

COPE REPORT
COCHIN PORT TRUST (CPT)

COCHIN PORT TRUST
WILLINGTON ISLAND, COCHIN, KERALA

PREPARED BY: SHUBHAM GUPTA
DATE: 6TH DEC 2019

CONTENTS

Purpose and Scope	3
Construction	5
Occupancy and Process	7
Combustibles & Hazardous Materials	11
Storage Configuration:	12
Utilities/Infrastructure	13
Transformer Details (Oil Type)	13
Fuels/Energy Supplies	13
Other Site Services	13
Fire Protection	14
Site Protection.....	14
Fire Protections Means	14
Sprinkler Systems Location & Demands.....	15
Water Supply Details:.....	15
Site Characteristics and Exposures	17
Management Programs	20
Risk Observations and Comments	23
Loss Estimates	24
Security	29
Loss History	31

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	1
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

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<i>PREMISES</i>	<i>COPE_CPT_COCHIN</i>	<i>FILE NO.</i>	<i>COPE_CPT_COCHIN_PRC0057689</i>
<i>DATE VISITED</i>	<i>21-JUN-19</i>	<i>REPORT DATE</i>	<i>6-DEC-19</i>

1

Purpose and Scope

Purpose

The purpose of this report is to inform existing and/or prospective insurance markets of physical conditions at Cochin Port Trust, Kerela. This report is based upon conditions and practices observed and information made available to Marsh Risk Consulting at the time of our survey and do not purport to refer to or guarantee compliance with local, state or federal regulations which may be applicable to such practice and conditions.

Scope

This survey was carried out at Cochin Port Trust (CPT) from 20th June to 21st June 2019, and involved a review of building construction, operations, fire protection systems, and fire protection features excluding life safety. The review is in line with international industrial standards such as NFPA and FM Global standards. The report relates to the following perils:

- Fire
- Equipment breakdown
- Natural Hazards

This survey also included a review of administrative controls such as Crane testing & maintenance, electrical systems testing & maintenance, natural hazard emergency response plans, hot work control, self-inspection survey, fire emergency planning, testing & maintenance of fire protection systems and impairments to these systems, etc., No tests such as fire pump test or hydrant loop tests were witnessed or performed.

The basis for the evaluation is interviews conducted with:

Sl.No.	Name	Designation	Departments
1	Smt. C. Premakumari	Secretary	General Administration
2	Sri. M.C. Jayandhan	Deputy Secretary	
3	Shri. B. Bhagyanath	FA & CAO	Finance
4	Smt. Rajasree. K. Dabke	Sr. Dy. Chief Accounts Officer	
5	Smt. M.P. Sreedevi	Sr. Accounts Officer	
6	Shri Goutam Gupta	Traffic Manager	Traffic
7	Sri. P.Raj Vinod		
8	Shri G.Vaidyanathan	Chief Engineer	Civil Engineering
9	Sri. K.Joji Paul	Supdt. Engineer (CP)	
10	Smt.C.S.Rekha.	Exe. Engineer (CM-1)	
11	Sri. K.V. Bhagavath Sing	Sr. Dy. Materials Manager (i/c)	Mechanical Engineering
12	Sri. V.A.Sajeev	Exe. Engineer (M)	
13	Sri. M.M. Abdul Rahim	Exe. Engineer (Ele.)	
14	Dr. Roy Thomas	Chief Medical Officer	Medical
15	Capt. Joseph J Alapat	Deputy Conservator	Marine

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19

The visit comprised an inspection of the following areas/structures at the Cochin Port Trust:

- Vessel Traffic Management System Room (VTMS)
- Central Fire Station
- Mattancherry Wharf (Q 4 Berth)
- COT (Cochin Oil Terminal)
- Vypeen Tug (Floatila/Floating Raft)
- Neelam Shatabdi (Dredger)
- Heavy Duty Reach Stacker
- Tyre Mounted Mobile Harbour Crane
- Container Freight Station

The container terminals and outdoor liquid tank farm area operated by authorities other than CPT and hence same were not visited as access to same was restricted.

<i>PREMISES</i>	<i>COPE_CPT_COCHIN</i>	<i>FILE NO.</i>	<i>COPE_CPT_COCHIN_PRC0057689</i>
<i>DATE VISITED</i>	<i>21-JUN-19</i>	<i>REPORT DATE</i>	<i>6-DEC-19</i>

APPENDIX A

Construction

Type	Percentage	Comments
Combustible	Nil	None.
Non-combustible	100%	Reinforced concrete foundation supporting cement plastered brick panel walls with concrete roofing – typical structure at port site. The auto garage, spares storage block and workshop have metal sheet roof and wall cladding (above the plastered brick panel walls).
Un-confirmed	0%	None

Construction Description

All the blocks at port site are of non-combustible construction and as described above.

There are no MFL walls/or effective partitions within buildings. The plastered brick panel wall external walls/internal partitions for the buildings can offer two hours of fire rating.

Diesel day tanks for the emergency generator and diesel engine fire pump are not provided with any secondary containment which is not satisfactory.

Compartmentalization and Fire Divisions

CPT has two major Wharfs – (Mattencharyy and Ernakulam) which are located on two shores of the Wellington Island. Fire in one Warf is not expected to spread to the other Wharf.

All the Berths are separated from each other by more than 400 m. Fire in one berth is not expected to spread to the other berth.

Flooded lead acid battery banks in EHT (Extra High Tension) substation are segregated from the rest of the electrical rooms by two hour fire rated construction (230 mm plastered brick panel walls) which is satisfactory.

Cable penetrations were observed through concrete floors at the electrical distribution building which is not satisfactory.

10 MVA power transformers in 110 KV EHT substations are segregated from the main electrical distribution building by 15 m and separated from each other by 15m distance which is considered satisfactory.

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19

Construction Summary

Bldg./Area Reference	Area (sq. ft.)	Structure	Roof	Partition Interior / Exterior Walls	Comb Non-Comb /	Construct ion / Renovati on Year	Remarks
Old Administrative Block (Clock Tower)	25,520 Sq.ft. (approx.)	Heavy Non-Combustible	Non-combustible Protected	Plastered Brick Panel Wall	NC	N.A.	
New Administrative Block	57,320 Sq.ft. (Approx.)	Heavy Non-Combustible	Non-combustible Protected	Plastered Brick Panel Wall	NC	N.A.	
Q4 Berth	NA (No building on Berth except a fire pump house)	Heavy Non-Combustible	Non-combustible Unprotected	Plastered Brick Panel Wall	NC	N.A.	
COT Terminal (Only utilities building)	5,000 sq. ft	Heavy Non-Combustible	Non-combustible Unprotected	Plastered Brick Panel Wall	NC	N.A.	
CFS (Container Freight Station)	1,04,000 Sq. Ft. (Approx.)	Heavy Non-Combustible	Non-combustible Unprotected	Plastered Brick Panel Wall	NC	N.A.	

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	6
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

APPENDIX B

Occupancy and Process

The main inward shipping channel of the port divides in to the Ernakulam and Mattancherry channels .The Ernakulum Channel is 4.90 Km long, with the width varying from 250 to 500 m and has a draft of 12.5 m up to the Oil Terminal and Q8 / Q9 and a draft of 9.14 m up to the wharves and the north and south tanker berths.. The 1024 m long Ernakulam Wharf has six alongside berths, five for general cargo and a fertilizer berth. Besides there are three oil berths in the Ernakulum channel. The Mattancherry channel is 4.08 Km long, with the width varying from 180 to 250 m and a draft of 9.14 m except at Boat Train Pier where the draft is 10.0 m. On the Mattancherry Channel there are four alongside berths, for general cargo, one Boat Train Pier and two jetties for miscellaneous cargo. The details of the berths (including SPM) are shown below:

BERTH / MOORING	Maximum Length overall (m)	Maximum Draft (m)	Products Handled
SPM	370	22.50	Crude
COT	250	12.50	Crude / POL
NTB	213	9.14	POL
STB	170	9.14	POL
ERNAKULAM WHARF (Q5 - Q6)	250	10.00	Dry Cargo / CBFS
ERNAKULAM WHARF (Q7)	250	10.50	Dry Cargo
ERNAKULAM WHARF(Q8 - Q9)	250	11.00	Dry Cargo
FERTILIZER BERTH (Q 10)	207	10.70	Fertilisers / Phos. Acid
SCB	170	9.14	Liquid Bulk
NCB	170	9.14	Dry /Liquid Bulk
B.T.P	190	10.00	Dry /Liquid Bulk
MATTANCHERRY WHARF (Q1)	180	9.14	Dry Bulk
MATTANCHERRY WHARF (Q2 & Q3) COASTAL BERTH	180	9.14	Dry Bulk
MATTANCHERRY WHARF (Q4)	180	9.14	Liquid Bulk
ICTT VALARPPADAM (V2-V3)	335	14.5	Containers
LNG PUTHUVYPIN	320	12.5	LNG

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19

Cochin Port Trust has multiple transit and storage shed in each channels in addition to CFS (Container Freight Station Shed). Details of various sheds at CPT are detailed below:

COVERED AREA (Transit Sheds and Overflow sheds)		
Location	Total Sheds	Area (Sq.m)
Mattanchery Wharf	6	19160
Ernakulam Wharf	4	13200
Container Freight Station	1	10000
Grand Total	11	42360

COVERED AREA (Warehouses)		
Location	Total Sheds	Area (Sq.m)
Mattanchery Wharf	4	11800
Ernakulam Wharf	1	2980
Cement Godown	1	1000
BTP	1	6000
Grand Total	7	21780

There is one container terminal (ICTT) which is operated by a third party and is not in jurisdiction of CPT. All the container handling have been moved from CPT to ICTT.

CPT works as a service provider for clients for loading and unloading of the cargo (Dry and liquid). All the oil tanks where liquid are stored are in jurisdiction of individual client and is not under jurisdiction of CPT.

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19

Key Features/Processes

Specifics for key machinery and key processes at the site are as follows:

Manufacturing Process and Equipment	<p>Mobile Harbour Crane (Tyre Mounted) 1 Nos. 40 tonnes at 9.5 m reach.</p> <p>Heavy Duty Ranch Stacker (HDRS) 2 HDRS of 45 tonne capacity. One was purchased in 2011 while other in 2016.</p> <p>Other Support Equipment</p> <ul style="list-style-type: none"> • Other support loading equipment such as Forklifts, Tractor, Trailors, Pay-loaders of various capacities. • Private handling, equipment like Top litters, pay-loaders, Forklifts, Heavy-duty Trailors etc. available on hire.
Materials Handling and Logistics	At the heart of the cargo handling activities at the port site are the mobile harbor cranes, HDRS and other handling equipment.

Equipment Hazards

No wharf or Quay cranes are installed on any of the Berths of CPT. Only one mobile harbor crane is set up at the Ernakulam Wharf of berth no. Q-10. This crane was procured in 2012 and is a tyre mounted crane. Safety interlocks on the cranes includes:

- Limit switches for load positions
- Dead man switch
- Emergency push buttons
- Winch brakes
- Slewing brakes
- Load limiters
- Winch drum roper rotation protection

All the limit switches for the cranes are tested on a biweekly basis with the help of check lists. Other safety interlocks, equipment protection devices, indications and drive movement are tested with the aid of a comprehensive check list on a quarterly and annually basis (e.g. wind velocity monitoring device is checked with the aid of blowers). All the checklist are driven from OEM recommendations.

The mechanical and electrical checks for the cranes are in accordance with the OEM's recommendation. All mandatory spares for the cranes are kept at site (e.g. motor with shaft and gear box – complete spare).

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	9
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

Statutory tests like comprehensive visual inspections are carried out on an annual basis. Structural Stability test is carried out once in five years (load testing and calibration). As informed at site there are no abnormalities from the above tests.

Life Extension and Non-Destructive Examination: Both HDRS and mobile harbor cranes are new (procured less than 10 years). Normal life of these materials handling equipment as informed by client is 20 years. Hence, life extension studies are not applicable.

Hydraulic Spray Fire Hazard for Cranes: Mobile harbor cranes are provided with on-board hydraulic power packs supplying to various hydraulic controls. Capacity of individual oil tank was informed to be of 1,500 litres. The hydraulic controls expose the cranes to a hydraulic spray fire hazard. No automatic fire protection and containment is being provided for the hydraulic oil mechanism and storage. Automatic shut off mechanism for the hydraulic fluid transfer pumps have not been provided.

Control Systems: The control system for the cranes is of Programmable Logic Controllers (PLC) and drive motor control is through variable frequency drives (VFD). Remote monitoring is provided for the cranes from the individual control cabinets.

Data Processing and Control Systems

Specific information about the electronic data processing and control systems in use at the site are as follows:

Equipment Type	Purpose & Importance	Back-up Procedures
Server Room	Legacy System for port administration	Physical backup in hard drive
Server Room	Port Operations data storage and processing server	Physical backup in hard drive plus remote back up in VTC.
Vessel Traffic Navigation Room	Data storage and processing server for all vessel navigation at port	Physical backup in hard drive

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	10
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

Combustibles & Hazardous Materials

Storage of Combustible Materials

The extent, type, and location of significant combustible material storage are summarized as follows:

Warehousing	COVERED AREA (Transit Sheds and Overflow sheds)		
	Location	Total Sheds	Area (Sq.m)
	Mattanchery Wharf	6	19160
	Ernakulam Wharf	4	13200
	Container Freight Station	1	10000
	Grand Total	11	42360
	COVERED AREA (Warehouses)		
	Location	Total Sheds	Area (Sq.m)
	Mattanchery Wharf	4	11800
	Ernakulam Wharf	1	2980
	Cement Godown	1	1000
	BTP	1	6000
	Grand Total	7	21780
		<p>Considering time limitation, only CFS was visited as same comprises of the maximum SI values as informed by client. Major construction at the CFS is of non-combustible with metal sheet roof. CFS is not provided with hydrant/sprinkler protection system. No detection system is installed in the CFS warehouse.</p> <p>Battery charging station for forklifts were located outside the warehouse.</p> <p>CFS warehouse is operated from 9:00 am to 9:00 pm. Post this security and electrician ensures that all the electrical connections are switched off and warehouse is properly shut down.</p>	
External	Not informed		
Dust Handling Systems	None		
Others	None		

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	11
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

Storage Configuration:

Location	Method of Storage	Commodity/ Class	Array	Form	Storage Height (units)
CFS	Floor	Not fixed. At the time of visit majority of the material stored were spices	Open	NA	6m

Hazardous Materials

The extent, type, and location of flammable liquids and other hazardous materials are summarized as follows:

Material	Type	Configuration	Volume/Quantity	Containment
Lube Oil/Hydraulic Oil Drums	Class IIIB liquid	On side 230 liters metal drums.	Multiple Units	Not provided
Engine Oil	Class IIIB liquid	Above Ground Metal tanks less than 1 cu. m.	Multiple Units	Not provided
Diesel	Class II liquid	Above Ground Metal tanks	Multiple Units (in DG power house)	Not provided

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	12
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

Utilities/Infrastructure

Power

Primary Supply to Site	Public Utility	Site Feed	Dual
Incoming Voltage	110 KV	Distribution on Site	Radial
Back-up Power	<p>Emergency power is supplied by diesel generators located at respective downstream substation. Two 2.5 MVA diesel generators are also installed at the DG power house.</p> <p>Battery back is provided in every power distribution building for critical loads and for the UPS equipment in data server and information processing areas.</p>		

CPT also serves as electricity service providers for some of the major areas on the Wellington Island such as hospitals.

Transformer Details (Oil Type)

Name	Capacity (MVA)	Units	Voltage
Power Transformer	10 MVA	2	110KV/11KV
Distribution transformers	Details not available (Multiple units across the port)	Multiple transformers located at different downstream substations	11 KV/415 v

Fuels/Energy Supplies

Fuel Type	Source	Purpose	Reliability	Capacity (units)	Back-up Capabilities
Diesel	Multiple	Power generation – Back Up Emergency Generator	High	990 Liters - multiple units	Complete

Other Site Services

Service Type	Purpose	# of units	Areas served	Back-up Spare Capacity /
Air Compressor	Building/Area Space	Multiple Units	Partial	Complete

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	13
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

APPENDIX C

Fire Protection

Site Protection

Site protection overall is summarized as follows:

	Public	Private
Distance to Fire Department	5Km (Navy, Kerela Govt.)	Five fire tenders are provided in and around port area.
Fire Department Type	Full Time	In-house fire tenders
Response Time (minutes)	10 minutes	Immediate
# of Hydrants Available	Not Available	The entire port site is provided with fire hydrant supply fed from the sea water intake through vertical turbine fire pumps
Hydrants Supply Type	Not Applicable	Pumped-off Private supply

Mock drills are carried every 3 months by in-house fire brigade.

Fire Protections Means

Means	Type(s)	Buildings/Areas Protected
Detections & Alarms	None.	No Fire detection and alarm system have been provided a the site except in VTMS room.
Sprinklers, etc.	None.	Not Provided.
Manual Protection		Liquid cargo handling station and dry cargo handling areas have been provided with hydrant protection.
Special Protection	None	None

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	14
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

Sprinkler Systems Location & Demands

There is no active sprinkler protection for the site.

Water Supply Details:

Each berth is provided with individual fire pumps and fire hydrant system. Fire pump house for Q4 and COT (Cochin Oil Terminal) was visited.

Pump Details (Q4)

Electric Motor Driven Pump				
Pump Mfg.:	Not Available	Design Rating		
Pump Type:	Vertical Turbine Pumps	Flow (m3/hour):	Pressure (meters):	Speed (RPM):
Gear Ratio:	Not Available	410	105	Not Available
Supply Source:	Intake from Sea Water Source			
Driver Details				
Driver Mfg.:	Not Available	Horsepower (HP):	Speed (RPM):	Frequency (HZ):
Driver Type:	Electric			
		Not Available	Not Available	50 Hz
Controller Details				
Controller Mfg.:	Local	Controller Type:	Not Listed	Approved/Non
Pump Start Pressure (bar):	Manual	Pump Stop Pressure (bar):	Manual	
Jockey Start Pressure (bar):	Manual	Jockey Stop Pressure (bar):	Manual	
Diesel Engine Driven Pump				
Pump Mfg.:	Not Available	Design Rating		
Pump Type:	Vertical Turbine Pump	Flow (m3/hour):	Pressure (meters):	Speed (RPM):
Gear Ratio:	Not Available	410	105	1500
Supply Source:	Intake from Sea Water Source			
Driver Details				
Driver Mfg.:	Not Available	Horsepower (HP):	Speed (RPM):	Frequency (HZ):
Driver Type:	Diesel			
		425	1,500	Not Applicable

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	15
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

Electric Motor Driven Pump			
Controller Details			
Controller Mfg.:	Local	Controller Type:	Not Approved/Non Listed
Pump Start Pressure (bar):	Manual	Pump Stop Pressure (bar):	Manual
Jockey Start Pressure (bar):	Manual	Jockey Stop Pressure (bar):	Manual

Fire pumps in COT were under maintenance. Access to fire pump house was not proper to gather the information on pump details.

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19

APPENDIX D

Site Characteristics and Exposures



CPT (Admin Office)



CPT (Container Freight Station)



COT (Cochin Oil Terminal)



CPT - Q4

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19

Location

Latitude	9.954635
Longitude	70.213416
Elevation	3 m

Boundary Exposures (Willington Island)

North	Vallarpadam Island (Sea in between)
East	Mattancherry Channel
South	Ernakulam Channel
West	Sea routes

Exposures

Type	Rank	Comments
Hail	Zone 1: Low	Low Exposure
Tornado	Zone 1: Low	Low Exposure
Tropical Cyclone	Zone 0: 76 - 141 km/h	The site lies in the 41 m/s wind zone as per FM Global datasheet 1-28. Low Exposure.
Storm Surge	Zone 2 : High	Site is exposed to 500 year return period storm surge as per Nathan report.
River Flood	Zone 100 year return period	As per Nathan, site is exposed river flood hazard as same is located on Mattencherry and Ernakulam river channels. However, Berths at the beds are sufficiently high to prevent water entry from river channel. It was informed that site was not affected during the recent Kerala flood incident. Moreover, there are no equipment being used at the berths which can be affected during flooding. There are only material transfer pipelines which are mostly underground.
Flash Flood	No information	Low exposure
Coastal Flooding/Tsunami	No hazard	As per Nathan, site is not exposed to Tsunami. As the facility is a sea port and on the west coast of India, exposure to Tsunami cannot be ruled out. But site has not experienced any damages from Tsunami past.
Lightning	Zone 4 : 10 - 20	Moderate Exposure.
Earthquake	Zone 0 : MM V and below	The site lies in the 500 year return period earthquake zone as per FMDS 1-28. No Hazard.
Volcanic	No Hazard	No exposure
Wild Fire	No hazard	No exposure

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	18
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

* Hazard zoning using Munich Re Nathan v2011:

Earthquakes: Probable maximum intensity (MM: Modified Mercalli scale) with an exceedance probability of 10% in 50 years (equivalent to a “return period” of 475 years) for medium subsoil conditions.

Lightning: Global frequency of lightning strokes per km² and year

Tropical cyclones: Peak wind speeds: probable maximum intensity with an exceedance probability of 10% in 10 years (equivalent to a “return period” of 100 years)

Extratropical storms (Winterstorms): Peak wind speeds: see “Tropical Cyclones”. Areas were examined in which there is a high frequency of extratropical storms (approx. 30° - 70° north and south of the equator).

Type	Rank	Comments
Rain	Moderate Hazard	The 24 hours, 100 year rainfall is 320 mm.
Dust/Sandstorm	No Hazard	
Subsidence Holes	Sink No Hazard	
Snow/Ice	No Hazard	
Avalanche	No Hazard	

The legends for the above ranking have been elucidated in the NATHAN Risk assessment report attached.



PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	19
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

APPENDIX E

Management Programs

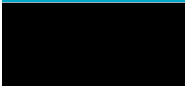

Our site visit, interviews and review of information provided leads us to the following maturity assessment of Management Programs in place to manage the risks at the location.

Program Category	Maturity	Comments
Equipment Maintenance	Embedded	The inspection, testing and maintenance for the cargo handling equipment is embedded with check lists derived from original equipment manufacturer's recommendation as well as years of experience accumulated by client in handling port operations. Magnetic Particle (MP) Test and Ultrasonic Test (UT) are carried out for the cranes along with periodical safety interlock and equipment protection devices simulation /testing. Further details about the equipment maintenance are enumerated in section below.
Electrical Maintenance	Formalized	The preventive maintenance schedules for electrical equipment at site are formalized. Thermography studies have not been done at site. The preventive maintenance schedules for oil filled transformers, circuit breakers, battery banks and emergency generators are established.
Weekly Self-inspections	Established	Self-inspection from a property loss prevention perspective is formalized by department wise checklists. No major deviations were observed during the survey.
Hot Work Permit	Formalized	Hot work control is formalized in accordance with Good Engineering Practices.

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	20
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

Program Category	Maturity	Comments
Contractor Management	Established	Monitoring of contractors is formalized at site and is observed to be adequate.
Emergency Response Procedures	Established	Emergency response plan for the port site for various exigencies including fire, natural hazards and external threats are established followed up with periodical mock up drills.
Pre-Planning with Local Fire Brigade	Established	The local fire brigade is periodically apprised of the port facility infrastructure and firefighting capabilities. Moreover, site has their own fire brigade capabilities which are well versed with the various areas and associated hazards for fire-fighting.
Fire Protection System Maintenance	Formalized	Inspection, testing and maintenance procedures for the fire pumps and manual firefighting aids are formalized at site.
Fire Protection Impairment Management	Undeveloped	An impairment management program in accordance with NFPA 25 is not formalized.
Valve Supervision	Undeveloped	Valve supervision program in accordance with NFPA 25 is not formalized.
Housekeeping	Established	Housekeeping at port site from a property loss prevention perspective is established. No major deviations were observed.
Smoking Control	Embedded	No smoking control is embedded at site.
Business Continuity Plan	Undeveloped	Business continuity plan was not developed at the site.

In assessing the maturity of the Management Programs the following maturity scale was applied:

Color Code	Maturity of Management Programs
	Unaware. No awareness or recognition of the risk issue or need for associated controls.
	Undeveloped. Informal actions with little or no systematic procedures.

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19

	Formalized.	Programs and procedures are established. Full familiarity is uncertain.
	Established.	Programs and procedures are communicated throughout the organization. Orientation is ongoing.
	Embedded.	Ownership is established at most or all organizational levels. Training and some exercises is conducted.
	Optimized.	Full ownership with active program maintenance, testing, exercising and continuous improvement.

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	22
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

APPENDIX F

Risk Observations and Comments

Site is benefitted with majorly non-combustible construction with RCC (Reinforced Concrete Cement) structure and brick masonry walls. Site is also equipped with individual hydrant system located for each berth with individual fire pump house.

Site has only one tyre mounted mobile harbor crane which is inspected, tested and maintained as per the OEM recommendation and is considered to be satisfactory. There is no rail mounted ship to shore/shore to ship cranes and hence hazard from equipment breakdown is considered to be low.

Fire in the CFS (Container Freight Station) warehouse is considered to be major risk at the site as the area is not provided with any of the fire detection and protection system. Providing adequately designed sprinkler system along with hydrant system will help in minimizing the risk of fire at the site. Further improving the inspection testing of already installed fire pumps will help in improving the reliability of existing system.

Site is not exposed to earthquake and windstorm risk. But, site has high exposure to Tsunami and Storm surges as it is located on the sea shore and as elucidated in Nathan risk report. Site has not experienced any past damage from Tsunami and storm surges at the site.

Site has developed good management program practices such as self-inspection programs, equipment maintenance, contractor management program etc. Improving on some of the management program such as fire pumps maintenance, hot work permit, valve supervision program etc. will help further managing the risk at the site.

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	23
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

APPENDIX G

Loss Estimates

This section covers the results of loss estimating based on the three day site evaluation carried out at Cochin Port Trust (CPT) from 15th to 17th March 2019. The results of these calculations are based on a scenario developed using site specific data collected during the evaluation.

The Loss Estimates presented here are believed to be reasonable, based on industry experience, events postulated, and information provided by the client. The calculation of Loss Expectancies is based on the review of building construction, operations, fire protection systems, and fire protection features at the time of our assessment. The estimates are further based on conditions observed at the time of the visit. By their nature, these estimates contain some element of subjectivity. Accordingly, the estimates cannot be taken as absolutes and could be exceeded due to changes in physical conditions on site, or the initiating event or escalation being more severe than anticipated within the boundaries of the estimate.

All damage and loss potential figures presented pertain exclusively to primary property damage, associated contents damage, and associated business interruption recovery time loss, caused directly by (fire or explosion) as defined in our Loss Estimate.

Values

Date Values	21-Jun-19	Currency	INR
Property Damage (P.D.) Values		Business Interruption (B.I.)	
Building	962,904,000		
Content and Equipment	2,003,273,805		
Stock	700,000,000		
Total Site P.D.	3,666,177,805	Total Site B.I.	Details Not Provided

These values are provided by the client unless otherwise specified. Unless stated differently the PD values are assumed to be Replacement Cost Values (RCV), and the financial numbers are deemed to be for a fiscal year.

The above property damage and business interruption site values are taken from the asset summary register provided at the site.

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	24
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

The Loss Estimates Definitions applied:

Level	Loss Estimate Definition and Elaboration
Level I	<p><u>Primary Protection Systems are functioning</u></p> <p>A loss event in which damage is based on the nature of hazards and construction factors, and where:</p> <ul style="list-style-type: none"> • All fire protection systems are in service and functioning as designed. • Full facility Emergency Response Team (fire brigade or Plant Emergency Organization) and Municipal Fire Department response expected. • Credit is given to all properly maintained fire barriers up to their design duration rating • Construction features function as designed. <p>Under normal circumstances, the total damage would be confined to a relatively small area. Where inadequate protection is provided or unusual factors (e.g. smoke damage, burning liquid runoff, etc.) exists, the loss expectancy may be greater and even approach Level II.</p>
Level II	<p><u>Primary Protection Systems not functioning</u></p> <p>A level II Loss Event is one which occurs when:</p> <ul style="list-style-type: none"> • The fire protection system protecting the area with the largest PD/BI potential is impaired or is rendered inoperative or ineffective due to the nature of the event. Adjacent fire protection systems are presumed operational unless rendered inoperative or ineffective due to structural failure. Same applies for the use of special extinguishing systems. • Credit can be given for adequate manual emergency response, defined as: <ul style="list-style-type: none"> • A responding organization that is trained to address the hazards of the facility being evaluated. • Can arrive on site within a reasonable time of being notified to be effective in reducing or limiting impact. • Has up to date preplans or emergency response plans for the facility. • Credit given to minimum adequately maintained (including fire doors and fire penetrations) 3 hour rated walls where the combustibles loading is light to ordinary, structural failure is not expected, and roof assembly is a listed or approved non-combustible. • Combustible roof construction (including combustibles or unknown metal deck assemblies) results in a contiguous structure loss. <p>Damage may be limited to the area where the impaired protection system is located and the nearby surroundings or may extend to the nearest adequate separation or properly designed and approved construction cutoffs, depending on site conditions. In some cases, the size of this loss could approach the value associated with a Level III type event.</p>
Level III	<p><u>No Protection Systems functioning; no manual fire fighting</u></p> <p>A level III Loss Event is one which occurs when:</p>

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	25
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

Level	Loss Estimate Definition and Elaboration
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- All fire protection systems throughout the entire site or facility are impaired.
- No credit is given for manual emergency response.
- Damage is limited only by adequate separation and/or free-standing 4-hours rated firewalls or equivalent. (Equivalencies must be well defined and proven.)
- Combustible roof construction (including combustible or unknown metal deck assemblies) results in a contiguous structure loss.

The size of this loss can approach the value of the buildings of origin or an entire facility, depending on site layout.

Level IV	<p><u>Catastrophic</u></p> <p>A catastrophic Loss Event has the potential to affect multiple plant areas or the entire facility. “Catastrophic” as used in this category refers to the initiating event, not the consequences due that event.</p> <p>Typical events falling into this category would be (including, but not limited to the following):</p> <ul style="list-style-type: none"> • Massive Releases of Hazardous Materials. • Massive Detonation of Explosives. • Natural Hazards (floods, tidal waves, hurricanes, seismic disturbances, tornadoes, etc.) • Falling Aircraft. • Terrorism, War Driven Events.
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PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	26
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

Level 2 and 3 Loss Estimate: Loss estimate for a fire starting at the CFS warehouse

Scenario	<p>Since there are no fire protection system (No hydrants, no sprinklers) provided at the site, level 2 and level 3 loss estimates are almost considered equivalent.</p> <p>Fire is expected to start at the CFS warehouse which is going to spread throughout the warehouse in absence of any fire rated partitions.</p> <p>Since the construction is Brick wall followed metal steel constructed walls and roof, 80% damage is considered to the structure.</p> <p>Equipment inside the warehouse consists of material handling equipment such as HPT, forklifts etc. Damage of 100% is considered to these equipment.</p> <p>100% damage is considered to the stock which includes food; beverages, spices etc. packed in plastic packing material and corrugated cardboards.</p> <p>All the other areas of the CPT are more than 100m away from the CFS warehouse. Fire is not expected to spread to these areas.</p>
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Property Damage Loss Estimate:

Description	Value of loss (INR)	% of Involved Value	% of Total Site Value (rounded off)
Building	38,516,160	80%	4%
Content and Equipment	102,663,690	100%	5%
Stocks & Spares	700,000,000	100%	100%
Property Loss	841,179,850	99%	23%

Total Property Loss INR 841,179,850

Business Interruption Loss Estimate: The above scenario is expected to result in 9 months of downtime for port operations (CFS only) as it will take at least 6 months to clean, repair/construct and revamp the operations at CFS warehouse.

	Duration Estimate	Duration Units
Recovery time	9	Months
Work-in-progress	Nil	Months

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	27
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

Make up capability	Nil	Months
Estimated downtime	9	Months
Total B.I Loss	Details not provided	

Loss estimate for a controlled fire starting at the CFS warehouse

Scenario	With automatic sprinkler protection and hydrant system provided in the CFS warehouse, fire can be controlled within the designed area of the sprinkler protection and limit the fire and smoke damage. With lesser property damage, business downtime is also expected to be short (typically not more than 2 weeks).
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Property Damage Loss Estimate:

Description	Value of loss (INR)	% of Involved Value	% of Total Site Value (rounded off)
Building	749,954	2%	0.1%
Content and Equipment	1,599,184	2%	0.1%
Stocks & Spares	10,903,846	2%	1.6%
Property Loss	13,252,985	2%	0.4%

Business Interruption Loss Estimate: The above scenario is expected to result in two week of downtime for port operations (CFS only) due to cleaning, investigation and revalidation.

	Duration Estimate	Duration Units
Recovery time	2	Week
Work-in-progress	Nil	Week
Make up capability	Nil	Week
Estimated downtime	2	Week
Total B.I Loss	Details not provided	

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	28
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

APPENDIX H

Security

Threat Target Risk

High Value	Yes	Unrest Labor	Yes
Terrorism Target	Yes	Protest Group	No
Unrest Civil	No	Neighborhood	No
Vulnerability Assessment	Not Evaluated		
Threat Target Risk Description	As the site is of national importance there is threat perception. However, no past histories were informed.		

Control Features

Site Perimeter			
Vehicle Access	Yes	Perimeter Fencing	Yes
Entry Provisions Posted	Yes	Fencing Height	5m (approx.)
No Trespassing Signs	Yes	Exterior Lighting	Yes

Building Physical Features			
Ground Level Windows Secure	Yes	Lock and Key Control	Yes

Security Staff / Guards			
On-site Guards	Yes	Recorded Rounds	Yes
Visiting Patrols	Yes	Rounds Frequency	Every Hour
Police Surveillance	Yes	CCTV	Yes

Intruder Detection		Access Management	
Motion Sensors	No	Access Monitored	Yes
Beams	Yes	ID Cards/Badges	Yes
Door Contacts	No	Visitors Monitored	Yes

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	29
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

Other Security Programs/Controls			
Emergency Response	Yes	Bomb Threat	Yes
Employee Screening	Yes	Cash Management	Not Evaluated
Safe/Vaults	Not Evaluated	Parking	Yes
Mobile Equipment Storage	Yes		

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689	30
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19	

APPENDIX I

Loss History

No losses were informed at the site in past 10 years.

PREMISES	COPE_CPT_COCHIN	FILE NO.	COPE_CPT_COCHIN_PRC0057689
DATE VISITED	21-JUN-19	REPORT DATE	6-DEC-19

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