RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN FOR SETTING UP OF 4 MLD DESALINATION PLANT FOR PEARL DISTILLERY LIMITED, SINGARAYAKONDA, ANDHRA PRADESH

PROJECT CODE: 590051718

For

PEARL DISTILLERY LIMITED
SINGARAYAKONDA
ANDHRA PRADESH

DECEMBER 2017

QS ISO 9001 Certified | QCI - NABET Accredited | NABL Accredited | DSIR - MoST Accredited

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1. DISASTER MANAGEMENT PLAN

1.1. Introduction

Emergency/ disaster is an undesirable occurrence of events of such magnitude and nature that adversely affect operations, cause loss of human lives and property as well as damage to the environment. Coastal infrastructure is vulnerable to various kinds of natural and manmade disasters. Examples of natural disaster are flood, cyclone, tsunami, earthquake, lightning, etc., and manmade disasters are like major fire, explosion, sudden heavy leakage of toxic/ poisonous gases, civil war, nuclear attacks, terrorist activities, sabotage, etc. It is impossible to forecast the time and nature of disaster, which might strike a common user infrastructure.

An effective disaster management plan helps to minimize the losses in terms of human lives, assets and environmental damage and resumes working condition as soon as possible.

1.2. Location of the desalination plant, Surrounding Areas and Population

PDL desalination plant is located at Singarayakonda Mandal, Andhra Pradesh. In an event of fire or any other disaster taking place in the desalination plant, PDL personnel present within 50 to 100 m will be affected. These persons will be trained to quickly leave the site of incidence. The Fire and Safety Department personnel should take charge of the situation. The fire accident in the Desalination plant has no likelihood of causing offsite consequences.

1.3. Approaches to Disaster Management Plan

Modern approach to disaster management involves the following two steps:

- Risk Identification
- Risk Evaluation

Probability of any hazardous incident and the consequent damage also depends on:

- Wind speed,
- Wind direction,
- Atmospheric stability, Source of ignition and

<u>Safety Measures</u>
Following safety tips should always be borne in mind while working in the Port to avoid emergency & hazardous situation.

- Follow specified procedures and instructions for start-up, shut down and any maintenance work.
- Follow permit to work system.

- Isolate the part, machine properly on which work is to be done.
- Remove flammable liquid/gases thoroughly on which work is to be done.
- Use non sparking tools.

1.4. Disaster Control/ Response Plan

Disaster may arrive without any warning, unexpectedly in spite of all precautions & preventive measures taken. However, an efficient control/response plan can minimize the losses in terms of property, human lives and damage to the environment can be the minimum. The disasters that can occur in the coastal area are storms, storm surges, tsunami and earth quakes.

1.5. Tsunami

Tsunami is a series of wave train generated in the ocean by a hydraulic impulsive force that vertically displaces the water column. Earthquakes, landslides, volcanic eruptions, explosions and even the impact of cosmic bodies taking place in the ocean can generate Tsunami waves with long periods (≈ 30 min), long wave length (≈ 100 km) with a high velocity of propagation (≈ 700 km/hr).

Tsunamis are shallow water waves which propagate with phase velocity equal to the square root of the product of the acceleration due to gravity and the water depth. For example, in the Pacific Ocean, where the typical water depth is about 4000 m, the Tsunami wave travels at about 700 km/hr. Because the rate at which the wave loses its energy is inversely related to its wave length, Tsunami not only propagates at high speed, but it can also travel great transoceanic distances with limited energy losses and reach different continents in shorter time i.e., the energy propagating with a Tsunami waves remain nearly constant.

Among the various factors causing the occurrence of Tsunami, the large vertical movements of the earth's crust is more predominant and it can occur at tectonic plate boundaries. The plates that interact along these boundaries are called faults. Around the margins of the faults, the denser oceanic plates slip under the continental plates in a process known as subduction. Such subduction earthquakes are particularly very effective in generating the devastating Tsunamis.

The energy flux due to Tsunami is proportional to its velocity of propagation and height and it remains nearly constant till reaching the coast. Consequently, the velocity of propagation gets retarded when it enters shallower water and its height gets amplified. Because of this shoaling effect, the Tsunami that is imperceptible at Deep Ocean close to centimetre height may rise up to several meters near the coast called run up.

When Tsunami finally reaches the coast, the crest of the wave appears as rapidly risen water mass gushing into the coastline as a bore with a crashing velocity of

700 km/hr for more than 10 - 30 min. The trough of the wave will appear as the withdrawal of water mass with same speed back into the ocean swallowing everything on the land and dragging back into the ocean.

In worst case, if a Tsunami occurs due to the movement of Andaman and Indonesian plate then there will be surging of Tsunami waves with a speed of > 60 kmph into the shore and the run-up will be > 4 m. The gushing of water will sweep and flood the areas having elevation < 3 m MSL.

1.6. Disaster Management Plan for Tsunami and Storm Surge

Cyclone, Tsunami and Storm surge are the most destructive force among the natural devastations. It causes instant disaster and burial of lives and destruction to entire coastal properties. The damage and loss can be minimized if appropriate preparedness plan is formulated. The following statutory guidelines are recommended by National Disaster Management Authority (NDMA) to minimize the impact due to Cyclone, Tsunami and storm.

- Developing sand dunes along the coast with shrubs or Casuarina trees for stabilization of the sand dunes (Tsunami Mound).
- Raising the ground level (above the design water level) with natural beach sand so as to rehabilitate the coastal region.
- Development of coastal forest (green belt) by planting casuarinas and coconut trees along the coastline to cover minimum of about 500 m width of the beach.
- Adopting natural beach nourishment to create steep beach face.
- Creation of sandy ramps at close intervals along the coast.

In addition to the guidelines by NDMA, it is also necessary to adopt various preventive actions in the coastal region of the project site.

Preparedness Plan

The preparedness plan shall contain details about: i) warning that should be given ii) Protective measures to contain the effect of surging water level and iii) Other precautionary measures to be taken. The following measures are the key aspects in the preparedness plan.

i) Coordination with National Designated Agencies
ii) Vigilant online monitoring
iii) Emergency Evacuation

1.6.1. Coordination with National Agencies

Tsunami waves do not induce high surface elevation in Deep Ocean and hence their presence is not felt in Deep Ocean until they reach the shallow water close to coast. If

any small yet potentially significant sea level change is noted following a seismic activity, the data are transmitted acoustically to the surface buoys and relayed by satellites to the warning stations. Computer modelling converts the data into a prediction of potential damages for the use of the members of the network.

After the 2004 Tsunami affected the Indian sub continent, the following organizations are involved on watch and cautioning the government and public in the event of possibility of occurrence of Tsunami. As a part of Tsunami hazard mitigation, warning systems have been established in India by the coordination of the following organizations.

i) National Disaster Management Authority (NDMA), New Delhi.
ii) Indian National Centre for Ocean Information Services (INCOIS), Hyderabad.
iii) Indian Meteorological Department (IMD), New Delhi.
iv) National Institute of Ocean Technology (NIOT), Chennai.

The contact details of National agencies are given below:

Organization	Address	Email ID	Contact Number
NDMA	NDMA Bhavan, A-1 Safdarjang Enclave, New Delhi, DL 110029.	www.ndma.gov.in	+91 - 11 – 26701700
INCOIS	Ocean Valley, Pragathi Nagar (BO), Nizampet (SO), Hyderabad - 500090	www.incois.gov.in	+91 - 40 – 23895002
IMD	Mausam Bhavan, Lodi road, New Delhi, DL 110033.	www.imd.gov.in	+91- 11 – 24699216
NIOT	Velachery - Thambaram main Road, Narayanapuram, Pallikaranai, Chennai 600100.	www.niot.res.in	+91 - 44 – 66783300
District Collectorate, Prakasam District, Andhra Pradesh State.	District Collector	-	+91 – 232701

INCOIS in collaboration with NIOT has deployed DART buoys at 3 locations in the deep ocean along the fault plane of Andaman plate and Indonesian plate.

The online monitoring is capable of raising alarm in case of instantaneous change in surface elevation exceeding centimetre which can be caused by the generation of Tsunami. IMD interacts with the above institutions and takes the responsibility of broadcasting the disaster through various Medias. In case of a Tsunami, the warning is usually broadcast based on the earthquake occurred in the nearby ocean. Irrespective of definite occurrence of Tsunami, the possibility to occur is also considered as equally vulnerable and accordingly the warning news is instantly flashed through Radios and TVs. The notification is followed by orders from the local Government Authorities on reinforcing evacuation, prohibition to enter the demarcated risky zone and mobilizing facilities for easier evacuation and augmenting medical facilities.

There are a variety of evacuation notification systems in case of Cyclone, Tsunami and Storm surge. They include sirens, weather radio, Emergency Alert System, Telephones, Emergency Weather Information Network etc. In each system, it should be noted that the application and message is consistent as well as continuous with repetition of messages with periodicity at short time interval. It should be ensured that the warning reaches immediately to all people prone to the devastation.

1.6.2. Vigilant online monitoring

The time at which the cyclone, storm surge or Tsunami may reach the coast can be predicted with sufficient lead time. The destruction can be minimized if the coastal populations are warned and evacuated to elevated place and inland in time. Therefore, keeping vigil on the warning is the very important aspect in protecting the lives. Live contact should be kept with the organizations indicated above transmitting the instant warning on occurrence of cyclone, Tsunami and storm surge. A vigilant team must be created and they should be trained to understand the method of monitoring and the kind of emergency preparedness. The vigilant team must monitor the warning systems around the clock. The training should be given periodically to update the system and methods of warning. The team should take the responsibility of giving immediate warning to the people in and around the plant in case of disaster warning and they have to undertake the Emergency Preparedness Action. Safety drills should be conducted periodically.

Operational and emergency preparedness procedures should be planned meticulously in order to act on the warning and to disseminate it rapidly and effectively to the public.

1.6.3. Emergency Evacuation

Evacuation of people from risk areas is the first priority when early warning is received or the natural warning sign indicates the immediate arrival of cyclone, Tsunami wave or rise of storm surge.

Evacuation plan describes the time span available before and during the Tsunami or storm surge event. When facing local threat, evacuation procedures most possibly will have the character of a 'runaway effort' and people should not expect to receive much institutional support. The primary objective should be bringing as many people as possible out of the reach of the wave' s impact to safe or 'relatively safe' areas. Therefore, necessary steps have to be taken in advance to enable and support the community at risk to protect themselves at any time.

1.6.4. Escape routes

The availability of safety zones that can be used as evacuation sites within walking distance must be inspected. People can be evacuated to higher grounds over ten metres in elevation or the deep inland (>1 km) away from coastal inundation area. Good elevated roads should be laid along the escape route to safe places which can be waded even during flooding.

1.6.5. Emergency alarm

An emergency alarm /siren should be in place at the plant. In case of emergency when warning is given, the alarm at the plant can be instantly activated and the vigilant team including the emergency response team can immediately start the evacuation and rescue operation. All the workers also should be advised to vacate and move to the designated safe places.