavy furniture.
5. If someone is traveling by a car or any vehicle or walking and the earth quake comes, don't halt under a tree, wall, electricity pole, transmission line etc.
6. Don't try to cross a bridge during earth quake.
7. Don't use telephone for the first 90 minutes after an earthquake, except for a medical or fire emergency. You could tie up the lines needed for emergency response.

Do's during Earth Quakes:

1. During earth quake instead of running outside the house, it is better to find out a strong corner or static furniture for shelter.
2. Switch off the main switch, main water supply, gas supply line in the building.
3. If at that time, electrical gazettes and stove, heater, Angithi, Chullha, Candle, Cigarette, Bidi, Lighter etc. are in operation/ lit, switch/ put them off.
4. Try to save one's head from injury. For this one can use pillow, cushion, helmet etc.
5. If someone is outside a house then prefer to be in an open area.
6. After Earth Quake while driving, be careful from the debris on the road.
7. To save oneself from flood try and find out a secure place and follow the dangerous signals and carefully follow the directives.

Apart from these conditions, the available in-charge during the emergency will deal with patience, courage and will act as per the directives.

3.5 Prevention and Mitigation of Hazards – Bomb/ Terrorist Threat, Terrorist Attack, Strike, Violent Agitation, Sabotage, Hindrance in power supply, Cyber attack

3.5.1 Background of Safety

In the power station area, Security team has been allocated the security of Power House, Switch Yard, Dam, Administrative Building, Town Ship, etc. Local law & order is being maintained by Police Station, [# # #] which is situated in the power station vicinity. As the power station is an important electricity producer for the Power Grid, it is considered to be a sensitive power station.

Deployment of Security teams are as under :-

Sl. No.	Name of Check Post	Location	In charge	EPABX/ phone Number
1	Power House Portal	[Name]	[Designation]	[# # #]
2	Switchyard			
3	Dam Check post			
4	Control Room			
5				

3.5.2 Emergency Plan in case of Bomb Threat:

Bomb may be planted inside the plant for fulfilling any of the following aims by terrorist group.

- a) To disrupt functioning of plant/ power station.
- b) To increase panic among employees.
- c) To kill an important senior officer of the plant/ power station.

- d) To gain publicity by killing large number of innocent employees and then claiming responsibility and to demoralize the security forces.

I. Targets for Bomb Threat

The following targets can be selected for achieving their aims:

- 1. Vital installation of the power station (as specific to power station)
 - i. Powerhouse & Switchyard
 - ii. TRT
 - iii. Surge shaft
 - iv. Adits
 - v. Central Store & Workshop
 - vi. Petrol pump
 - vii. Dam and Intake structure
 - viii. DG set building
 - ix. Administrative Buildings
 - x. Residences of higher officers
 - xi. [Name] Bridge

II. Possible Places where Bomb can be planted:

In general, areas where bombs can easily be placed / planted are identified as under:

- a) Area under staircase
- b) Toilets
- c) DB boxes of Telephone land line
- d) Flower pots
- e) Areas of the plant which are not commonly visited
- f) Car/ Scooter parking place

III. Probable Sources of Entry of Bomb:

The Bomb can gain entry to the plant through any of the following resources:

- a) Visitors, Contractors and their laborers.
- b) Packed material boxes
- c) Disgruntled employees
- d) General supply material
- e) Govt. and private vehicles

IV. Preventive Measures

The following preventive measures must be adopted by security forces and management of the [Name] Power Station as well as other agencies to prevent entry/ planting of Bomb inside the Power House and other installations:

- a) Security personnel deployed at various Posts/ Barriers must remain alert and vigilant for men and materials.

- b) Thorough searching of all visitors, contractors, their laborers, suppliers, employees and their belonging such as suit cases, bags, parcels and Tiffin carriers even with the help of metal detector.
- c) Entry and exits at the power house gate should be properly supervised by the officer deputed at power house.
- d) Visitors pass for the power house must be checked properly.
- e) On the personnel deployed at power house, administration block etc., should be specially watched particularly over attendants and other laborers.
- f) HR Department must ensure that character and antecedents of all employees and trainees and contract labours working are verified through police.
- g) Company commander must ensure that all vehicles at the barriers must be thoroughly checked under the supervision of officers.
- h) The management should issue instructions to all drivers not to park vehicle everywhere and they should carry out anti sabotage check for all the vehicles.
- i) Vital installation should be guarded by security forces and frequently checked by guard.
- j) All the employees & visitors must display their ID cards to make it visible at all entrances.
- k) All sections must identify the disgruntled employees who may support the terrorists.
- l) The intelligence wing personnel of security forces should keep a watch on vital installations, which are not frequently visited by the employees of security forces duty personnel.
- m) All the office must be locked/ sealed after office hours and keys deposited at the security posts.
- n) All the heads in their respective sections must ensure that proper housekeeping is being maintained in such a way that any unidentified object could be seen easily and is not mixed up in unattended manner.

V. Immediate Action in case of Bomb Explosion or Finding out Explosives:

Whosoever gets the First Information

1. To alert everyone.
2. To vacate the area.
3. To prohibit people from going in the area.
4. Not to touch any unidentified object.
5. To take the help of the nearest security personnel.

Action by Control Room.

1. To inform the security personnel in the unit line to get ready.
2. To send extra security personnel to cordon the area.
3. To inform the fire station.
4. To call the ambulance and send it to the said area.
5. To inform the local Police and if necessary, ask for bomb detection squad.
6. To inform the higher officials and the concerned officials of the installation.
7. To control the traffic, if necessary.
8. To act according to the plan after getting the extra help.

Action by Unit Line

In any emergency conditions, even off duty security personnel will assemble in front of security control room. The senior most official will act as the operation in-charge. He will work as under:

1. To inform all the security personnel about the incident and get them ready.
2. To issue arms as per necessity.
3. To depart for the incident site.
4. During their journey to incident site, the in-charge will distribute the action plan to different groups. So that they immediately after getting to the site, come into action.

VI. Check-list for Bomb and Explosives

As soon as the control room In-charge gets the information about the Bomb, he has to ask from the informant the following questions:

1. Where is the Bomb installed?
2. By what time the Bomb is going to explode?
3. Why is the Bomb planted?
4. How does the Bomb look?
5. Where are you speaking from?
6. Have you kept the Bomb?
7. What is your name and address?

After getting the above mentioned information, the In-charge will take up the action as following:

1. By what time is the Bomb going to explode?
2. Is that a populated area?
3. Is any criminal involved in it?
4. Is this a mischief by someone or is it not a kidding by a child?
5. Isn't it an act of misleading or of disturbance?
6. Do you suspect someone?

On getting above mentioned threat or danger, the following actions have to be taken:

1. To vacate and cordon the area.
2. Not to allow anybody into the area.
3. To inform for extra help.
4. To find out the suspect object as per the plan.
5. After getting the suspected object, not to touch it.
6. To call trained or Bomb Disposal Squad for help.
7. To arrange sand bags around the suspect object.

Other Important Actions:

1. To inform police and Bomb Disposal Squad.
2. To inform the higher authorities.
3. To inform the Fire Station.
4. To inform the nearby offices.
5. To investigate as per plan.
6. Get ready the Ambulance.
7. To keep the phone free for incoming calls.

As per the directives of security forces, the incidental report and investigation analysis, shall be informed to higher authority & local administration.

Explosion site is to be cordoned, any object is to be left un-touched and the evidence as well as the suspect is to be handed over for investigation.

VII. Bomb Threat Action Plan:

A) Bomb Threat in the Plant/ Power Station:

If there is bomb in the plant premises, it can be communicated in two ways.

- a) It can be telephonically communicated by a Bomb planter when objective is to destroy a facility rather than to kill people.

Or

- b) A telephone call just to create a panic in the power station premises.

B) Response to Telephone Bomb Threat:

In case of receipt of any telephonic message about planting of Bomb/ Explosive, the receiving person will try to ascertain the following from caller:

- a) What is the exact location of the bomb?
- b) What does the bomb looks like?
- c) Who is calling?
- d) Where is he calling from?
- e) What organization does he belong to?
- f) Why is he doing this?
- g) Whether male or female voice?

The receiver must bear in mind that he or she would be in a position to furnish accurate and detailed information about the caller to the security forces & Management and therefore not only should he or she be calm and cool but also able to obtain maximum possible information from the caller in that brief encounter.

Two essential points on which information must be obtained are:

1. The expected time when the bomb would go off.
2. The location of the bomb.

Some tips for the receiver of the calls.

- a) Attempt to keep the caller on the line as long as possible to gather more information and to ascertain, if the threat is genuine. This can be done by gently encouraging the conversation and while trying to obtain the exact location of the bomb mentioning places or land marks which do not exist at all. If the caller accepts this, the threat is likely to be bogus/ hoax.
- b) Record in writing or if feasible, tape record exact words of the caller regarding location of the bomb, expected time of explosion, its size, type, what it looks like.
- c) Attempt to establish the approximate age, education status and the attitude of the caller, more particularly his reason for placing the bomb.

- d) Note any particular of speech especially his accent and favorite words etc. which may help to establish his identity.
- e) Do not upset or panic the caller by asking too many questions.
- f) If the person who has received the call is not security forces Control Room Officer, he should immediately inform the security forces Control Room Duty officer with full details.

Keeping in view the above, a check list has been prepared. During conversation, the check list should be completed and handed over to security forces officers for further action.

C) Duties of security forces Control Room:

1. Inform the Head of Power station, Head of security forces at power station and other members of the bomb threat co-ordination Committee.
2. The security forces Control Room in-charge will direct the security forces personnel to seal all entry and exit points of the affected area.
3. The security forces Control Room in-charge will alert all the duty personnel with available communication. He will receive OK or otherwise reports from other duty personnel on regular intervals of time and will keep himself fully informed. He will also direct the duty personnel to give OK or otherwise report to designated bomb threat co-ordination control room and will provide them such telephone numbers.
4. He will immediately inform head of the security forces at PS, Quarter Guard etc. regarding the threat by quickest means of available communication.
5. He will not leave the telephone unattended. If the threat call has been received by some other security personnel or any employees of the Power Station, he will ensure that the same telephone is not left un-attended. If possible, he will also arrange for recording of the telephone call.
6. He will immediately inform to the following:
 - a) Shift I/C Control room Power House.
 - b) Fire Station.
 - c) Chief Medical Officer for ambulance and first aid.
 - d) Bomb Disposal squad ([Name at district level]).
 - e) S.D.M.
 - f) Police Station.
7. If the receiver of the call is duty officer of the security forces Control Room, he will complete the Bomb Threat Check List above.
8. In case the explosion of the Bomb appears immediately, he will arrange to blanket the area with sand bags around the suspected object/bomb.

D) Duties of Cordon Group :

- a) The Cordon Group In-charge will ensure by posting his group at reasonable distance for cordoning the affected area, building. While doing so, he will ensure that armed personnel are placed in the cordon at all positions.
- b) He will instruct his men to challenge any intruder/suspected trying to run away
- c) He will ensure that no outsider enter the cordon area. If it is building, which is being cordoned, the area between building and Cordon Group is cordoning area.
- d) He will ensure that after proper cordoning has been completed, it is reported to Dy. Commandant for his further action.

E) Returning to Normal:

- a) The coordinator in consultation with members of Bomb Threat Assessment Committee will call off the emergency on receiving clearance from the bomb disposal squad, which they will give either when they are satisfied or when they have defused the bomb.
- b) Then the Commandant of security forces will announce over Public Address system "AREA CLEAR, EMERGENCY CALLED OFF".

3.5.3 Emergency Plan against Terrorist Attack:**I. Preventive Measures to Counter Sudden Attack by Terrorist/ Anti Social Elements for Sabotage Purposes:**

The main entry point of Power House is deployed with security forces, equipped with DFMD and trolley mirrors and other necessary search instruments besides regular service weapons. All the personnel including powerhouse shift staff are thoroughly frisked by the security forces at the entries. Entry of the unauthorized vehicles is strictly prohibited.

Speed-Breakers are erected between Power house entrances as well as at various places to slow down the vehicle to take care of exigency like suicidal attack/sabotage etc. Speed breaker, spike barrier and grilled metal sliding gate have been provided to check the entry of unauthorized person. No private vehicles are allowed inside power house except VIP vehicles after the security check. The Dam complex is also guarded by security forces round the clock. The entry of unauthorized persons is strictly prohibited.

II. Action by the person having first information:

1. To alert everyone.
2. To prepare and position oneself for the counter attack.
3. To inform the Control Room.

III. Action by Control Room:

1. To prepare the security personnel in the unit line and to depart for the incident site.
2. To send the security personnel available in that area to cordon the area.
3. The armed security personnel to take their position.
4. To inform the higher officials and officers concerned in the installation.
5. To act according to the plan after getting extra help in the unit line.
6. To ready the Ambulance.

IV. Action by Unit Line:

The senior most official will act as the operation in-charge. He will work as under:

1. To inform all the security personnel about the incident and get them ready.
2. To issue arms as per necessity.
3. To depart for the incident site.
4. During their journey to incident site, the in-charge will distribute the action plan to different groups. So that they immediately after getting to the site come into action.

Action Plan after reaching the Incident Site:

1. Try to find out the situation and position of the attacker and his arms.
2. The theory of Bullet for Bullet has to be followed.
3. The Arms & Ammunition have to be used in such a way that scarcity of it is not felt.
4. The Advance Party will attack the attacker and will physically overpower him.
5. The Second Support Party will give the cover fire and help to the Advance Party.
6. After overpowering and arresting the attacker, action has to be taken as per rules.
7. The muscle power is to be implemented just to overpower the attacker.
8. Injured person is to be immediately taken to the Hospital for first-aid.
9. The party that arrives for help is to be identified properly.

3.5.4 Emergency Plan in case of Strike or Violent Agitation:

If the employees of the installation are indulged with outside people in a violent agitation, security forces have to come into action. The following actions will be taken:

- I. To give minute to minute information to the management.
- II. To control the activities of violent mob with the help of local police and administration.
- III. To control the violent mob by deploying extra security personnel and if necessary, to act according to mob dispersal drill.
- IV. Try to engage the violent mob in talks rather than taking up reflective action, so that they can put forward their views to the management.
- V. The information system has to keep a vigilant eye and keep vigilance on the activities of non satisfied employees and to analyze them.
- VI. To deploy extra security at the peaceful post. The security personnel at these posts will try to prevent the non-satisfied employees from diluting the friendly atmosphere around.

- VII. To provide full protection to the loyal employees, if necessary, provide them security while coming and going from the duty.
- VIII. To update the security personnel by regular briefing & debriefing and keep them informed about the latest situation.
- IX. To inform the local administration and police about latest incidents.
- X. To regularly inform the Headquarters, Regional Headquarters and Information Department about the latest incidents.
- XI. To keep an eye on the agitators during and after the agitation.
- XII. After the agitation, inform the Management about the shortfalls and the problems faced, so that preventive steps are taken in the future and such incidents are prevented.
- XIII. In these situations, the security personnel have to maintain their patience and even in high tempered situations, they have to keep their cool.
- XIV. Security forces in its action have to be impartial and has to work according to and within rules & regulations.

3.5.5 Emergency Plan against Hindrance in Power Supply due to Destruction or any other Reasons:

Havoc is created due to destruction and hindrance in the power supply. In this regard, the following actions have to be taken:

1. To identify important places and keep a constant vigil.
2. To instate static duty and cover at important places and keep a regular check by patrolling.
3. To identify suspect people and to keep them under vigilance.
4. To alert the nearby post.
5. If necessary, call extra security personnel and initiate a combing operation in the area.
6. To detain suspected people for inquiry and to inform the higher officials and to hand them over.
7. To be alert at the incident site so that due to the crowd around, anyone does not try to steal or enters the area un-authorized.
8. Do not allow anyone to touch anything at the incident area, may be by the time investigation committee arrives, the evidence is destroyed.
9. Important institution will be given electricity supply by the generator and the concerned departments are to be informed.
10. Information system has to keep a vigilant eye on the condition and have to watch out the movements of non-satisfied employees and to analyze the same.

3.5.6 Emergency Plan in case of cyber attack:

Generating plants are located as Energy pockets at strategic locations. Any cyber attack can put the whole plant down and lead to outage of the generation capacity. Vulnerability on control systems used for set of plant can lead to a possible safety incident. In this regard the power station shall contact the respective Computer emergency response teams (CERTs) and prepare Crisis management plan, as follows:

- Identification of critical cyber assets/ areas.
- Risk assessment and vulnerability study in each area of responsibility.

- Creation and enactment of cyber security policy covering all the stakeholders of cyber space.

3.6 Public Warning:

3.6.1 Details of Public Address System and Sirens

The warning system in the Power Station is installed in the form of Public Address system and is monitored by Power House Control Room. The contact no. is as below:

Sl. No.	Area	Controlled by	Contact Numbers
1	Power House	PH Control Room	[# # # #]

For the purpose to alert the employees and local people in case of any emergency, sirens of different ranges are installed at all sites/work places. The security personnel on duty at respective check post or official on duty wherein control is provided is authorized to operate the emergency sirens if communication is being made to them.

The details of sirens and their contact numbers are as under:-

SI No	Area	Controlled by	Contact Numbers
1	Dam	Dam Control Room	[# # # #]
2	Switchyard	Switchyard	
3	TRT	Pump House TRT	
4	Store & Workshop	Check post Central Store	[# # # #]
5	Administrative Building	Check post Admn Building	[# # # #]
6			
7			

Procedure:

The Alarm for various emergency situations will be blown as per the following table:

S.No	Type	Duration
1.	Normal Factory Siren	Continuous 1 minute
2.	(in case of fire)	10 seconds On , 5 seconds Off, 5 times
3.	Emergency sirens for major accident	20 seconds On, 5 seconds Off, 5 times
4.	All clear signal	Continuous On siren for 3 minutes only once.

3.6.2 Public warning in case of release of water from dam/ power house:

- Erection of warning boards (in two or three languages) at identified places along the d/s river course
- Patrolling of downstream identified stretch of river.

- Spreading awareness to the inhabitants by way of distributing pamphlets, coordinating & holding mass awareness programme in association with local administration on quarterly basis.
- Warning notices to be issued in the local newspaper regarding possibility of sudden release of water at any time on quarterly basis.
- Installation of powerful sirens/ hooters on the dam & in the identified d/s stretch of river to give prior warning to the people before release of water from dam.
- Blowing sirens before start of generating machines.
- Communication by different modes to be ensured between dam control room, power house control room, Project Incharge and local administration by way of mobile, internet, wireless, telephone, etc.
- Advance information to be given to local administration in case of planned release of water from reservoir like reservoir flushing etc.

(Refer SOP for d/s release from dams/ PH for further details)

4. MAINSTREAMING DM PLAN IN DEVELOPMENTAL PROJECTS

Around each power station, numerous sustainable developmental programme, activities and projects are being planned & launched such as construction of dams, bridges, development of colonies, etc. Each development programme, activity and project should clearly identify:

- existing risks of disasters that may impact adversely on the activity;
- existing risks of disasters that may be reduced due to the activities and
- New risks of disasters that may be created due to the activities.

Appropriate policies for sustainable development by factoring disaster risk concern as discussed above are being devised. In this context, guidelines for prevention against flooding of Hydro Electric Power Stations are enclosed as Annexure – XIII. Various development projects connected with the power stations are being identified to induce strategic interventions for accomplishing sustainable development. Some of the observations in this regard are as below:

- All developmental work in the d/s of the dam is suggested to be taken up above the submergence elevation as identified in the inundation plan.
- All the important bridges being constructed in the d/s are being suggested to be built above PMF level.
- Relevant design data of the PS is shared with all the new projects coming in the u/s & d/s area for analysis and design accordingly.

5. PREPAREDNESS

5.1 EOC facility for Monitoring progress of preventive/ protective action implementation

The office of the main controller shall act as an Emergency Operation Centre (EOC) for that particular hazard as listed in Annexure – VII. The contact details are also mentioned in the annexure.

5.2 Preparedness Mechanism in case of Fire/ Explosion

5.2.1 Identification of Assembly Areas

On declaration of emergency and/ or sounding of emergency alarm, all employees, workers, visitors, contractors shall assemble in designated assembly area at each site for head count by the security. The Assembly Area has been identified and displayed on the respective sites.

5.2.2 Evacuation mechanism

An alert and educated/ trained staff is the power station's most valuable resource for fire protection. Fire hazards arise from unsafe conditions and practices. Every employee has a responsibility in making a concerted effort to correct and improve their work conditions and practices.

The power station has an evacuation plan for employees to use during alarm/emergency situations. Each employee is required to be familiar with the plan and be prepared to properly respond in the event of an emergency situation.

Escape Route in Power House - ANNEXURE- XIV

Escape Route in Dam - ANNEXURE- XV

Installations are equipped with Fire hydrant, sprinkler systems, suitable portable extinguishers and smoke detection system etc. These systems do not ensure that all emergencies /fire situations will be suppressed. Employees may get start for evacuation in case if situation is not under control.

In the event of any fire, employees should practice the following procedures:



5.2.3 Evacuation Guidelines

Employees

1. Prepare and evacuate the area/ building by way of the nearest emergency exit. Walk, do not run. Do not use elevators in case of fire.
2. Close but do not lock all doors as you leave.
3. Before exiting through any closed door, check for heat and the presence of fire behind the door by feeling the door with the back of your hand. If the door feels very warm or hot to the touch, advise everyone to proceed to another exit.
4. In the event you are unable to exit the building:
 - a) Remain calm; don't be panic.
 - b) Remain low; crawl, if necessary.
 - c) Use wet cloth if possible, over the mouth to serve as a filter.
 - d) Signal for help from a window. Use a towel, clothing, sign etc.
5. Upon exiting the building/area and proceeding to the assembly area, remain at least 20 feet away from the building walls and overhangs. Do not block any driveways, as Fire Department personnel will need access to these areas. Employees are required to report to their assigned assembly areas as defined in Disaster Management Plan/ Evacuation Plan.
6. The cessation of an alarm/departure of the fire department is not an "all clear" to re-enter the building as corrective measures may still be in progress. Stay clear

of the building until advised by appropriate authority /authorized official of Fire department to re-enter the building/area.

7. Assist visitors, if any, during alarm/emergency situations. Visitors may not be aware of exits/alternative exits and the procedures that should be taken during alarm situations.

Employees should calmly inform visitors of the proper actions to be taken and assist them with the evacuation.

5.2.4 Duties of Officer Designated (In-charge P/H)/ Officer Designated (In-charge office complex) / Safety Officer.

1. Collects information or verbal reports for occupants as to the cause of the emergency.
2. Proceeds to the predetermined assembly area to meet the fire department.
3. Notifies others for evacuation.
4. Meets the Safety Department personnel. Inform fire personnel of any known facts pertaining to the alarm situation. If requested, assists fire department personnel.
5. Informs Safety Department if further measures are needed and/or other pertinent facts.
6. Ensures the safe and orderly evacuation of the building/area. If applicable, ensure handicapped evacuation plan is properly implemented. Make quick assessments during evacuation.
7. Knocks on any closed doors in your area after checking for warmth or smoke; and then open the door to ensure proper evacuation of all personnel.
8. Notes any individuals who do not evacuate and report them to the Safety Department. If a problem arises when an area is evacuated, contact the Safety Department responders and advise them of the situation. Evacuate the area and hold all persons out until a representative from the Safety Department has given the all clear to reenter the building.

Individuals assigned to monitor the exit areas should remain at a safe distance from the facility.

5.2.5 Mock Drills & Exercises

Regular fire and safety mock drill (wet/dry) is to be carried out covering various aspects as per frequency defined in Emergency Preparedness Plan of IMS.

Multi level fire protection system of Power House is given in Annexure-XI.

5.2.6 Training and Awareness :

The Training and HR Division shall be responsible for training & awareness. Training on Fire & Safety Equipments will be given to the maximum numbers of employees of Power House & Dam through any specialized agency twice in a year. Training on First

Aid will also be given to employees of the Power Station. Do's & Don'ts to be displayed at all sites/ workplace conditions so that they are visible to maximum people.

5.3 Preparedness Mechanism in case of Floods

5.3.1 Preparedness while Flooding due to Water Leakage inside the Power House

The possible escape routes from the power house have been identified in case of flooding of power house.

5.3.2 Preparedness in case of Flooding due to Dam Break (Refer EAP for dam)

I. Identification of Roads/ Villages likely to be affected

II. Identifications of Safe Places

5.4 Preparedness Mechanism in case of Landslides

The landslide prone areas are being surveyed before the onset of monsoon and necessary preventive measures are undertaken.

Preventing Measures : Retaining & Breast Walls, Cross Drainage, Nallah Training Works and Cause Ways have been provided to take care.

5.5 Preparedness Mechanism in case of Earthquake

[# # #] nos. Accelerographs have been installed at [Name] Dam for monitoring of seismic activities. The data is analysed by the concerned after occurrence of each seismic events. Severity of earthquake is decided based on data analysis and communicated to the power station for further necessary action.

I. Earthquake Emergency Survival Guide:

Employees are required to be familiar with Earthquake Emergency Survival Guide as per Annexure-XVI so as to protect them at the time of occurrence of earthquake.

II. What One Can Do After an Earthquake ?

1. Is it safe to move?

Once the shaking has stopped, look around for possible hazards to determine if it is safe to move before getting up and helping others. *If time permits* and there is a small fire that can be put out with the fire extinguisher, do that.

2. In case of inside, decide whether to evacuate or stay put.

- Any of the following require immediate evacuation: Fire, damage to structure, a gas leak, or hazardous materials spill.

- In some situations, it may be chosen not to evacuate or to delay evacuation. For example, if there is a slight shaking with no apparent damage and another hazard such as severe weather, it may be more dangerous to move children outside.

5.6 Preparedness Mechanism in case of Terrorist/ Bomb Threat, Terrorist Attack, Strike, Violent Agitation, Sabotage

5.6.1 Preparedness to Counter Sudden Attack by Terrorist/ Anti-Social Elements for Sabotage Purposes:.

- Regular updation of the security arrangements in close coordination with Security Forces and HR Department.
- Adequate numbers of Walkie Talkie/ Wireless with adequate back-up are provided to the security staff for communication.
- All entries into the power station area are closely monitored and entry of unauthorized vehicles and persons is strictly prohibited.
- Emergency list telephone Nos. is available at Power House entrance gate.
- A close liaison is to be kept with state department and security & police department.

However, the detailed contingency plan for encountering any terrorist attack/bomb blast/intruders with sabotage intentions has been prepared by the project unit of Security Forces, duly vetted by the Distt. Authorities/ DIG (Police), [Name of district]

5.6.2 Emergency Plan in case of Strike or Violent Agitation:

In case, the employees of the installation are indulged with outside people in a violent agitation, only then Security Forces has to come into action. The following actions will be taken as per prevention and mitigation plan at para no. 3.5.4.

5.6.3 Preparedness in case of grid failure:

Black start operation is to be done in case of collapse of [Name] Grid. In order to restoration of Grid, [Name] Power Station has been selected to take lead for black start operation. The procedure for black start operation is as under:-

- Start D.G. Sets
- Charge auxiliary Power Supply of the power house.
- Start auxiliary system of Generating Units.
- Start One Generating Unit.
- Monitor the Generating Unit Parameters
- Charge the Bus.
- Exchange of Information with the Grid.
- Close Line Breaker.
- Extend Power to Grid.

The guidelines / instructions issued from RLDC during the black start operation shall be followed.

5.7 Mechanism for Medical support

Medical Services Wing takes care of the medical supports in case of any kind of exigency. Roles and responsibilities are as follows:

- ❖ Ensuring availability of life saving medicines and emergency medical services.
- ❖ Availability of all medical & paramedical staff.

I. Infrastructure:-

[# #] bedded Hospital is available in the Power Station. [*Head of the medical*] is in-charge of Hospital who is being assisted by [# #] Senior Medical officers and Paramedical Staff. The hospital runs 24x7 basis. Following facilities are available in the Project Hospital.

Medical services staff and related Information regarding hospital in nearby area is given in 'Annexure-IX'.

II. Medical facilities (As per availability)

1. 24 hours emergency including ambulance
2. Fully computerized laboratory
3. ECG
4. X-Ray
5. Ultrasonography
6. Treadmill
7. Physiotherapy

III. Equipment available (As per availability)

1. ECG Machine
2. Oxygen Concentrator
3. Suction apparatus
4. Multi-parameter patient monitor
5. Defibrillator
6. TMT
7. Ultrasound machine
8. X-ray machine with automatic film processor
9. Fully automatic blood chemistry analyzer
10. Blood cell counter
11. Urine analyzer
12. Hb A 1C analyzer

Besides, there is an incinerator in the Hospital for treatment of bio-medical waste.

In addition of above first aid boxes are provided at all sites/ workplaces .The contents of first aid boxes are given as below be checked by medical services wing regularly.

IV. First Aid Kit (As per availability)

1. 12-Sterilized Dressing-small size.
2. 6-Medium size dressing.
3. 6 Large size dressing.
4. 6 large sterilized burn dressing.
5. 6-pack 15 gram sterilized cotton.
6. 120 ml cetrimide soln./Savlon.
7. 1 pair scissors.
8. 2 adhesive plaster 2 cm size.
9. Sterilized eye pad.
10. 1-torniquet.
11. 100 tab Aspirin/ Paracetamol.
12. First Aid leaflet.
13. Disposable gloves.
14. Band-aid.

V. Preparedness:

- ❖ First aid boxes placed at different sites/ offices will be checked by Medical Services Wing and shall be replaced by complete first aid box on regular basis.
- ❖ Working of medical equipments must be ensured.
- ❖ Availability of life saving drugs must be ensured.

5.8 Search and Rescue Mechanism

In order to facilitate search and rescue operations in an emergency situation, following equipments have been provided in the power station.

5.8.1 Personal Protective Equipments (PPE):

To handle any emergency situation, personal protective equipment has been provided wherever necessary, their types and locations are attached as 'Annexure – XVII'.

All functional HOD shall maintain minimum level of PPE(s) as mentioned in DMP to mitigate any emergency situation.

5.8.2 Emergency Handling Items& Equipments:

Power Station has different types of miscellaneous items & equipments for handling of any emergency situations. The list of items & equipments available with, Power House & Dam are given in Annexure- XVIII & XIX respectively.

5.8.3 Various Access to the site:

Map showing connectivity to [Name] dam to nearby rail head and airports are enclosed at Annexure – XX. Some of the routes connecting [Name] dam are as below:

- ❖ Nearest rail head – [Name] about [# #] Kms connected by road (NH/SH-[# #]), Travel time – [# # #] hrs.

- ❖ Nearest airport – [Name] about [# # #] Kms connected by [Name] road, Travel time – [# # #] hrs.

Helipad (Location & Coordinate) : Helipad also exists at [Name] Power Station situated at [Name] area and its coordinates are as under :

Longitude : [# # #]
 Latitude : [# # #]
 Elevation: EL [# # #]m

Footpaths connecting power house, dam sites and other PS sites: should be available at the PS.

5.9 Resource Management

Details regarding following are enclosed at **Annexure - XXI**

- a) Materials needed for emergency repair, their location, source and intended use. Materials should be as close as possible to the work site. (Annexure : XXI-a)
- b) List of supplies and suppliers alongwith address and contact nos. (Annexure : XXI-b).
- c) List of equipments, its location and operators. (Annexure : XXI-c)
- d) List of local as well as main contractor alongwith address & contact nos. (Annexure : XXI-d)

5.10 Mechanism for Alternate Source of Power Supply

Electrical department will be responsible for restoration/ extension of power supply during emergency situation with-in Power Station.

Infrastructure:

There is one [# # #] kV line from [Name] Sub-Station ([State] SEB) to [# # #] kV Sub-Station at [Name] (Near Switchyard).

In case of failure of supply from [State] SEB, there are [# # #] DG sets of [# # #] KVA capacity are installed at 33 kV / 11 kV Sub-Station at [Name] to meet out emergency supply. In addition of above, [# # #] DG Set of [# # #] kVA is installed at Dam for supply of power exclusively for Dam area.

The following are the sub-stations in [Name] Township and Dam area.

Sr. No.	Capacity	Location	Feeding Areas
1.			
2.			
3			
4			
5			

5.11 Training & Capacity Building

Power Station authority should exercise the Disaster Management Plan (DMP) in coordination with various departments & emergency management authorities. Exercises promote prevention, preparedness, and response to incidents and emergencies and may also be extended to include recovery operations. Exercising also demonstrates the DMP's effectiveness in an actual situation and demonstrates the readiness levels of key personnel. Periodic exercises result in an improved DMP as lessons learned are incorporated into the updated DMP document. PS should include State, local and tribal emergency authorities in exercise activities. This includes, but is not limited to, entities listed on the Notification Flowchart. To facilitate the participation of emergency management authorities, dam safety exercises also can be coordinated with, or integrated into, other event exercise scenarios for earthquakes, floods, hurricanes, and other hazards.

5.11.1 Discussion-based Exercises

Discussion-based exercises familiarize participants with current plans, policies, agreements, and procedures, or may be used to develop new plans, policies, agreements, and procedures. The following are types of discussion-based exercises:

- ❖ **Seminar.** A seminar is an informal discussion designed to orient participants to new or updated plans, policies, or procedures (e.g., a seminar to review a new Evacuation Standard Operating Procedure). Seminars should include internal discussions as well as coordination with emergency management authorities and other organizations with a role in DMP implementation.
- ❖ **Workshop.** A workshop resembles a seminar but is used to build specific products such as a draft plan or policy. For example, a Training and Exercise Plan Workshop is used to develop a Multi-Year Training and Exercise Plan.
- ❖ **Tabletop Exercise.** A tabletop exercise involves key personnel discussing simulated scenarios in an informal setting. Tabletop exercises can be used to assess plans, policies, and procedures.
- ❖ **Games.** A game is a simulation of operations that often involves two or more teams, usually in a competitive environment, using rules, data, and procedures designed to depict an actual or assumed real-life situation.

5.11.2 Operations-based Exercises

Operations-based exercises validate plans, policies, agreements and procedures; clarify roles and responsibilities; and identify resource gaps in an operational environment. Types of operations-based exercises are:

- ❖ **Drill.** A drill is a coordinated, supervised activity usually employed to test a single operation or function within a single entity, such as testing sirens and warning systems, calling suppliers, checking material on hand, and conducting a call-down drill.

Mock drill of potential emergency situation is carried out on the frequency mentioned in Emergency Preparedness Plan as per Annexure-III. The schedule of mock drill is intimated to respective HOD. The mock drill of terrorist attack /bomb

threat is carried out by Security Force every month as per intimation received from Security Force HQ. The report of mock drill is submitted by the concerned department to Management Representative (Integrated Management System) and report to be sent to various authorities including CEA.

- ❖ **Functional Exercise.** A functional exercise examines and/or validates the coordination, command, and control between various multi-agency coordination centers, such as Emergency Operation Centers (EOCs) and Joint Field Offices. A functional exercise does not involve any “boots on the ground” such as first responders or emergency officials responding to an incident in real time.
- ❖ **Full-Scale Exercises.** A full-scale exercise is a multi-agency, multi-jurisdictional, multi-discipline exercise involving functional (e.g., Joint Field Office, EOC, “boots on the ground” response to a simulated event, such as activation of the EOC and role-playing to simulate an actual dam failure).

Functional and full-scale exercises are considered comprehensive exercises that provide the necessary verification, training, and practice to improve the DMP and the operational readiness and coordination efforts of all parties responsible for responding to emergencies at a dam. The basic difference between these two exercise types is that a full-scale exercise involves actual field movement and mobilization; in a functional exercise, field activity is simulated. The primary objectives of a comprehensive exercise (functional and full-scale) are listed below:

- ❖ Reveal the strengths and weaknesses of the DMP, including specified internal actions, external notification procedures, and adequacy of other information, such as inundation maps.
- ❖ Reveal deficiencies in resources and information available to the dam owner and emergency management authorities.
- ❖ Improve coordination efforts between the PS and emergency management authorities. Close coordination and cooperation among all responsible parties is vital for a successful response to an actual emergency.
- ❖ Clarify the roles and responsibilities of the dam owner and emergency management authorities.
- ❖ Improve individual performance of the people who respond to the dam failure or other emergency conditions.
- ❖ Gain public recognition of the DMP.

5.11.3 Frequency of Exercises

The seminar, drill, tabletop exercise, and functional exercise should receive the most emphasis in an DMP exercise program. The following are recommended frequencies for these exercise types. Dam owners, in consultation with emergency management authorities, should determine actual frequencies appropriate for their dam.

- ❖ Seminars with primary emergency management authorities – annually
- ❖ Drills to test the Notification Flowchart and emergency equipment/ procedures – annually

- ❖ Tabletop exercise – every 3 to 4 years or before functional exercises
- ❖ Functional exercise – every 5 years

A full-scale exercise should be considered when there is a need to evaluate actual field movement and deployment. When a full-scale exercise is conducted, safety is a major concern because of the extensive field activity. If a dam owner has the capability to conduct a full-scale exercise, a commitment should be made to schedule and conduct the entire series of exercises listed above before conducting the full-scale exercise. At least one functional exercise should be conducted before conducting a full-scale exercise. Functional and full-scale exercises also should be coordinated with other scheduled exercises, whenever possible, to share emergency management resources and reduce costs.

5.11.4 Evaluation of Exercises

Emergency exercises and equipment tests should be evaluated orally and in writing. Immediately after an exercise or actual emergency, an after-action review should be conducted with all involved parties to identify strengths and deficiencies in the DMP. The after-action review should focus on procedures and other information in the DMP, such as outdated telephone numbers on the Notification Flowchart, inundation maps with inaccurate information, and problems with procedures, priorities, assigned responsibilities, materials, equipment, and staff levels. The after-action review also should address the procedures that worked well and the procedures that did not work so well. Responses from all participants involved in the exercise should be considered. The after-action review should discuss and evaluate the events before, during, and after the exercise or actual emergency; actions taken by each participant; the time required to become aware of an emergency and to implement the DMP; and improvements for future emergencies.

After the after-action review has been completed, the DMP should be revised, as appropriate, and the revisions disseminated to all involved parties.

5.12 Mechanism for Communication System

For communication, IT & C wing shall be responsible to establish the communication system to all sites/ offices or among the employees. Various backup arrangements are as follows:.

There are [# # #] Nos. EPABX system installed at various locations of Power Station and dam. All these Exchanges are interconnected with OFC link.

BSNL Exchange is located in [Place Name] with [# # #] extensions. Internet is provided through Broadband. [# # #] MBPS MPLS leased line has been taken for ERP. All the sites are connected with OFC Link.

Coverage of various mobile networks like [Name of mobile networks like BSNL/ Airtel/ Idea.....] is available at Power Station area.

[Name] of mobile networks] CUG is working in Power Station and all the key officials and control rooms are connected with CUG connection.

The important Nos of key personals are given in Annexure-VIII.

6. RESPONSE

6.1 Institutional Arrangement for Disaster Response

6.1.1 Internal Response

6.1.1.1 Task Force

Task force consisting of Executives/ Employees from the following departments/ organizations under the chairmanship of HOP has been constituted :-

- ❖ Chief Engineer (Civil),
- ❖ Chief Engineer (Electrical),
- ❖ CMO or Head of Medical Services
- ❖ Sr. Manager/Manager (HR) or Head of HR
- ❖ Sr. Manager/Manager (Fin) or Head of Finance
- ❖ Sr. Manager/Manager – Dam Complex
- ❖ Sr. Manager/Manager – Infrastructure
- ❖ Sr. Manager/Manager – Power House.
- ❖ Sr. Manager/Manager- Electrical Installation Works and IT&C
- ❖ Manager/ Dy. Manager- Safety.

(The above list may change as per organization chart of the power station)

The contact details of task force members is mentioned in 'Annexure-VIII'. Head of HR will issue the revision of contact details for effectiveness implementation of DMP from time to time.

Task force will be responsible for taking immediate decision in case of emergency and Main controller will declare full emergency after discussion with task force. Members of taskforce will take charge of the support process to mitigate the emergency situation and shall remain in contact with Incident Controller.

For internal response, various divisions exist at power station which shall act as team, who could be given specific responsibilities for certain activities required to be carried out during crisis period. The details of the teams may be as follows:

- O&M team,
- Administrative team,
- Safety team including fire fighting team,
- Medical team,
- Security team
- Communication team
- Transport team
- Finance team, etc.
-

6.1.1.2 Security Team

- ❖ Security Force will fall under this category.
- ❖ Services of Private Security Personals shall also be utilized.
- ❖ They shall communicate & co-ordinate with Incident and Site Controller for relief & rescue operation.
- ❖ At least one of them should be present at the main gate for controlling in coming & outgoing persons and vehicles.
- ❖ One should take charge of the head count in the assembly area and tally with the number of persons present inside the premises. If any discrepancy is noticed, he shall inform the security in-charge.
- ❖ Other security personnel shall participate in the fire fighting/emergency.
- ❖ If required, the security in-charge shall inform the incident controller about the occurrence of emergency.

6.1.2 Safety & Security

The Safety/ Security Officer of the power station shall co-ordinate & liaison with Commandant Security Force /Deputy Commandant, Security Force or any other senior most ranking authority of Security Force holding command at the moment of emergency to conduct all safety/security & rescue operations, what so ever required.

I. Employees

- ❖ Any employee, on spotting any emergency, shall immediately intimate the respective area in-charge by the means available, verbally or telephonically.
- ❖ The fire fighters and first aiders (as nominated by the PS) present in the department shall take respective charges.
- ❖ In case of powerhouse or any electrical related accident, other employees shall stop the operation, cut off all electrical supplies to the machine and safely evacuate along with others to the Assembly Area for head counting or for further directions.
- ❖ Employees shall also help all visitors and contractors present in their area for evacuation.
- ❖ They shall ensure not to create any panic or rumour.

II. Visitors and Contractors

- ❖ Ongoing works must be stopped immediately by the contractors.
- ❖ In case of emergency, all workers & visitors and employees will proceed towards assembly area and to wait for further instruction.

6.1.3 External Response - Liaison with Civil Administration

Site Controller will liaison with out-side agencies i.e. nearby industries, Police, Civil Administration for required help/aid during emergency or timely information is required to be communicated as mentioned in 'Annexure-IX'.

6.2 Classification of Emergency/ Disaster

For various potential Emergency situations, the arrangement for disaster management is annexed at Annexure-VII.

7. **RECOVERY**

Following the relief phase, the Main Controller would coordinate the recovery and rehabilitation activities in the disaster affected areas. The following activities would be carried out in this phase:

- Declaration of end of Disaster Situation
- Declaration of Rehabilitation Schemes
- Coordination with respective ministries regarding implementation of rehabilitation programme
- Coordination of resources
- Documentation of the disaster and revision of the DMP based on experience.

Besides, a meeting of the Management Review Committee shall be convened to analyze the actions taken and loss encountered, suggesting / incorporating any corrective and preventive mechanisms and for modifying the Emergency Preparedness Plan if required. As required, further training shall also be provided to the personnel.

8. **FINANCIAL ARRANGEMENTS**

Fund provision for Disaster management be kept in Annual Budget for:

- Departmental DM plan implementation and management.
- Fund provisioning for Disaster Management
- Implementation of Disaster Risk Reduction (DRR)

ANNEXURES

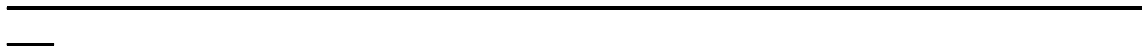
Annexure – I

Salient Features



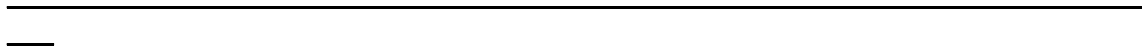
Annexure – II

Vicinity Map



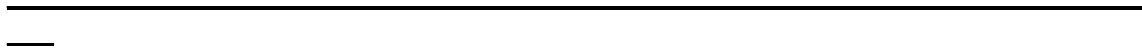
Annexure – III

Project Layout Map



Annexure – IV

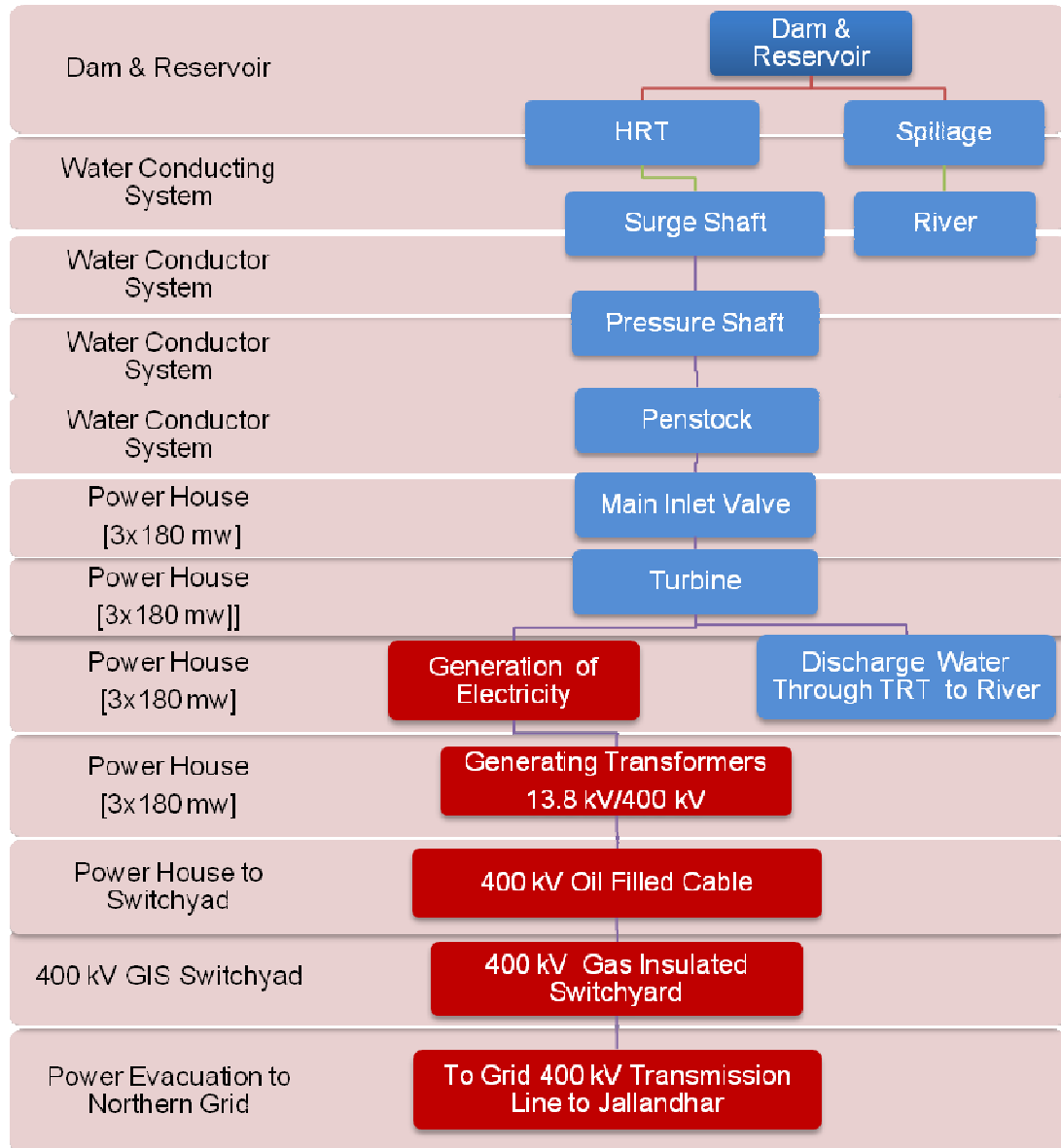
Layout Map of Township



Annexure – V

Organization Chart of Power Station

Generation Flow Chart



[Sample Generation Flow Chart]

[Name] Power Station
Disaster Preparedness Plan

LOGO of PSU

SI No	Potential Emergency Situation	Main Controller	Site Controller	Incident Controller-I	Incident Controller-II	Frequency of Mock Drill	Min Resources Required / Preventive Measures
1	Fire at Vital Installation & Explosion in Pressure Vessels	General Manager	Respective Chief Engineer	Respective Manager	Safety Officer	Two Months	Fire Tenders, Fire Extinguishers, Fire Hydrant, Emulsifire System etc.
2	Spillage/Leakage of Hazardous Waste / Explosive Items	Respective Chief Engineer	Respective Manager / Dy Manager	Respective DM / AM	Respective DM / AM	NA	Capacity to Store Spillage of Hazardous Waste
3	Explosion of Gas Cylinders	General Manager	Respective Chief Engineer	Respective Manager	Safety Officer	NA	Hydrostatic Testing of Pressure vessels
4	Flood at Vital Installation	General Manager	Respective Chief Engineer	Respective Manager	Respective Manager/ Dy Manager	Once in a Year	Dewatering Pumps, Boats, Life Jacket
5	Failure of Backup power	Respective Manager / Dy Manager	Respective DM / AM	Respective Engineer / Junior Engineer	Respective Engineer / Junior Engineer	Once in a month	Standby by DG Set, UPS, Battery Bank
6	Electrocution	Respective Manager / Dy Manager	Respective DM/AM	Respective Engineer / JE	Respective Engineer / JE	Half Yearly	Trained first Aiders , Stretcher
7	Loss of Ventilation	Manager / Dy Manager	DM/AM	Engineer / JE	Engineer / JE	NA	Oxygen Level Detector
8	Blockade of approach Road of Power House & Dam due to Land Slide	Chief Engineer (Civil)	Respective Sr.Mgr/ Mgr/ Dy. Mgr	Respective Engineer / Junior Engineer	Respective Engineer / Junior Engineer	NA	Availability of HEM Equipments
9	Accident of the Vehicle	Respective Chief Engineer	Manager (SMD)	DM/AM	Safety Officer	Half Yearly	Availability of Recovery Van
10	Failure of Boat Engine/ Drowning of Boat	Manager / Dy. Mgr/ Asst. Mgr. Dam HMD	DM/AM	DM/AM	Engineer / JE	Half Yearly	Life Jackets, Mobile Set or Walky Talky
11	Strike of Emergency Supply / Services	Respective Chief Engineer	HDD HR	DM (HR)	Respective Manager	NA	Monitor Situation Control Supply/ Distribution
12	Bomb Threat/ Terrorist Attack	General Manager	DC Security	Respective Manager	Dy Coy Commander	Monthly	Security Battalion and Civil Administration
13	Earthquake	General Manager	Respective Chief Engineer	Respective Manager	Safety Officer	Once in a Year	Availability of HEM Equipments, Trained first Aiders , Stretcher

EMERGENCY SITUATION HANDLING FLOW CHART

Important Contact Nos	
Location	EPABX No

Important :

- Follow Flow Chart for handling any Emergency Situation as shown in Emergency Preparedness Chart.
- If the Incident Controller-II and Site Controller is of the same rank then senior executive will act as Incident Controller-II.
- Fire Control Room , headed by Safety Officer must have trained fireman, Fire Tender and necessary infrastructure and equipments .
- First Aid Box are required for those sites where 100 Employees working in a factory .
- Frequency of mockdrill as mentioned above are for entire power station.HDD will have to conduct mockdrill of emergency situations within 7 days of notification communicated.
- The reports of mockdrill should be communicated to MR IMS with in 7 days after conducting of mockdrill.

(Sample Disaster Preparedness Plan)

Annexure – VIII

Contact Numbers of Key Personnel & Control Rooms

(This Annexure will be updated time to time).

A) Power Station

Sl. No.	Name / Designation	Landline	Intercom	Mobile No.	Email id
1.					
2.					

B) Control Rooms

Sl. No.	Name / Designation	Landline	Intercom	Mobile No.	Email id
1.	Administrative Office - Emergency Control Room				
2.	Hospital Emergency				
3.	Power House Control Room				
4.	33kV/11kV Substation [Name] (Switchyard)				
5.	Dam Control Room				
6.	Fire Station Control Room				

C) [Corporate Office] Key Officials

Sl. No.	Name / Designation	Landline	Intercom	Mobile No.	Email id
1.					
2.					

D) Medical Services Facility at Power Station

Sl. No.	Name / Designation	Landline	Intercom	Mobile No.	Email id
1.	Dr. [Name]				
2.					
Other Important Numbers					
3.	Ambulance				
4.	Emergency Wards				

Contact Numbers of Civil Administration, U/s & D/s Projects and Hospitals**A) Contact Nos. of Civil Administration**

Sl. No.	Name / Designation	Landline	Mobile No.	Email id
1.	DC			
2.	SDM			
3.	SP			
4.	DSP			
5.	SHO			
6.	Commandant			
7.	Fire Control Room			
8.	CMO, Distt Hospital			
9.	Fire Emergency nos.			
10.	Gram Pradhan, [Village Name]			
11.	Gram Pradhan, [Village Name]			
12.				
13.				

B) Contact nos. of u/s and d/s Power Stations

Sl. No.	Name / Designation	Landline	Mobile No.	Email id
	[Name] Power Station			
1.	[Name of HOP]			
2.	Risk Manager			
3.	Safety Officer			
4.	PH Control Room			
5.	Dam Control Room			
	[Name] Power Station			
6.	[Name of HOP]			
7.	Risk Manager			
8.	Safety Officer			
9.	PH Control Room			
10.	Dam Control Room			

C) Hospitals and Primary Health Centres nearby Power Station

Sl. No.	Hospital/ PHC	Name of Incharge	Landline	Mobile No.
1.	Civil Hospital [Name]			
2.	Zonal Hospital [Name]			
3.	PHC [Name]			
4.	PHC [Name]			
5.	PHC [Name]			

D) Important Hospitals & Multi Speciality Hospitals nearby PS

Sl. No.	Hospital/ PHC	Address	Landline	Mobile No.
1.	Hospital [Name]			
2.	Hospital [Name]			
3.	Hospital [Name]			
4.	Hospital [Name]			
5.	Hospital [Name]			

Annexure – X

List of Fire Extinguishers at Various Locations

Sl. No.	Location/ Deptt.	ABC 5 kg	Foam 9 ltr	Co.2 3 kg	Co.2 45 kg	Total
1.	Workshop [Location Name]	[# #]	[# #]	[# #]	[# #]	[# #]
2.	Hospital					
3.	L.P.G. Store					
4.	Main Store [Location Name]					
5.	Admin Block					
6.	Guest House					
7.	Power House & Switchyard					
8.	[Security Forces] Unit					
9.	Dam Complex					
10.	KV School					
11.	T&HRD Office					
12.	T&HRD Hostel					
13.	T.R.T					
14.	Civil Complaint Building					
15.	Petrol Pump					
16.	Elect. Sub-Station					
17.	IT					
	Total					

Note: This sample annexure will be updated by Manager (Safety) time to time.

Annexure – XI

Fire Extinguishers – Power House

(A sample list is detailed as hereunder)

Overall Monitoring : Chief Engineer will be responsible for ensuring of corrective & Preventive action in case pointed out by technical inspection team or any other external agency.

Overall Responsibility: Sr. Manager/ Manager (E/M) Power House.

Responsibility : In-charge of respective groups as mentioned in the table below.

	Description of Protection System	Looked After By
Level I	<p>Fire Detection & Alarm System</p> <p>There are two types of fire alarm and detection systems installed at power house. Out of which one is smoke detection and alarm system and other is deluge controlled system. However both systems are also interconnected with each other but works only consociate alarms from other area. However, In smoke detection and alarm system the power house area have been dividing into 56 zones (32 Power house, 24 Switchyard) and having three alarm detection and annunciation panels installed at Power house control room, switchyard and Power house portal gate respectively.</p>	DM/AM - C&I Group
Level II	<p>Fire Protection - Water System</p> <p>There is an overhead tank of a capacity of 15 m³ outside the power house cavern at an elevation of 649.0 meters. Two vertical turbine type pumps of 40 HP are installed which draw water from tail race tunnel and fill this overhead tank. As a back-up penstock in unit # 1 has been tapped with a pressure reducing valve for filling the tank.</p> <p>A charged system capable of delivering required water flow to handle the single largest fire hazard.</p>	DM/AM - Mechanical Maintenance Group

1	<p>Fire Fighting System - Power House</p> <p>2 No. vertical turbine water pumps of capacity 1200 LPM, 40 HP and rated head 110 M each complete with basket strainers are installed on Inlet Valve floor of unit #1 and unit #3 These pumps fill the overhead fire tank provided outside the power house through a single pipe line through transformer gallery.</p> <p>There are two fire water headers of red colour in the power house. The working pressure of H.P. fire header is 10 Kg/cm² and that of L.P. fire header is 5 Kg/cm². As a back-up, the penstock of unit # 1 has been tapped with a pressure reducing valve to reduce pressure from 18-20 Kg/cm² to 10 Kg/cm² for filling the overhead tank. Normally this tapping valve is in closed position.</p>	DM/AM - Mechanical Maintenance Group
	<p>Pressure gauges are provided to indicate the fire water header pressure at EL. 547.5M. Another control panel is provided at the same floor that indicates whether overhead tank is full or empty, operation of pumps, AC supply failure, and pump strainer blocked etc.</p>	DM/AM- Electrical Maintenance Group
	<p>The operation of fire deluge system is set at a pressure of 5 Kg/cm² pressure. One pressure reducing station with pressure reducing valve, strainer, gauges and relief valve has been provided on inlet valve floor of unit # 2 at EL. 543.SM.</p>	DM/AM- Electrical Maintenance Group
2	<p>Fire Fighting System -Transformer Gallery</p> <p>The high pressure water header piping with a pressure of 10 Kg/cm² from power house becomes the low pressure header with 5 Kg/cm² as it goes to the transformer gallery, because of higher elevation level (from 547.5 M to 590.0 M).</p>	DM/AM- Mechanical Maintenance Group
	<p>The control panel of fire deluge operating system has been provided in transformer gallery for automatic operation and stopping the deluge operation by push button. It also provides the switches to make supply ON & OFF.</p>	DM/AM- Electrical Maintenance Group
	<p>The deluge system in transformer gallery for fire hazards is provided on the same header with pressure of 5 Kg/cm²</p>	DM/AM- Electrical Maintenance Group
3	<p>Fire Fighting System - Switchyard and Cable Tunnel</p> <p>One tapping is taken from the fire water header in transformer gallery, which takes the water to the switchyard area via. cable tunnel. The whole area is divided in various zones and deluge system has been provided at each zone to take care of any fire hazard.</p>	DM/AM- Switchyard Maintenance Group
Level III	FIRE FIGHTING EQUIPMENT	
1	<p>Fire Hydrants</p> <p>Fire Hydrant Points are provided at various locations of Power</p>	DM/AM- Mechanical

	House & Switchyard. Hose reels & Nozzles are available in each boxes.	Maintenance Group
2	Fire Extinguishers CO ₂ type Fire Extinguishers & ABC Type of Fire Extinguishers are placed at all vulnerable place inside Power House. Details of these Fire Extinguishers have been given in 'Annexure-X'.	DM/AM-Co-Ordination Group
3	Fire buckets is also placed at some places to extinguish the oil fire.	DM/AM-Co-Ordination Group

Records:-

1. Technical Audit Reports.
2. Audit Reports of Integrated Management System.

Annexure – XII

List of Dewatering Pumps in Power House

(A sample list is detailed as hereunder)

Sl. No.	Description of Dewatering Pumps and Capacity	Qty.	Location	Use (Dedicated/ Spare)
1.	50 HP, 37 KW submersible pump	[# #] nos.	Main sump at knee liner floor	Dedicated
2.	50 HP, 37 KW submersible pump	[# #] nos.	Drainage trench at knee liner floor	Dedicated
3.	120 HP, 90 KW submersible pump	[# #] nos.	Drainage trench at knee liner floor	Dedicated
4.	50 HP, 37 KW submersible pump	[# #] nos.	Penstock plug end sump	Dedicated
5.	120 HP, 90 KW submersible pump	[# #] nos.	Penstock plug end sump	Dedicated
6.	27 HP, 20 KW submersible pump	[# #] nos.	Draft tube plug end sump	Dedicated
7.	27 HP, 20 KW submersible pump	[# #] nos.	Access tunnel sump	Dedicated
8.	50 HP, 37 KW submersible pump	[# #] nos.	Power hose, Turbine floor	Spare

Annexure – XIII

Guideline for prevention against flooding of Hydro Electric Power Stations to be adopted during design, construction operation and maintenance stages**GENERAL**

- Flood warning system shall be established on the upstream of dam/barrage so as to have advance information regarding high inflows ensuring sufficient lead time for taking protective measures. Immediately on commencement of project works adequate and reliable communication system shall be established between flood warning stations and the project.
- Hourly monitoring of inflows and silt levels (PPM) shall be carried out during complete monsoon/high inflows period specially in case of silt prone projects/Power stations. Websites of weather prediction agencies should be regularly assessed for additional requisite data.
- Separate Disaster Management plan for each project/Power station including that related to flood management be prepared on commencement of project work and widely circulated.
- Fixed type public address system and Siren (alongwith audio-visual devices at suitable locations, if required) for covering the complete project/Power station area shall be provided. In addition, portable public address system shall also be provided.
- List of probable sources for emergent supplies, drainage/dewatering pumps including diesel operated pumps, all types of pipes, spares, etc., may be identified in advance and kept readily available.
- System shall be built up for proper liaisoning with local bodies for sharing information regarding inflows, any blockade in upstream of dam and sudden release of water etc. Directory of contact numbers of key persons of civil administration, police/ambulance, fire station, etc. should be available with the project. Periodical revision / updation of the same shall be carried out.
- Periodical Training programme for the operating personnel on “Flood prevention of Power station” be conducted on mandatory basis in each power station to enhance their alertness and effectiveness during such exigencies.
- Technical audit or project/Power station should be regularly got carried out from an independent team of experts to ensure effectiveness and efficacy of flood prevention measures including awareness and alertness of the concerned construction/O&M stage depending upon the flood related threat perception, based on the layouts of the individual project.
- Requisite number of Earth Moving Equipment e.g. Loader/Excavation and Dumpers etc. should be made available even during O&M stage depending upon the flood related threat perception, based on the layouts of the individual project.

DESIGN STAGE

Civil

- The portals of adits of HRT, Access tunnel (s), etc. shall be designed at substantially higher elevation than Highest Flood Level to avoid risk of flooding.
- Suitable protection measures to protect the back slope and flood protection walls with height above HFL shall be constructed for surface Power station(s) located very near to river course.
- For drainage of areas surrounding the Power station, suitable measures like construction of deep drains with associated sumps and pumping arrangements (if required) shall be made to prevent flooding of surface Power station.
- In cloud burst prone areas, the possibility of having under ground Power station may be considered.
- The cross drainage structures in areas leading to important locations are also to be suitably designed for flood situations.

Hydro-Mechanical

- Provision of independent gate with dedicated gantry for each opening of penstock (s)/ pressure shaft (s) in surge shaft may be considered.
- Provision of independent gate with dedicated gantry for each Draft Tube shall be considered. In case the number of draft tube gates exceed four sets, two or more hoisting arrangements may be considered in respect of existing power station(s) .
- Outfall structure of TRT shall be planned with suitable gate to prevent reverse entry of flood water from the river.
- Possibility of providing suitable arrangement for locking the D/T gates just above the openings may be explored to reduce the travel time in case of emergency closing.
- Stop logs shall be parked near location of the gates, if possible, so as to avoid the time delay in transportation of same during emergency.
- Provision of standby DG supply of sufficient capacity shall also be made for operation of various gates.

Electro-Mechanical

- Drainage system shall be designed with capability of discharging normal seepage from power station walls, floors, leakages from “turbine shaft seals”, water from back flushing of cyclone separator(s) (if provided)etc. with an additional margin of at least 50%.
- For standby drainage capacity for flood protection purposes, minimum equal no. of additional pumps of same capacity, as that of drainage capacity provided for Power House, be provided in a separate sump at the lowest floor.
- Use of Submersible type pumps, (suitable for submergence of minimum 20m) may be made mandatory for drainage & dewatering system. In case of silt prone Power station, at least one slurry type pump may be provided.
- The pumps shall be capable of discharging water above the highest flood level directly into the river (or in the TRT/ pool beyond D/T gate).
- A Mild Steel pipe of suitable size shall be embedded in the main access tunnel to provide alternate route to discharge flood water from underground power station

directly into the river. In surface/sub surface Power stations, additional drainage pipe(s) may be embedded in the draft tube deck wall /draft tube pier with NRV and gate valve with outlet above Highest Flood Level.

- In case of Power stations (with head above 100 meter), tapping(s) from penstocks shall be avoided and water for unit cooling, fire fighting etc. be lifted from the tail race.
- Cooling water, fire fighting and drainage/ dewatering systems shall have cast steel valves suitable for a pressure of 1.5 times of Design pressure.
- All electrical panels of drainages, dewatering pumps, SST, DC battery bank etc. in the Power station shall be placed at level of Machine hall or above.
- The total DG capacity to be provided in the Power station shall be capable of operating all drainage and dewatering pumps simultaneously in emergent conditions.

CONSTRUCTION STAGE

All the recommendation as indicated under sub headings General & “Design stage” in respect of civil, Hydro-Mechanical and Electro-Mechanical shall be considered for implementation during construction stage also.

Civil

- Plugging of construction adits after completion of works to be undertaken as per design requirement.
- TRT portal shall be provided with a plug (either of rock (preferably) or concrete or masonry), which shall be completely removed only after the completion of outfall structure and installation of outfall structure and installation of gates(s).
- Outfall structure of TRT shall be constructed during non-monsoon, period. TRT works shall be carried out after taking all precautions or else avoided during high period.

Hydro- Mechanical

- If the installation of draft tube gate(s) is not completed before monsoon, then suitable plug/bulk head may be provided before onset of monsoon. Similarly if the portal of TRT falls near the river, bulk head may be provide there also.

Electro- Mechanical

- Suitable designed Bulk heads (plugs) shall be provided on top of draft tube (s) inside the Power station for each unit with Francis type Turbine during construction stage to avoid from tail race.

O & M STAGE

- Adequacy of various systems, i.e., civil, Hydro- mechanical and Electro-Mechanical installed in existing Power stations under operation and maintenance stage may be reviewed with reference to flood control measures as listed above and modified suitably to remove deficiencies, if any.
- List of internationally known and reputed firms specializing in restoration of flooded power Stations to be kept ready. Details of competent contractors/agencies and good workmen in nearby areas, who can be assigned the job of restorations is to be prepared by all Power Station and regularly updated

Civil

- Steep and vulnerable slopes in the Power station area need to be identified and protective measures shall be taken for ensuring accessibility during exigencies.
- Drains around the Power station area need to be cleaned and maintained regularly specially during monsoon to divert rain water away Power station.

Hydro- Mechanical

- Regular preventive checks/maintenance of HRT, surge shaft draft tube. TRT, bulk head gates & associated seals and their water away from Power station.
- TRT gate, if provided, to be closed during high flood after stoppage of units.

Electro-Mechanical

- All the outdated/obsolete equipments and components specially relating to flooding in the Power station may be suitably modified/ replaced.
- Regular visual inspection, periodic testing of various pipe/weld joints, valves etc., prone to wear due to silt in the Power station shall be carried out.
- Vigorous monitoring and regular maintenance of all important and vulnerable systems, e.g., flood warning system, drainage & dewatering system, all gates, standby DG supply, turbine shaft seals, etc., failure of which may lead to flooding of power station shall be carried out.
- Before onset of monsoon, all the requirements, e.g., standby equipments, adequate spares, requisite consumables, experts, etc need to be organized through OEM from other reputed sources only after proper inspection and prepared and these be procured through OEM or from other reputed sources only after proper inspection and testing.
- Pipes, valves, choked heavily due to silt/debris shall be cleaned under expert supervision after taking adequate precautions/measures to prevent gushing of water in the Power station.

RESTORATION OF HYDRO POWER PLANT AFTER FLOODING

In the unfortunate event of any unforeseen failure, implementation of the following recommendations given below will help in faster restoration of the project/Power station:

- The first priority is to evacuate the trapped persons from the project/power station. Instruments, Electronic cards of important panels and other devices & equipment which can be easily removed may be taken out simultaneously, if possible.
- Immediate action is to be taken to dewater the Power station. Simultaneously. the source of flooding shall be identified, e.g., major leakages from civil structures. leakages through intake, TRT gate, etc. The source of flooding shall be blocked by lowering of intake, draft tube/TRT gates etc. to stop the ingress of water to the Power station despite identification of the source, the services of divers shall be arranged on top priority of rectification of the trouble spot like faulty gate seals, cracks in concrete etc.
- A control room, for the restoration/refurbishment of plant shall be set up where all the information regarding management of flooding shall be available.
- The damage room, rectification and testing of various components shall be done immediately after dewatering and cleaning of the Power station with the help of experts/supervisors/ O& M's representatives etc.
- All the human resources and facilities shall be planned for round the clock working till the completion of all the work(s). All event and arrangements shall be recorded in sequential order basis for future reference.

Annexure – XIV

Escape Route in Power House

A sketch for evacuation plan from power house in case of emergency/ alarming situation should be placed here showing all possible routes for safety of the personnel working inside.

Annexure – XV

Escape Route in Dam

A sketch for evacuation plan from Dam gallery in case of emergency/ alarming situation should be placed here showing all possible routes for safety of the personnel working inside.

EARTHQUAKE EMERGENCY SURVIVAL GUIDE

GOVERNMENT OF INDIA
Ministry of Home Affairs
NATIONAL DISASTER MANAGEMENT DIVISION

Earthquake Emergency Survival Guide

EMERGENCY SUPPLIES

Keep enough supplies in your home to
card, cash or traveller's cheques.
Sanitation supplies.

WHAT ITEMS YOU MAY NEED IN AN EVACUATION.
Store these supplies in sturdy, easy to carry-containers such as backpacks, duffel bags or covered trash containers.
Include:
A three day supply of water (4 litres per person per day) and food that won't spoil.
One change of clothing and footwear per person, and one blanket or sleeping bag per person.
A first aid kit that includes your family's prescription medications.
Emergency tools including a battery powered radio, flashlight and plenty of extra batteries.
An extra set of all important keys and a credit

Name & Address _____
Phone _____

Closest Relative living away from your city _____

Address _____
Meeting Place _____
Phone _____
Emergency meeting place _____

EMERGENCY SUPPLIES

Keep enough supplies in your home to
card, cash or traveller's cheques.
Sanitation supplies.

UTILITIES
Keep important family documents in a water proof container. Keep a smaller kit in the trunk of your Car.
Locate the main electric fuse box, water service main and natural gas main.
Learn how and when to turn these utilities off.
Teach all responsible family members. Keep necessary tools near gas and water shut-off valves.
Turn off the utilities only if you suspect the lines are damaged or if you are instructed to do so.



BEFORE

Develop a family emergency plan and practice it regularly.
Identify an out-of area phone contact person to call and check in with.
Choose a couple of family meeting places, pick easy to identify, open and accessible places that you can likely walk to.
Prepare to be self sufficient for a minimum of three days.
Assemble an emergency supply kit include food, water, prescription medications and first aid supplies a battery operated radio, flashlight extra batteries shelter clothing, sturdy shoes and personal toiletries.
Have knowledge about first aid.
Quake-proof your house by securing heavy furniture and objects

IMPORTANT TELEPHONE NUMBERS

Police	100
Fire	101
Ambulance	102

DURING

Do not panic. Remain calm Do not jump from the building
If inside,
If you are NEAR AN EXIT, leave the building as soon as possible. Put your arms over head to protect yourself against possible objects falling from above and move away from nearby buildings. Watch out for traffic.
If you can not reach the exit quickly or you are situated in HIGHRISE BUILDING/UPSTAIRS stay inside.... Do DROP, COVER and HOLD Sit on the inside or underneath sturdy furniture Hold on to be furniture. Cover as much of your head and your upper body as you can. When the shaking stops get up and evacuate the building. Don't use the elevators.
If outdoors,
Move to an open area away from all structures, especially buildings, bridges and overhead power lines.
If driving,
Stop in an open area away from all structures especially bridges, overpasses, tunnels and

AFTER

STAY CALM! Allow a little time for objects to fall before moving.
Move cautiously and check for unstable objects and other hazard above and around you.
Check yourself for injuries.
Help those around you and provide first aid.
Only use phones (including cell phones) if a life is at stake.
Listen to the radio or watch local TV for emergency information and additional safety instructions.
Inspect gas water and electric lines if there are leaks or if there is any doubt about leaks, shut off mains, evacuate immediately if you hear or smell gas and can't shut it off. Report leaks to the authorities.
Anticipate aftershocks, especially if the shaking lasted longer.
Stay out of damaged buildings.

DROP, COVER & HOLD



Personal Protective Equipment

Sl. No.	Description / Type	Location
1.	Safety Helmets	Power House, Dam Site, Work Shop, and Switch Yard as per site requirement.
2.	Life jackets	
3.	Safety Shoes	
4.	Welding Hand Gloves	
5.	Welding Jackets & Leg Guards	
6.	Welding Goggles & Helmets	
7.	Safety Belts	
8.	Dangries	
9.	Ear Plugs	
10.	Masks	
11.		

Annexure – XVIII

Emergency Handling Items & Equipment in Power House

S.No.	ITEM	UOM	QTY
1.	Hammer 10 Kg	No.	[# #]
2.	Cutting plier 8”	No.	
3.	Screw driver set	Set	
4.	Nylon rope Size 1”	Meter	
5.	Manila rope Size 1”	Meter	
6.	Hand Gloves	No.	
7.	Safety Helmet	No.	
8.	Safety Belt	No.	
9.	Gum boot	No.	
10.	Grinding Goggle	No.	
11.	Emergency Light /Torch	No.	
12.	Gas Cutter	No.	
13.	Welding Screen	No.	
14.	Flexible hoses	No.	

Annexure – XIX

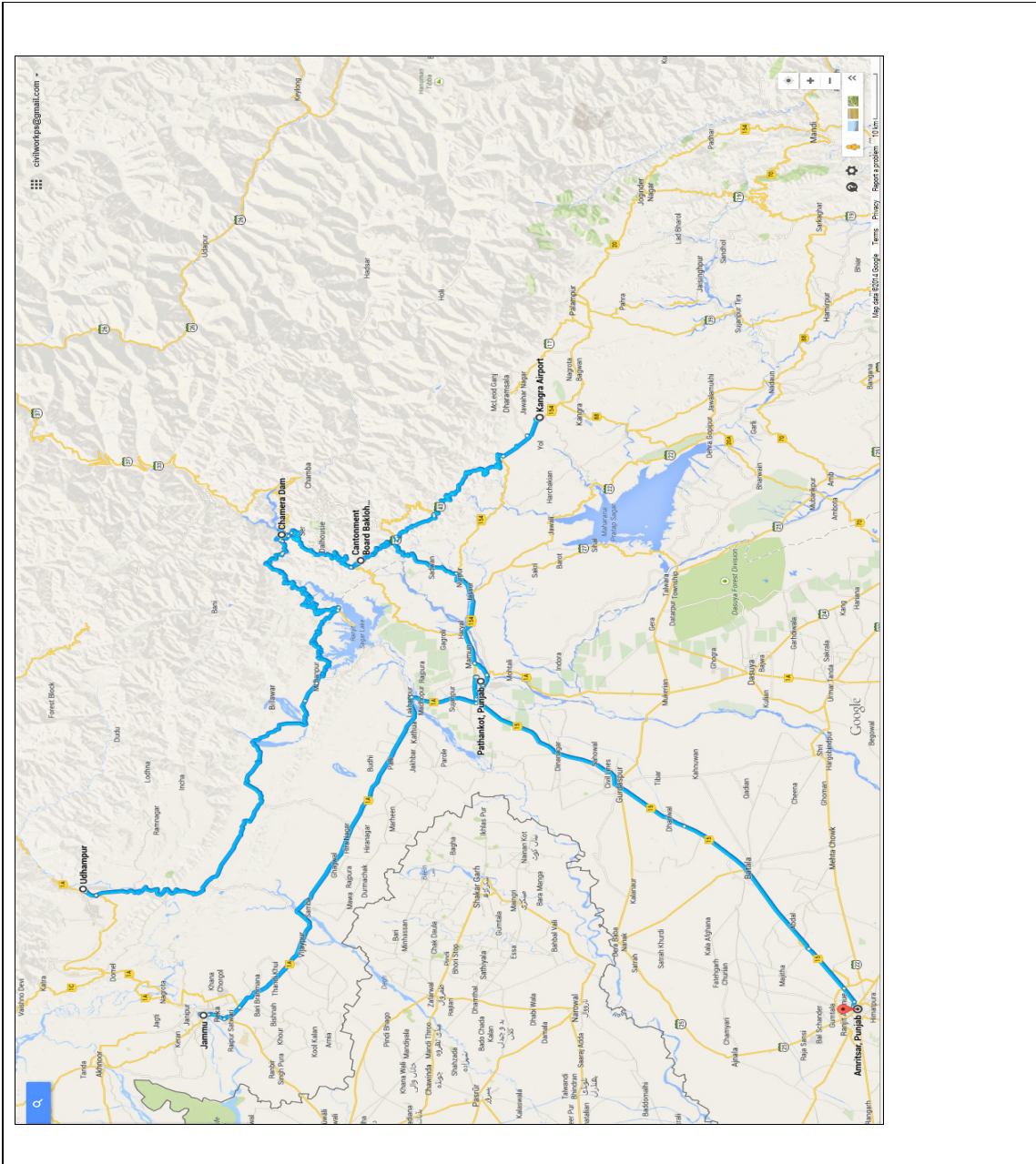
Emergency Handling Items & Equipment in Dam

S.No.	ITEM	UOM	QTY
1.	Power Boat	No.	[# #]
2.	Life Jackets	No.	
3.	Helmets	No.	
4.	Empty Barrel	No.	
5.	Showel	No.	
6.	Manilla Rope 1”	Kg	
7.	Nylon rope ½”	Kg	
8.	Nylon Rope 1”	Kg	
9.	Hammer 6.5 Kg	No.	
10.	Hammer 1 Kg	No.	
11.	Hammer ½ Kg	No.	
12.	Crowbar	No.	

Dragon Lights

S.No.	LOCATIONS	UOM	QTY
1	Check Posts HR Deptt.	No.	[# #]
2	Lower Simbleu Sub Station	No.	
3	Dam Control Room	No.	

Various Access Routes to the Power Station



[A Sample Presentation]

Annexure – XXI

Stock piling Materials and Equipment

Annexure – XXI-a: Materials needed for emergency repair, their location, source and intended use.

Annexure – XXI-b: List of supplies and suppliers alongwith address and contact nos.

Annexure – XXI-c: List of equipments, its location and operators.

Annexure – XXI-d: List of local as well as main contractor alongwith address & contact nos.