Kerala Industrial Infrastructure Development Corporation (KINFRA)

Petrochemical Park, Kochi, Kerala

Risk Assessment Report

Area- 489.46 Acres
Project Category- 7C A
File No.- 21-330/2017-IA.II
Proposal No. IA/MP/NCP/67681/2017

Village- Puthencruz, Taluk- Kunnathunadu &
Village Thiruvankulam, Taluk- Kanayannur,
District- Ernakulam, Kerala
Monitoring Period- March – May 2018

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Submitted by

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1 RISK ASSESSMENT STUDY

1.1 Risk Assessment & Emergency Preparedness Plan

Industrial accidents results in great personal and financial loss. Managing this accidental risk in today's environment is the concern of every industry including IEs, because either real or perceived incidents can quickly jeopardize the financial viability of a business. Many facilities involve various manufacturing processes that have the potential for accidents which may be catastrophic to the plant, work force and environment or public.

A state of "Emergency" is defined as any event that disrupts normal operations or poses a serious threat to persons or property, requires a quick or immediate response and may require support beyond the abilities of the company. Generally good design, regular inspection and preventive maintenance of the equipment(s) reduce the probability of occurrence of emergencies. However, as it is not possible to totally eliminate such eventualities and random failures of equipment or human errors, omissions and unsafe acts.

It must be realized that any incident may develop into a major emergency even with the best safety measures and programmes in any industry. Hence an emergency preparedness should be planned properly and documented for ease of implementation at the time of need without losing time and avoiding chaos and confusion etc. at the hour of the need by assigning specific responsibilities to persons, who will render services in meeting emergency smoothly and effectively.

Different types of industries proposed in Petrochemical Park, Kerala are as below –

a) Petrochemical intermediates
b) Speciality chemicals
c) Drugs & pharmaceuticals
d) Ancillary and allied industries

Details of the feedstock chemicals and end products are sited in chapter 2.

Other than above mentioned industries if any other industry will be going to propose which will come in Schedule A according to EIA notification 2006, in that case they will be taken the separate Environment Clearance from the authority.

Present Risk Assessment and Emergency Preparedness Plan is based upon above industries only, however in case of other industries, same studies should be carried out as part of EIA study.

1.1.1 Scope

An important element of mitigation is emergency planning, i.e. recognizing that accidents are possible, assessing the consequences of such accidents and deciding on the emergency procedures, both on-site and offsite, that would need to be implemented in the event of an emergency -

- To prevent or minimize damage of property or the environment.
- To render help to the person at site to provide him relief.
- To restore the affected area as soon as possible.
- To review incident to evaluate and strengthen the emergency

1.1.2 Objective

The objectives of DMP is to describe the company's emergency preparedness, the resource availability and response actions applicable to deal with various types of emergencies that could occur at the mines with organization structure being deployed in shortest time possible during the emergency.

a) Regular review and updating of DMP.

b) Protect training of the concerned personnel.

Minimizing the effects may include rescue, first aid, evacuation, rehabilitation and giving information promptly to people living nearby and scrutinized information's to media.

1.1.3 Identification of Hazards

The following types of Hazards are identified at the Project Site

- Fire Hazard;
- Chemical Hazard
- LPG/ Natural Gas/ Hazardous Gas leakage;
- High Tide

1.1.4 On-Site Emergency Planning

A. *Response team:*

It is important to setup an Emergency Organization. A senior executive who has control over the affairs of the plant would be heading the Emergency Organization. He would be designated at Site Controller. Manager (Safety) would be designated as the Incident Controller. In the case of stores, utilities, open areas, which are not under the control of the Production Heads, Senior Executive responsible for maintenance of utilities would be designated as Incident Controller.

All the Incident Controllers would be reporting to the Site Controller.

Each Incident Controller organizes a team responsible for controlling the incidence with the personnel under his control. Shift In-charge would be the reporting officer, who would bring the incidence to the notice of the Incidence Controller and Site Controller.

Emergency Coordinators would be appointed who would undertake the responsibilities like firefighting, rescue, rehabilitation, transport and provide essential and support services. For this purposes, Security In-charge, Personnel Department, Essential services personnel would be engaged. All these personnel would be designated as Key personnel.

In each shift, electrical supervisor, electrical fitters, pump house in-charge, and other maintenance staff would be drafted for emergency operations. In the event of power or communication system failure, some of staff members in the office/facility would be drafted and their services would be utilized as messengers for quick passing of communications. All these personnel would be declared as essential personnel.

B. *Responsibility*

The responsibilities of the key personnel should be defined for the following:

i) Site controller
ii) Incident controller
iii) Emergency coordinator - rescue, fire fighting
iv) Emergency coordinator-medical, mutual aid, rehabilitation, transport and communication
v) Emergency coordinator - essential services
vi) Employers responsibility

Effective emergency plans require that, in the event of an accident, nominated individuals be given specific responsibilities, often separate from their day-to-day activities. The two principal people are the site incident controller and the site main controller.

The site incident controller will take control of handling the incident. He or she will often be the person in charge of mine at the time of the incident and should provide 24-hour cover when shift operation applies. The site incident controller will have to take decisions involving neighbouring area perhaps, to be involved in an escalating emergency if it is not shut down.

The responsibilities of the site incident controller include the following:

a) To assess the scale of the incident (both for internal and external emergency services);

b) To initiate the emergency procedures to secure the safety of employees, minimize damage to plant and property and minimize loss of material;

c) To direct rescue and fire-fighting operations until (if necessary) the fire brigade arrives;

d) To search for casualties;

e) To arrange evacuation of non-essential workers to assembly areas;

f) To set up a communications point with the emergency control centre;

g) To assume the responsibilities of the site main controller pending his or her arrival;

h) To provide advice and information as requested to the emergency services.

i) The site main controller will be chosen from the senior management of the works with general responsibility of directing operations from the emergency control centre after relieving the site incident controller of the responsibility for overall control.

j) The specific responsibilities of the site main controller include;

k) To decide (if not decided already) whether a major emergency exists or is likely, requiring the emergency services and the off-site emergency plan;

l) To exercise direct operational control of the mines outside the affected area;

m) Continually to review and assess possible developments to determine the most probable course of events;

n) To assess the shutting down of all operation and then evacuation, in consultation with the site incident controller and key personnel;

o) To ensure that casualties are receiving adequate attention;

p) To liaise with Chief Officers of the fire and Police services and with the Mines Safety Directorate and district authorities.

q) To control traffic movement within the project area.

r) To arrange for a log of the emergency to be maintained;

s) To issue authorized statements to the news media;

t) To control rehabilitation of affected areas after the emergency.

u) Apart from the two site controllers, other works personnel will have key roles to play in the implementation of the emergency plan. These will include senior management of project not directly involved in the emergency, first aid, atmospheric monitoring staff, casualty reception

staff and public relations staff to liaise with the media. All need to be aware at the emergency pre-planning stage of the precise nature of their roles.

1.1.5 Emergency facilities

Emergency Control Centre – with access to important personnel, telephone, fax, telex facility, safe contained breathing apparatus, hand tools, emergency shutdown procedures, duties and contact details of key personnel and government agencies, emergency equipment, etc.

i) Assembly Point – with minimum facilities for safety and rescue

ii) Emergency Power Supply – connected with diesel generator, flameproof emergency lamps, etc.

iii) Fire Fighting Facilities – first aid firefighting equipment, fire alarms, etc.

iv) Location of wind Stock – located at appropriate location to indicate the direction of wind for emergency escape

v) Emergency Medical Facilities – Stretchers, gas masks, general first aid, emergency control room, breathing apparatus, other emergency medical equipment, ambulance

1.1.6 On-Site Emergency Response

A. *Code of Practice in Case of Fire*

Source of Fire

- Hazardous and flammable storage area
- Oil & Lubricant storage area
- Diesel Pump/storage area
- Due to leakage of LPG

Line of Action

Any person notices any sign of fire shall start shouting FIRE, FIRE (Aag, Aag) to seek assistance and also immediately take steps to give warning by blowing the siren continuously and take steps to extinguish the fire by using appliances available near the site.

i) Duties of Safety Officer

The Safety officer receiving the warning shall forthwith inform following on Phone.

- Firefighting station – for sending fire-fighting team
- Security main gate – to inform senior person and to prevent unauthorized entry

- Security Personnel – to manage with available resources till then

ii) Instructions for employees

- Get out of the buildings/ factory as quickly and as safely as possible.
- Use the stairs to escape. When evacuating, stay low to the ground.
- If possible, cover mouth with a cloth to avoid inhaling smoke and gases.
- Close doors in each room (after escaping) to delay the spread of the fire.
- Do not use elevators to evacuate, use stairs. Be patient, do not panic or push.

If in a room/work area with a closed door, please follow the instructions as mentioned below:

- If smoke is pouring in around the bottom of the door or if it feels hot, keep the door closed.
- Partially open a window to escape or for fresh air while awaiting rescue and stand near it.
- If there is no smoke at the bottom or top and the door is not hot, then open the door slowly.
- If there is too much smoke or fire in the hall, slam the door shut.
- Pack the space under the door with wet clothing or other material to keep the smoke out.
- Let someone know you are trapped. Call Security and stay on the line until he tells you to hang up. If there are no phones available, yell out the window (if you have one), kick on the door, do anything to make noise and draw attention to yourself. Hang a sheet, jacket or other article out of the window to signal your location.
- Stay low to the floor as the smoke will fill higher areas first.
- Do not attempt to jump from windows above the ground level as this can cause serious injury or death.
- If you are physically unable to evacuate, proceed to a safe place and inform Security of your location.
- You may assist a disabled but mobile individual in an evacuation. However, attempts to carry immobilized individuals are discouraged. Once the location of the disabled individual is received, trained and equipped emergency personnel will evacuate the individual depending upon the site of the fire and the potential hazard.

- All personnel should know where primary and alternate exits are located, and be familiar with the various evacuation routes available. Floor plans with escape routes, alternate escape routes, exit locations and designated assembly points shall be displayed.
- Stay out of damaged buildings.
- Check that all wiring and utilities are safe.

B. *LPG/ Natural Gas/ Hazardous Gas Leakage*

Line of Action

i) Response Procedures for employees

- The affected area should be evacuated and cordoned off immediately
- Intimate the Emergency Response Team about LPG/Natural Gas leakage.
- Shut down the main valves in the gas pipeline.
- Ensure that only concerned personnel are present in the affected area and all other employees are moved to the nearest assembly points.
- Rescue trapped personnel. Also, check if any personnel are unconscious in the area and immediately move them outside and provide first aid.
- Ambulance should be summoned to take injured personnel to the nearest hospital.
- Personnel in the nearby buildings shall be asked to close all doors and windows to prevent entry of the leaked gas.
- Source of leakage shall be traced and isolated from all other areas. If required, pedestal fans shall be used to bring down the gas concentration.

ii) Duties of Safety Officer

- Rush to the spot and supervise safe removal of affected person, if any.
- Inform to senior officials and statutory bodies
- Inform Hospital on Phone No. for ambulance, if required.

iii) Damage Control

No attempts are to be made at damage control that involves any degree of risk to life and health of facilities personnel. The following actions can be undertaken by the employees to reduce damage potential to the property:

- Shut off gas mains
- Shut off water mains
- Disconnect mains power supply if the isolating devices for these utilities are outside the building

1.1.7 Risk Hazard And Its Control Measures

It is attempted to plan and construct the project facilities following all safety norms. However, it is not always possible to eliminate such eventualities and random failures of equipment or human errors. An essential part of major hazard control has therefore, to be concerned with mitigating the effects of such emergency and restoration of normalcy at the earliest. A detailed table showing activities during construction and operation phase along with mitigation measures are given in **Table 7.1**

Table 1.1: Activities during Construction and Operation Phase along with Mitigation Measures

HAZARDS ASSOCIATED WITH ACTIVITIES (During Construction & Operation)	CONTROL/MITIGATION MEASURES
Manual Handling - Strains and sprains due to incorrect lifting - too heavy loads -twisting - bending - repetitive movement - body vibration.	- Exercise/warm up - get help when needed - control loads - rest breaks/no exhaustion - no rapid movement /twisting/ bending / repetitive movement - good housekeeping.
Falls - Slips - Trips - Falls on same level - falls to surfaces below - poor housekeeping - slippery surfaces - uneven surfaces - poor access to work areas climbing on and off plant - unloading materials into excavations wind - falling objects.	- Good Housekeeping - tidy workplace - guardrails, handholds, harnesses, hole cover, hoarding, no slippery floors/trip hazards - clear/ safe access to work areas - egress from work areas - dust/water controlled - PPE.
Fire - Flammable liquids/Gases like LPG, Diesel Storage area and combustible building materials - poor housekeeping - grinding sparks - Open flames, absence of Fire hydrant network.	- Combustible/flammable materials properly stored/used - good housekeeping - fire extinguishers made available & Fire hydrant Network with reserve Fire water (As per NFPA Code) - Emergency Plan in case of Fire or collapse of structure.
Absence of Personal Protective Equipment - Lack of adequate footwear - head protection	- Head/face - footwear

HAZARDS ASSOCIATED WITH ACTIVITIES (During Construction & Operation)	CONTROL/MITIGATION MEASURES
- hearing/eye protection - respiratory protection - gloves -goggles.	- hearing/eye - skin - respiratory protection provided - training - maintenance
Defective or wrong Hand Tools - Wrong tool - defective tool - struck by flying debris - caught in or on - missing guards	 - Right tool for the job - proper use of tools - good condition/ maintenance guards - isolation/ proper demarcation of work space - eye/face protection - flying debris controlled
Electricity - Electrocution - overhead/underground services - any leads damaged or poorly insulated - temporary repairs -no testing and tagging - circuits overloaded - Nonuse of protective devices.	 - Leads good condition and earthed - no temporary repairs - no exposed wires - good insulation - no overloading - use of protective devices - testing and tagging - no overhead/ underground services
Scaffolding -Poor foundation -lack of ladder access insufficient planking -lack of guardrails and toe boards -insufficient ties or other means -all scaffolds incorrectly braced or stabilized to prevent overturning.	 - All scaffolds correctly braced and stabilized - 3:1 height to base ratio - firm foundation, plumb and level - ladder access provided and used - proper platform (3 planks/675 mm) - planks secured - guardrails and toe boards - 900mm to 1100mm high, within 200mm of working face, mid-rail.
Ladders - Carrying loads - not secured against dislodgement - defective ladders - not sufficient length - wrong positions - incorrectly placed (angles, in access ways, vehicle movements.	 - Secured against movement or footed - ladders in good condition - regularly inspected - extend 1m above platform - 4:1 angle - out of access ways, vehicle movements - not carrying loads - 3 points of contact - no higher than 3rd step down - use for access only, not working platforms

HAZARDS ASSOCIATED WITH ACTIVITIES (During Construction & Operation)	CONTROL/MITIGATION MEASURES
Excavations - Trench collapse - material falling in undetected underground services - falls - hazardous atmosphere struck by traffic and mobile plant.	- Soil stability known - no water accumulation - existing services known - material 600mm from edge - clear of suspended loads - hardhats/PPE - ladders - public protection – atmospheric testing - traffic controls - Emergency Plan.
Gas Cutting and Welding - Fire - welding flash, burns, fumes, electrocution in wet conditions - flashback in oxygen set, leaking cylinders, acetylene cylinders lying down - poorly maintained leads.	- Welding flash and burns controlled with PPE and shields - fumes controlled with ventilation and PPE (in good condition and properly positioned),Gas cylinders be kept upright & secured position (properly tied) - combustible materials to be kept at secured place to avoid fire & Fire Extinguishers to be kept in fire prone area with training to people for its use.
Noise - Unknown noise levels - known noise levels over 85 decibels	- Levels below 85 decibels - proper protection.
Falling Material - Fall during carrying/Lifting materials- dislodged tools and materials from overhead work areas.	- Materials to be secured - kept away from edge - toe boards - Use of hard hats.
Craneage & Lifts - Display of carrying capacity i.e. load (No. Of person), incorrectly slung, defective lifting equipment, unsecured loads, craning in close proximity to building people and plant - falls - falling materials.	- Periodic testing by competent authority - correctly slung/secured loads, lifting equipment good condition - use of proper hand signals - falls while unloading controlled.
Visitors Presence at site - Falls - struck by dropped materials - road accidents - insufficient hoarding or fencing - pedestrian access past site - mechanical plant movement on and off site.	- Sufficient hoarding - fencing and barricades - safe pedestrian access past site traffic management for loading and delivery - construction separated from occupied areas of projects.